DOT-250005

Project Manual for the Construction of
FACD08 Restrooms at Preble Truck Parking Facility
New Paris, Ohio
Preble County

I-70 WB @ MM 01
New Paris, Ohio 45347
United States

Prepared For:

Ohio Department of Transportation

ODOT Division of Statewide Facilities

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Issued for Bid

February 12, 2026

PROCUREMENT AND CONTRACTING REQUIREMENTS GROUP

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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

Electronic bids will be received by:

Ohio Department of Transportation (ODOT)
https://bidexpress.com

for the following Project:

Project DOT-250005
FACD08 Restrooms at Preble Truck Parking
Ohio Department of Transportation (ODOT)
I-70 WB @ MM 01, New Paris, Ohio 45347
Preble County

in accordance with the Contract Documents prepared by:

Star Consultants, Inc.
1910 Crown Park Court
Columbus, Ohio 43235
PH: (614) 538-8445
FAX: (614) 538-8446
Ali Alghothani
ali@starconsultants.org

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.

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.

The Bidder must indicate on the electronic Bid Form, in the spaces provided or by attachment, the locations where its services will be performed, in accordance with the requirements of Executive Order 2019-12D related to providing services only within the United States. The Bidder must also affirm its compliance with 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 Substance Use Prevention and Recovery (SUPR) Program 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 SUPR criteria described in **Section 1.6** of the **General Conditions**.

Electronic bids will be received for:

Trade	Estimate
General Contract	**$3,899,201.00**

until **March 13, 2026**, at **1:00 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 **February 24, 2026**, at **10:00 a.m.** until approximately **11:00 a.m.**, at the following location: **Virtual Pre-bid Meeting**

https://teams.microsoft.com/meet/25407810085294?p=IlckcXjvHohrnn8BQm
Meeting ID: 254 078 100 852 94
Passcode: yt3Hp9R5

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

Public Bid Advertisement (Electronic Bidding)
State of Ohio Standard Forms and Documents

DOT-250005
FACD08 Restrooms at Preble Truck Parking Facility
I-70 WB @ MM 01, New Paris, Ohio 45347
Preble County

Bids Due: 01:00 p.m. local time, March 13, 2026 through the State's electronic bidding system at https://bidexpress.com
EDGE Participation Goal: Not Required
BUILD AMERICA, BUY AMERICA (BABA) is required.

Contract	Estimated Cost
General	$3,899,201.00

Virtual Pre-bid Meeting: February 24, 2026,10:00 am, at

https://teams.microsoft.com/meet/25407810085294?p=IlckcXjvHohrnn8BQm
Meeting ID: 254 078 100 852 94
Passcode: yt3Hp9R5

Bid Documents: Electronically at https://bidexpress.com.
More Info: Ali Alghothani, (614) 538-8451, ali@starconsultants.org

Description

This project involves the construction of a new 1-story, non-sprinkled restroom for a highway Truck Parking area. The facility will be constructed of CMU bearing walls with a pre-engineered roof truss system. This project will also involve plumbing, mechanical and electrical.

-------- end of advertisement—do not publish this line ----------

APPROVED FOR PUBLICATION
In: Bid Express
On: February 12, 2026

Ohio Department of Transportation

Carrie Yost
Project Manager

Date

RECEIVED BY:

Type or print name of authorized representative

Signature

Date

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

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

2.10.3.5 a complete listing of Substance Use Prevention and Recovery ("SUPR") violations in the last 5 years;

2.10.3.6 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.

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

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

2.10.3.9 a description of the EDGE-certified Business(es) the Bidder proposes as Subcontractors for this Project by attaching a fully completed **EDGE Affidavit** form for each EDGE-certified Business;

2.10.3.10 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;

2.10.3.11 a current Ohio Workers' Compensation Certificate;

2.10.3.12 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;

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

2.10.3.14 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 solicit for other Bids. The solicitation shall be for the period, in the form, and in the manner 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 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 of the finding and the reasons for the finding. The notice shall be given by email, or by certified mail if no email address is available.

3.6.2 Ten Percent Rule.

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

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

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

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

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

3.7 Notice of Intent to Award

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

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

ARTICLE 4 - WITHDRAWAL OF BID

4.1 Withdrawal prior to Bid Opening

4.1.1 A Bidder may withdraw a Bid after 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. The Bidder shall not 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 any of the following:

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; or

5.1.1.3 an electronic verification through an electronic verification and security system described in ORC section 153.08.

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 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.

6.1.5 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.

6.1.6 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.

6.1.7 Evidence that the Bidder is enrolled in, and in good standing in, a SUPR program approved by the OBWC.

6.1.8 Required Notice of Unresolved Findings for Recovery.

6.1.8.1 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.

6.1.9 EDGE Program – Supporting Documentation Required.

6.1.9.1 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(es) for the Project by submitting a fully completed EDGE Affidavit for each EDGE-certified Business, 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(es) for this Project, or both.

6.1.10 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, 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.

END OF DOCUMENT

See attached Geotech report next page.

GEOTECHNICAL INVESTIGATION REPORT
FACD08 RESTROOMS AT PREBLE TRUCK PARKING
DOT-250005
I-70 WEST BOUND, MILE MARKER 01
EATON, PREBLE COUNTY, OHIO
DHDC PROJECT NUMBER: D25-056

For:

Star Consultants, Inc.
Architects & Engineers
1910 Crown Park Court
Columbus, Ohio 43235

Submitted by:

DHDC Engineering Consulting Services, Inc.
2390 Advanced Business Center Drive
Columbus, Ohio 43228

Date:

October 23, 2025

2390 Advanced Business Center Drive
Columbus, Ohio 43228
o: 614.527.7656
www.dhdcinc.com

October 23, 2025

Ali Alghothani, Ph.D., P.E
Vice President
Star Consultants, Inc.
Architects & Engineers
1910 Crown Park Court
Columbus, Ohio 43235

Subject **Geotechnical Investigation Report**
FACD08 Restrooms at Preble Truck Parking
DOT-250005
I-70 West Bound, Mile Marker 01
Eaton, Preble County, Ohio
DHDC Project Number: D25-056

Dear Mr. Alghothani:

In compliance with your request, DHDC Engineering Consulting Services, Inc. (DHDC) has completed a subsurface exploration and geotechnical evaluation for the above referenced project. We appreciate the opportunity to be of service to you on this project. If you have any questions regarding our report or if we may be of further service, please contact us at your earliest convenience.

DHDC Engineering Consulting Services, Inc.

STATE OF OHIO
MOHAMMED O. HAQUE
E-63310
REGISTERED
PROFESSIONAL ENGINEER

Mohammed O. Haque, P.E.
Geotechnical Engineer

Savvas P. Sophocleous
Project Manager

Attachment

DHDC
Engineering Consulting Services, Inc.

2390 Advanced Business Center Drive
Columbus, Ohio 43228
o: 614.527.7656
www.dhdcinc.com

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APPENDIX:
Geological Maps
Boring Location Plan
Soil Terms
Boring Logs
Lab Test Results

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1.0 INTRODUCTION

This report presents the results of a geotechnical investigation and soils evaluation of the proposed new rest area facility to be constructed along I-70 West Bound near Mile Marker 01 in Eaton, Preble County, Ohio. The purpose of this investigation was to determine the general types of subsoils present at the proposed site, to make an evaluation of their likely impact on the proposed development and to make comments and recommendations relative to the design and construction of earthwork and structure foundation for this project. Also, selected pertinent comments and recommendations regarding earthwork and foundation construction are provided.

The scope of this investigation included a review of available geologic and soils data for the project area, a subsurface investigation consisting of four (4) standard soil test borings within the footprint of the proposed restroom structure and one (1) soil boring within the proposed sanitary sewer line and septic tank area, as shown on the attached Boring Location Plan in the Appendix, field and laboratory soil testing, and an engineering analysis and evaluation of the subsurface conditions encountered at this site.

2.0 PROJECT AND SITE CHARACTERISTICS

The scope of the project as presently understood will consists of the construction of a new rest area facility. In the past there used to be a rest area at this site. Currently site is an open vacant land. It appears that the previous rest area building structure was razed and the area was backfilled. Currently DHDC doesn't have any information regarding the exact location of the razed building structure. The parking lots, access and exit drives are still in place, but appear to be out of service for a long time.

It is DHDC's understanding that the foundation of the proposed restroom building structure will be shallow spread footing. DHDC has not been made aware of any special or unusual loading conditions or settlement restrictions for the proposed building structure. For purposes of the analysis, DHDC has assumed that the maximum wall and column loads will not exceed 3.0 kips per linear foot (klf) and 80 kips, respectively.

The borings were drilled through the open grassy areas. The topography of the proposed construction site within the proposed construction can be described as relatively flat to gently rolling. The site rolls gently from north to south. Drainage of the site appears to be good at this time and consists of surface runoff or sheet drainage off site. DHDC's site reconnaissance indicates no surface features that would indicate unusual subsurface problems. It is DHDC's understanding that no more than 2 to 3± feet of cuts and/or fill will be required to bring the existing ground to the finished subgrade elevation.

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3.0 INVESTIGATIVE PROCEDURES

Five (5) soil borings were performed for this investigation. Borings B-1 through B-4 were drilled within proposed restroom building structure footprint area, and Boring B-5 within the sanitary sewer line and septic tank area. DHDC didn't perform any borings through the existing or future pavement areas. All five (5) borings were drilled to a depth of 30.0 feet below the exposed grade. Based on the site plan DHDC located the test borings in the field. It is DHDC's recommendation that prior to finalizing the site plans, the boring locations should be surveyed, and the surveyed boring locations should be shown on the site plan.

The test borings were performed in accordance with geotechnical investigative procedures outlined in American Society for Testing and Materials (ASTM) Standards D 1452 and D 5434. The borings were performed utilizing 3¼-inch inside diameter hollow-stem augers. Soil samples were collected at 2.5-foot intervals to a depth of 20.0 feet and then 5.0 thereafter to the maximum depth explored.

Split-spoon samples were obtained by the Standard Penetration Test (SPT) Method (ASTM D 1586), which consists of driving a 2.5-inch outside diameter split-spoon sampler into the soil with a 140-pound weight falling freely through a distance of 30 inches. The sampler was driven in three successive 6-inch increments with the number of blows per increment being recorded. The sum of the number of blows required to advance the sampler the second and third 6-inch increments is termed the Standard Penetration Resistance (N-value) and is presented on the Logs of Test Borings attached to this report. The split-spoon samples were sealed in jars and transported to our laboratory for further classification and testing.

Soil conditions encountered in the test borings are presented in the Logs of Test Borings, along with information related to sample data, SPT results, water conditions observed in the borings, and laboratory test data. It should be noted that these logs have been prepared on the basis of laboratory classification and testing as well as on field logs of the encountered soils.

All samples of the subsoils were visually or manually classified using the Unified Group Soil Classification System (ASTM D-2487 and D-2488). All soil samples were tested in the laboratory for moisture content. Atterberg Limits and grain size analysis tests were performed on selected soil samples. Pocket Penetrometer test, which is the approximate unconfined compressive strength was performed on cohesive soil samples. The results of these tests are presented on the soil boring logs attached to this report.

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4.0 GENERAL SUBSURFACE CONDITIONS

4.1 Site Geologic Conditions

Various topographic, geologic and county soil and groundwater availability maps published by the Ohio Department of Natural Resources (ODNR) and the United States Department of Agriculture (USDA) were reviewed as part of this investigation. The results of the review are summarized in the paragraphs below.

The site is in the Southern Ohio Loamy Till Plain regional physiographic province. The soils at the site are primarily fine-grained, low plasticity soils formed by weathering of the underlying loess and glacial till. Deep deposits of Late Wisconsinan-aged glacial till ground moraine cover the area to various depths. The bedrock geology consists of the Silurian-aged Lockport Dolomite and undifferentiated sub-Lockport formations, and the Ordovician-aged Drakes, Whitewater, and Liberty Formations. The Lockport Dolomite is a medium to massively bedded, white to medium gray dolomite with a vuggy, finely to coarsely crystalline texture. The sub-Lockport undifferentiated material contains dolomite, limestone, and shale with a highly variable texture. The Drakes Formation is composed of approximately 90 percent shale and 10 percent limestone and dolomite and is approximately 20 to 30 feet thick. The Whitewater and Liberty Formations are composed of approximately 60 to 50 percent limestone and 40 to 50 percent shale, respectively. Krast is present at isolated locations in Preble County; however, the nearest occurrence is located in the extreme southern part of Preble County.

4.2 Soil Profile

Surface Material

Topsoil

Borings were drilled through the grassy areas. Topsoil was encountered as the surface material. Topsoil thickness shown in the boring logs should be considered approximate. The thickness of topsoil ranged from about 8.0 to 16.0 inches. For estimation purpose DHDC recommends about 12 inches of topsoil at this site. This material is generally unsuitable for structural support and should be wasted or stockpiled for later landscaping use

Subgrade Soils

Fill Material

Man-made fill material was encountered only in Boring B-5 to a depth of about 3.0 feet below the boring surface grade. The man-made fill material consisted of sandy clay with little amounts of gravel. The Standard Penetration Values (N-value) within the fill material was 13 blows per foot (bpf) and the moisture content was 12 percent.

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Naturally Occurring Native Soil

Cohesive Soil

Below the topsoil or below the fill material, cohesive silty clay to silty sandy clay soil was encountered in all three borings to the maximum depth explored of 30.0 feet below the boring surface grades. Thin to moderate layers of sandy clay soil was encountered in few borings at various depths.

The N-value within the silty clay soils ranged from 6 to 34 bpf, indicating medium stiff to hard soil consistency. The moisture content of the cohesive silty clay soils ranged from 7 to 17 percent. Pocket Penetrometer value, which is the approximate Unconfined Compressive Strength, ranged from 1.25 to 4.0 tons per square foot (tsf) on intact soil samples. The bottom of the silty clay soil ranged from about 3.0 to 8.0 feet below the boring surface grades. The silty clay soil is glacial till soil and can be classified as low to moderate plasticity CL soil according to the Unified Soil Classification System (USCS).

Below the silty clay soil, thin to moderately thick layer of sandy clay soil was encountered in Borings B-3 through B-5. The N-value within the sandy clay soils ranged from 6 to 36 bpf, indicating medium stiff to hard soil consistency. The moisture content of the sandy clay soils ranged from 9 to 19 percent. Pocket Penetrometer value, ranged from 1.25 to 4.0 tsf on intact soil samples. The bottom of the sandy clay soil ranged from about 5.5 to 14.0 feet below the boring surface grades. The sandy clay soil is glacial till soil and can be classified as low plasticity CL soil according to the USCS.

Below the silty clay or sandy clay soil, silty sandy clay soil was encountered in all five borings to the maximum depth explored of 30.0 feet below the boring surface grade. Coarse gravel and/or cobble were encountered within the silty sandy clay soil matrix at various depths. Saturated silty sand and sandy silt layers were also encountered within the silty sandy clay soil matrix. The N-value within the silty sandy clay soils ranged from 8 to 37 bpf, indicating medium stiff to hard soil consistency. The moisture content of the silty sandy clay soils ranged from 8 to 14 percent. Pocket Penetrometer value, ranged from 1.5 to more than 4.5 tsf on intact soil samples. The silty sandy clay soil is glacial till soil and can be classified as low plasticity CL soil according to the USCS.

Cohesionless Soil

It is very common to encounter thin to thick interbedded layers of cohesionless silty sand (SM), sandy silt (ML), sand and gravel (SP and GP), and a mixture of sand, gravel, and cobble within the cohesive glacial till soil matrix. Such thin to moderate layers of some of those materials were encountered in the borings at various depths. The N-values within the cohesionless soils ranged from 21 to 36 bpf, indicating medium dense to dense relative density. Thin to occasional thick layers of coarse gravel and/or cobble were encountered within the cohesionless soils.

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4.3 Groundwater Conditions

Ground water observations were made during the drilling operations (by noting the depth of water on the drilling tools) and in the open holes following the withdrawal of the drilling augers. No groundwater was encountered at any of the five (5) soi borings during or at completion of the drilling operations. Groundwater in Ohio glacial tills is typically contained in discontinuous sand layers within the cohesive soil matrix. Thin to moderate layers of cohesionless soils were encountered within the cohesive glacial till soil at various elevations. Some perched or trapped groundwater can be encountered within the cohesionless soils sandwiched between less permeable cohesive glacial till soil.

Seasonal influences typically cause a rise and fall in groundwater levels. Groundwater conditions should be anticipated to fluctuate depending on variations in precipitation, surface runoff, infiltration, site topography, and drainage.

4.4 Seismic Site Classification

The Ohio Building Code (OBC) follows International Building Code (IBC) with regards to seismic guidelines. As part of the OBC code, the seismic properties of the overburden soils and bedrock are utilized to determine the site seismic classification. The Seismic Site Class is determined by evaluation of the shear wave velocities of the overburden soil and bedrock to a depth of 100 feeet.

Based on the boring findings, review of geological information, and in accordance with the Ohio Building Code – Site Class Definitions, we estimate the site as a Site Class D - stiff soil profile. Table 20.3-1 of the International Building Code shows the various Site Class.

TABLE 20.3-1 SITE CLASSIFICATION

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard rock	>5,000 ft/s	NA	NA
B. Rock	2,500 to 5,000 ft/s	NA	NA
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the following characteristics: - Plasticity index PI > 20, - Moisture content $w \geq 40\%$, and - Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1 ft/s = 0.3048 m/s 1 lb/ft^2 = 0.0479 kN/m^2

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5.0 GEOTECHNICAL CONCLUSIONS & RECOMMENDATIONS

Based upon our analysis of the soil conditions and the preliminary design details supplied for this project by the client as previously outlined, the following recommendations were developed. If the project characteristics are changed from those assumed herein, or if different subsurface conditions are encountered during construction, DHDC should be notified, so that our recommendations can be reviewed to see whether any modifications are needed.

5.1 Important Subgrade Information

- Man-made fill material was encountered only in Boring B-5. No man-made fill material was encountered in any of the other four (4) borings drilled for this investigation. Since the site was developed in the past, it is possible that some cuts and some fills might have been performed in the past to bring the previous grade to the current grade. Although not encountered in other four (4) borings, it is possible that some minor fill materials can be encountered in some areas of the proposed building footprint area.

- No groundwater was encountered at any of the five (5) boings drilled for this investigation. It is possible that some perched or trapped groundwater can be encountered within the cohesionless soils sandwiched between less permeable cohesive glacial till soil.

- Soft and compressible soils were not encountered in the borings; however, it is possible that some soft and compressible soils can be encountered at the interface of saturated cohesionless soils.

5.2 Building Foundation Recommendations

<u>It is DHDC's recommendation that all surface material, and organics, and any deleterious material (if any), and man-made fill materials should be removed and replaced with engineered fill at the proposed structure and to a minimum horizontal distance of 10 feet beyond the proposed building lines.</u>

The boring locations shown on the Boring Location Plan should be considered approximate and the depth of existing fill materials shown in the boring logs should be used as a guideline during the removal of exiting fill materials. The actual depth of existing fill materials and the soft and compressible naturally occurring native soils (if encountered) should be determined during the earthwork.

Once the undercutting has been done and the building pad has been prepared as recommended above and engineered fill placed and compacted as described in Section 5.9, conventional shallow spread footing may be used to support the proposed building. Continuous (wall) footings, isolated (column) footings, or a combination of both may be utilized to transmit the structural loading to the bearing strata. DHDC recommends that the structure footings be designed for a maximum net allowable bearing pressure of 3,500 pounds per square foot (psf) for both column (square) and wall (strip) footings, provided that they

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bear on medium stiff or stiffer naturally occurring native silty clay soil or sandy clay soil, or on compacted engineered fill supported by such subgrade materials.

This recommended soil bearing value should be considered the upper limit, and any value less than that listed above would be acceptable for the foundation system. It is strongly recommended that careful observation of the undercut excavation as well as all foundation excavations be carried out by a representative of DHDC to identify unsuitable or unstable subgrade soil and to recommend appropriate remedial actions as necessary.

In using net pressure, the weight of the footing and backfill over the footing, including the weight of the floor slab need not be considered; hence, only loads applied at or above the finished floor need to be used for dimensioning the footings. Furthermore, wall footings and isolated column footings should be at least 18 inches wide and 24 inches square, respectively (or as per applicable building code requirements, whichever is larger) for protection against a punching shear type of failure.

Provided that the footings are designed as prescribed herein and inspected as outlined in this report, it is estimated that the total and differential foundation settlements will not exceed approximately 1 inch and 3/4 inches, respectively. Careful field control will contribute substantially to minimizing the settlements. To minimize differential settlement of masonry wall footings, DHDC recommends top and bottom layers of reinforcement steel within the footing.

Uplift forces on footings due to wind load can be resisted by the weight of the footings and the soil material that is placed over the footings. It is recommended that the soil weight be limited to that immediately above and within the perimeter of the footings (unless a much higher factor of safety is used). A total soil unit weight of 120 pounds/cubic foot can be used for the backfill material adjacent to and above the footings, provided it is compacted as recommended in Section 5.9. It is also recommended that a factor of safety of at least 1.2 be used for calculating uplift resistance from the footings (provided only the weight of the footing and the soil immediately above it is used to resist uplift forces).

Lateral forces on a shallow spread footing can be resisted by the passive lateral earth pressure against the side of the footing and by friction between the subgrade soil and the base of the footing. An allowable passive pressure of 600 pounds/square foot can be used for that portion of the footing that is below a depth of 3.0 feet below the final exterior grade (no portion of the footing above this depth should be used for lateral resistance). An allowable coefficient of friction (between the base of the footing and the underlying soil) of 0.20 can be used in conjunction with the minimum downward load on the base of the footing.

All footings should be taken to at least 3.0 feet below the final exterior grade for frost protection. All foundation bearing surfaces should be protected against freezing, surface water and undue disturbance as the cohesive soils will tend to soften and increase settlements in such cases. If possible, the footing concrete should be placed the same day that the excavation takes place. If this is not feasible, proper protection of the footing excavations should be provided. All footing excavations should be observed by

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a representative of DHDC to assure that adequate bearing is achieved before placing concrete for the foundations.

5.3 Floor Slabs

Floor slabs should rest on satisfactorily proofrolled naturally occurring native silty clay or sandy clay subgrade soil or compacted engineered fill supported by satisfactorily proofrolled naturally occurring native subgrade soil. It is recommended that all floor slabs be separated from all walls and foundations by means of construction joints to minimize the possibility of cracking and displacement of the floor slabs because of differential movements between the slabs and the foundations or walls. Although potential movements are projected to be within tolerable limits for structural safety, the minor movements could still be detrimental to the slabs if they are rigidly connected to the foundations. The slab should be designed to be structurally independent of any building footings or walls and should be appropriately reinforced to support the anticipated loads.

A six (6)-inch thick crushed stone (ODOT Item No. 304) will be required to improve subgrade support characteristics in floor slab areas. With crushed stone improvement, a modulus of subgrade reaction (k) value of 120 pci will be available.

A vapor barrier may not be required beneath the floor slabs unless the floors are to be covered with moisture sensitive flooring. It should be noted that vapor barrier can have adverse effects on concrete curing and performance. If used, the vapor barrier should be installed in accordance with the recommendations contained in the ACI Manual of Concrete Practice 302.1 R, Guide for Concrete Floor and Slab Construction, and should be placed below the crushed stone layer. If the vapor barrier is placed immediately below the concrete slab, a coefficient of friction between the slab-on-grade concrete floor and the vapor barrier of 0.15 should be used.

5.4 Sewer Line

Sewer Line Support

It is DHDC's belief that the bottom of sewer line will vary between 8.0 to 15.0 feet below the boring surface grades and the sewer line will be installed using the open-cut method. Based on soil borings information, the excavation at those depths will expose naturally occurring native cohesive silty clay, sandy clay and silty sandy clay soil. Thin to moderate layers of cohesionless soils can also be encountered during excavation. Although no groundwater was encountered during or at completion of the drilling operations, it is possible that some perched or trapped groundwater can be encountered during the excavation through the cohesionless soils.

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Although no soft or loose soil was encountered in the borings, it is strongly recommended that careful observation of all pipe bearing material be carried out by a representative of DHDC to identify loose or soft and unstable soils to recommend appropriate remedial actions as necessary. DHDC recommends that the undercut areas (if needed) should be backfilled with compacted granular fill or ODOT 57 stone to the desired pipe bearing elevation.

Positive seals must be provided at joints between pipe sections according to the pipe manufacturer's specifications. Water flowing into the pipe will carry fine soil particles with it, thus resulting in voids forming under and around the pipe. Excessive flow from the pipe could erode the underlying soils, thus reducing their support capacity. In either case, loss of support, excessive movements and possible failure of the pipeline could result. DHDC recommends that the trapped groundwater should be pumped out from a sump in the excavation bottom.

Excavation

It is DHDC's belief that due to the occasional presence of coarse gravel and/or cobble and possible boulders, there can be some minor difficulty excavating some of the overburden soil. However, it is anticipated that there will be minimal difficulty experienced in excavating the overburden soils with conventional equipment and methods.

All temporary excavations for the installation of the sewer line should be properly laid back or braced in accordance with Occupational Safety and Health Administration (OSHA) requirements. The cohesive silty clay soils encountered at the borings can be classified as OSHA Type "A". OSHA Type "A" soils require side slopes for excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4H:1.0V. However, DHDC recommends that the excavations deeper than 5 feet to be no steeper than 1.0H:1.0V for this site. Cohesionless soils are OSHA Type "C" soils. All simple slope excavations in Type "C" soils 20 feet or less in depth shall have a maximum allowable slope of 1.5H:1.0V or be properly braced during construction for safety purposes.

Temporary Sheeting and Shoring

Where temporary retention of construction excavations is required, it is anticipated that driven steel sheet piling (either cantilevered or tied-back) would be most desirable method of excavation retention. To compute the active lateral earth pressure acting against temporary cantilevered sheet piling, assuming level ground behind the wall and no other surcharges, DHDC recommends a triangular earth pressure distribution, an active earth pressure coefficient of 0.40, and a total soil unit weight of 130 pcf. For temporary sheet pile walls that are tied-back with pretention anchors, DHDC recommends a uniform pressure distribution of 0.45 $K_a\gamma H$, with K_a=0.60. If the retained earth is not dewatered, then the hydrostatic pressure against the sheeting must be taken into account, and the buoyant soil unit weight should be used.

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Backfill Material

Backfill for the sewer line should consist primarily of compacted granular material such as crushed ODOT No. 57 or 467 stone to a depth of 1 foot above and around the sewer pipe. Sewer line excavations within the roadway or pavement must be backfilled entirely with granular material. In areas outside of the street pavement, any non-organic, naturally-occurring soils with a Liquid Limit (LL) less than 50 and a Plasticity Index (PI) less than 25 can be used for fill above the sewer line. The fill should contain no pieces whose greatest dimension is larger than 3 inches in size. If fill construction takes place during the winter months, care should be taken so as not to place fill over frozen soil, nor should froze materials be used within the fill.

It is DHDC's recommendation that all backfill around the underground utility lines be compacted to at least 95 percent of the maximum Standard Proctor dry density (ASTM D-698). For proper and timely construction of the fills, the soils should be placed at or near the optimum moisture content as determined by the specified Proctor test. Appropriate measures should be taken to avoid damage to the sewer line pipe by the compaction equipment.

5.5 Well Pit (Septic Tank) Support

It is DHDC's understanding that the bottom of the well pit/septic tank will be at least 10.0 to 15.0 feet below the boring surface grade (Boring B-5). DHDC recommends that the footing foundation can be designed for a maximum net allowable bearing pressure of 4,000 pounds per square foot (psf) resting on naturally occurring native sandy clay or silty sandy clay glacial till soil. Wall footings should be at least 18 inches wide. Although no groundwater was encountered in the borings, it is possible that some perched or trapped groundwater can be encountered during excavation. Groundwater can be pumped out from a sump pit installed in naturally occurring cohesive soil.

Uplift Pressure

Uplift pressures will be developed on the bottom of the structure from water head differentials. The maximum uplift pressure is anticipated to occur from the 100 year flood elevation. The floors of these structures will have to resist the uplift pressures generated by that level of water. Furthermore, the below grade structures will have to be designed to be water-tight if they are to be maintained in the dry.

Resistance to uplift due to high groundwater conditions should be provided if a static analysis of the man-hole structures indicate that the weight of the structure is less than the buoyant force applied to the structure by a high groundwater table. Resistance to uplift to the structures may be increased by weighting the structure to resist the buoyant forces.

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The effective weight of the structure can be increased by thickening the walls or base of the structure or by extending the base beyond the walls so that the weight of the soil overlying this "lip" also resists the buoyant forces.

Lateral Earth and Water Pressure

Walls of permanent structures extending below grade and any temporary sheeting or shoring must be adequately designed to resist lateral pressures imposed by the surrounding soil and groundwater. The following are our recommendations regarding design lateral earth pressures for these installations.

Walls that are braced so as not to allow translation, or rotation at the top, should be designed for at-rest earth pressure (K_o) conditions. If the wall is free to translate or rotate in response to lateral loads, then the wall can be designed for active earth pressure (K_a) conditions. DHDC recommends a total soil unit weight of 130 pounds per cubic foot (pcf) be used for all fill and natural soils on this project. DHDC recommends that K_o be taken as 0.50 and that K_a=0.40 be used for this project, assuming that the walls are backfilled with a suitable granular materials such as ODOT Item 703.02 or 703.05, or AASHTO #57 or #67 aggregate. For this analysis, the granular backfill must extend out and upward at an angle of at least 45^0 from the base of the wall. However, the granular backfill should be capped with at least 2 feet of clayey material to inhibit surface water infiltration behind the wall.

If an imbalance in water pressure between the inside and outside of the wall can be avoided, such as with drainage media placed outside of the walls, then hydrostatic pressure can be ignored in the wall design. If such an imbalance water condition cannot be avoided, then the hydrostatic pressure must be considered in the design, although only the buoyant unit weight of soil need be considered below the design water level. The buoyant unit soil weight can be taken as 67.6 pcf.

If the extent of granular backfill is less than that described above, i.e., if native soils are the predominant material within the 45^0 envelope described above, then the lateral earth pressure coefficients, K_a and K_a, should be increased to 0.60 and 0.50, respectively.

After the structures are constructed, they should be backfilled with a well compacted "Granular fill". The backfill granular materials to be used should meet the gradations of as per the ODOT Construction and Material Specifications. Lateral earth and water pressures will be exerted on the structures below grade walls by the granular backfill materials and the groundwater.

5.6 Drainage

Adequate drainage should be provided at the site to minimize any increase in moisture content of the foundation soils. The ground surface should be sloped away from the structures to prevent ponding of water. The site drainage should also be such that the runoff onto adjacent properties is controlled properly. Positive drainage of the site should also be maintained during construction.

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5.7 Site Preparation

Recommendations regarding the subgrade preparations have already been discussed in previous sections of this report. In general, within the proposed building footprint areas, topsoil, organic soil and any deleterious materials (if encountered) and unstable naturally occurring subgrade soils should be removed to a minimum horizontal distance of 10 feet beyond the proposed building lines prior to constructing structure or placing any fill on the site.

Currently DHDC has no information regarding the location of the demolished building g structure. DHDC recommends that if any portions of the demolished building falls within the footprint of the proposed building structure, all remnants associated with the demolished building structure and backfilling materials should be removed from the proposed construction site. The excavated areas should be prepared and backfilled in accordance with the procedures outlined in Section 5.7 and 5.9 of this report.

After the completion of the stripping operations, the exposed subgrade should be proof rolled with suitable heavy equipment, preferably a 25- to 30-ton loaded dump truck. Any soft or loose yielding areas delineated by proof rolling operations should be undercut or otherwise stabilized as directed by the geotechnical engineer prior to placing structural fill. The naturally occurring cohesive soils may tend to "pump and rut" under construction traffic if they become wet. They will also become difficult to properly compact if the water content of the soil is significantly greater than the optimum moisture content. Depending upon the field moisture conditions at the time of construction, it may be necessary to undercut or otherwise stabilize these soils. The client should be prepared to deal with these conditions at the time of construction.

5.8 Excavation

It is anticipated that there will be minimal difficulty experienced in excavating the site with conventional equipment and methods. Unless specified otherwise, all permanent cut slopes shall be no steeper than 3 horizontal to 1 vertical. All temporary excavations for the installation of foundations, utilities, etc., should be properly laid back or braced in accordance with Occupational Safety and Health Administration (OSHA) and any other applicable requirements. Any underground utilities should be protected from undermining due to excavation for the new structure. All federal, state and local safety regulations should be followed in this regard.

DHDC recommends that, if possible, the construction be carried out during the drier part of the year. Each foundation excavation should be observed by a geotechnical engineer or a qualified soils technician to insure that all soft or otherwise undesirable material is removed at footing locations and that the foundation will bear on satisfactory material. At the time of such observations, it will be necessary to make hand auger borings or use a hand penetration device in the base of the foundation excavation to ensure that the soils below the base are satisfactory for foundation support. The necessary depth of penetration will be established during inspection.

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5.9 Fill

Once stripping, undercutting, and subgrade preparation has been performed, fill may be placed to attain desired final grades. The proposed fill should have a plasticity index value no higher than 25, a liquid limit no higher than 50, maximum dry density of at least 100 pounds per cubic foot, and organic content less than 5 percent.

The naturally occurring native cohesive soils from the on-site borrow pit can be used as compacted engineered fill. The natural moisture content of the subsurface soils was mostly in low teens and occasional twenties. The optimum moisture content of the similar materials will be in mid-teens. Hence, if the natural moisture content of the subgrade soils remains within teens at the time of fill construction, no modification of the naturally occurring native soils will be required prior to their use.

The fill should contain no pieces whose greatest dimension is larger than the thickness of the lift being placed. If fill construction takes place during the winter months, care should be taken so as not to place fill over frozen soil nor should froze materials be used within the fill.

The fill should be placed in lifts of uniform thickness. The lift thickness should not exceed that which can be properly compacted throughout its entire depth with the equipment available. DHDC recommends that structural fills supporting footings, floor slabs, and pavements be compacted to at least 100 percent of the maximum Standard Proctor dry density (ASTM D-698). For proper and timely construction of the fills, the soil should be placed at or near the optimum moisture content as determined by the specified proctor test. Suitable equipment for either aerating or adding water should be available as the soil moisture and weather conditions dictate.

In general, it is recommended that fills supporting structures extend a minimum of 10 feet beyond the exterior building lines. Any fills placed on existing slopes that are steeper than 10 horizontal to 1 vertical should be properly benched into the existing slope as directed by the soils engineer. For preliminary design, permanent embankment slopes for earth fills constructed in accordance with the recommendations in this report should be no steeper than 3 horizontal to 1 vertical.

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6.0 QUALIFICATION OF RECOMMENDATIONS

Our evaluation has been based on our understanding of the site and project information and the data obtained during our field investigation. The general subsurface conditions were based on interpretation of the subsurface data at specific boring locations. Regardless of the thoroughness of a subsurface investigation, there is the possibility that conditions will differ from those encountered at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should observe construction to confirm that the conditions anticipated in design are noted. Otherwise, DHDC assumes no responsibility for construction compliance with the design concepts, specifications, or recommendations.

The design recommendations in this report have been developed on the basis of the previously described project characteristics and subsurface conditions. If project criteria or locations change, DHDC should be permitted to determine whether the recommendations must be modified. The findings of such a review will be presented in a supplemental report.

Our professional services have been performed, our findings derived, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. DHDC is not responsible for the conclusions, opinions, or recommendations of others based on this data.

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APPENDIX: GEOLOGICAL MAPS

GLACIAL MAP OF OHIO

WISCONSINAN (14,000 to 24,000 years old)	ILLINOIAN (130,000 to 300,000 years old)	PRE-ILLINOIAN (older than 300,000 years)	
Ground moraine	Ground moraine	Ground moraine	Kames and eskers
Wave-planed ground moraine	Dissected ground moraine	Dissected ground moraine	Outwash
Ridge moraine	Hummocky moraine		Lake deposits
			Peat
			Colluvium

Recommended citation: Ohio Division of Geological Survey, 2005, Glacial map of Ohio: Ohio Department of Natural Resources, Division of Geological Survey, page-size map with text, 2 p., scale 1:2,000,000.

STATE OF OHIO • DEPARTMENT OF NATURAL RESOURCES • DIVISION OF GEOLOGICAL SURVEY

BEDROCK GEOLOGIC MAP OF OHIO

Recommended citation: Ohio Division of Geological Survey, 2006, Bedrock geologic map of Ohio: Ohio Department of Natural Resources, Division of Geological Survey Map BG-1, generalized page-size version with text, 2 p., scale 1:2,000,000. [Revised 2017.]

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APPENDIX: BORING LOCATION PLAN

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BORING LOCATION PLAN

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APPENDIX: SOIL TERMS

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DESCRIPTION OF SOIL TERMS

The following terminology was used to describe soils throughout this report and is generally adapted from ASTM 2487/2488 and ODOT Geotechnical Specifications.

GRANULAR SOILS – The relative compactness of granular soils is described as:

Description	Blows per foot – SPT (N)		
Very Loose	2	–	5
Loose	6	–	10
Medium Dense	11	–	30
Dense	31	–	50
Very Dense	Over	–	50

COHESIVE SOILS – The relative consistency of cohesive soils is described as:

Description	Blows per foot – SPT (N)			Unconfined UCS (ksf)		
Very Soft	Below	–	2	Less Than	–	0.50
Soft	2	–	4	0.50	–	1.00
Medium Stiff	5	–	8	1.00	–	2.00
Stiff	9	–	15	2.00	–	4.00
Very Stiff	16	–	30	4.00	–	8.00
Hard	Over	–	31	Over	–	8.00

GRADATION – The following size related denominations are used to describe soils:

Soil Fraction	USCS Size	ODOT Size
Boulders	Larger than 12”	Larger than 12”
Cobbles	12” to 3”	12” to 3”
Gravel – Coarse	3” to 3/4"	3” to 3/4"
Gravel – Fine	3/4" to 4.75 mm	3/4" to 2.0 mm (#10)
Sand – Coarse	4.77 mm to 2.0 mm	2.0 mm to 0.42 mm (#40)
Sand – Medium	2.0 mm to 0.42 mm	
Sand – Fine	0.42 mm to 0.074 mm	0.42 mm to 0.074 mm (#200)
Silt	0.074 mm to 0.005 mm	0.074 mm to 0.005 mm
Clay	< 0.005 mm	< 0.005 mm

MODIFIERS OF COMPONENTS – Modifiers of components are as follows:

Term	Range		
Trace	0%	–	10%
Little	10%	–	20%
Some	20%	–	35%
And	35%	–	50%

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APPENDIX: BORING LOGS

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APPENDIX: GB-1 ANALYSIS REPORT

BORING NUMBER B-1

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants
PROJECT NAME Preble Truck Stop
PROJECT NUMBER D25-056
PROJECT LOCATION OHIO
DATE STARTED 9/18/25 **COMPLETED** 9/18/25
GROUND ELEVATION ____ **HOLE SIZE** inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Daniel **CHECKED BY** M.O.H
AT END OF DRILLING ---
NOTES ____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**TOPSOIL** (16")											
		Stiff, Dark Brown, **SILTY CLAY** (CL), trace sand, Damp.		SS 1	78	5-5-6 (11)	4.0		16				
		Medium Stiff, Dark Blackish Brown, **SILTY CLAY** (CL), trace sand, trace gravel, Moist.		SS 2	33	3-4-3 (7)	3.0		18				
5		Very Stiff, Brown with trace Gray, **SILTY SANDY CLAY** (CL), trace gravel [Glacial Till], Moist. ---Coarse **GRAVEL** within the soil matrix---		SS 3	100	3-8-8 (16)	2.75		10	28	17	11	50
		Stiff, Mottled Brown and Gray, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist.		SS 4	89	4-5-9 (14)	4.5		10	24	14	10	45
10		Stiff, Grayish Brown, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist.		SS 5	72	3-4-5 (9)	2.75		9				
		Stiff, Gray, **SILTY SANDY CLAY** (CL), trace to little gravel [Glacial Till], Moist.		SS 6	89	3-5-6 (11)	4.0		8	24	13	11	46
15		---Coarse **GRAVEL** and/or **COBBLE** within the soil matrix--- ---Occasional **SILTY SAND** seams--- ---Saturated **SILTY SAND** layer at about 15.0 feet---		SS 7	61	6-8-12 (20)			9				
20				SS 8	94	6-6-8 (14)	4.0		10				

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BORING NUMBER B-1

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants **PROJECT NAME** Preble Truck Stop

PROJECT NUMBER D25-056 **PROJECT LOCATION** OHIO

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
20		Stiff, Gray, **SILTY SANDY CLAY** (CL), trace to little gravel [Glacial Till], Moist. ---Coarse **GRAVEL** and/or **COBBLE** within the soil matrix--- ---Occasional **SILTY SAND** seams--- ---Saturated **SILTY SAND** layer at about 15.0 feet--- *(continued)*											
				SS 9	100	3-3-5 (8)	2.5		10				
25													
				SS 10	100	3-7-9 (16)	4.0		10				
30													

Boring discontinued at 30.0 feet depth
Boring caved in at 25.3 feet

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BORING NUMBER B-2

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants
PROJECT NAME Preble Truck Stop
PROJECT NUMBER D25-056
PROJECT LOCATION OHIO
DATE STARTED 9/18/25 **COMPLETED** 9/18/25
GROUND ELEVATION **HOLE SIZE** inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Daniel **CHECKED BY** M.O.H
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**TOPSOIL** (8")											
		Hard, Dark Brown, **SILTY CLAY** (CL), trace sand, Damp.		SS 1	67	9-16-18 (34)			7				
		Dense, Brown, fine to medium **SILTY SAND** (SM), trace gravel, Moist.		SS 2	72	12-14-19 (33)			4				29
5		Very Stiff, Mottled Brown and Gray, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist. ---Coarse **GRAVEL** and/or **COBBLE** within the soil matrix---		SS 3	61	4-8-9 (17)	4.0		8				
				SS 4	100	4-5-8 (13)	3.0		10				
10				SS 5	56	3-9-14 (23)	2.5		9				
		Stiff to Very Stiff, Gray, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist. ---Interbedded saturated **SILTY SAND** layers---		SS 6	83	4-6-9 (15)	3.5		9				
15				SS 7	100	8-8-8 (16)	3.0		9				
				SS 8	100	6-6-7 (13)	3.25		11				
20													

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BORING NUMBER B-2

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants **PROJECT NAME** Preble Truck Stop

PROJECT NUMBER D25-056 **PROJECT LOCATION** OHIO

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
20		Stiff to Very Stiff, Gray, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist. ---Interbedded saturated **SILTY SAND** layers--- *(continued)*											
				SS 9	67	3-8-8 (16)	1.75		9				
25													
				SS 10	100	4-7-9 (16)	2.5		10				
30													

Boring discontinued at 30.0 feet depth
Boring caved in at 16.0 feet

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BORING NUMBER B-3

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants
PROJECT NAME Preble Truck Stop
PROJECT NUMBER D25-056
PROJECT LOCATION OHIO
DATE STARTED 9/18/25 **COMPLETED** 9/18/25
GROUND ELEVATION **HOLE SIZE** inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Daniel **CHECKED BY** M.O.H
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**TOPSOIL** (8")											
		Very Stiff, Dark Brown, **SILTY CLAY** (CL), trace sand, Damp.		SS 1	67	8-8-10 (18)	4.0		14				
		Hard, Brown with trace Gray, **SANDY CLAY** (CL), trace gravel [Glacial Till], Damp. ---Coarse **GRAVEL** within the soil matrix---		SS 2	89	10-20-16 (36)	4.0		11				
5		Medium Dense, Brown and Gray, fine to coarse **SILTY SAND** (SM), some gravel, Moist. ---Coarse **GRAVEL** within the soil matrix---		SS 3	61	7-11-15 (26)			4				
		Very Stiff, Brown with trace Gray, **SANDY CLAY** (CL), trace gravel [Glacial Till], Moist. ---Coarse **GRAVEL** within the soil matrix---		SS 4	94	4-5-11 (16)	3.0		10				
10		Stiff, Mottled Brown and Gray, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist. ---Saturated **SILTY SAND** seams---		SS 5	83	3-5-9 (14)	2.5		10				
		Medium Dense, Brwon and Gray, fine to medium **SILTY SAND** (SM), little gravel, Saturated.		SS 6	100	5-10-11 (21)	0.75		12				
15		Hard to Very Stiff, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist to Very Moist.		SS 7	72	5-8-8 (16)	2.5		17				
20				SS 8	89	6-13-24 (37)	3.25		10				

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BORING NUMBER B-3

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants **PROJECT NAME** Preble Truck Stop

PROJECT NUMBER D25-056 **PROJECT LOCATION** OHIO

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
20		Hard to Very Stiff, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist to Very Moist. *(continued)*											
				SS 9	39	9-23-12 (35)	2.5		11				
25													
				SS 10	100	5-8-8 (16)	4.0		9				
30													

Boring discontinued at 30.0 feet depth
Boring caved in at 18.3 feet

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BORING NUMBER B-4

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants
PROJECT NAME Preble Truck Stop
PROJECT NUMBER D25-056
PROJECT LOCATION OHIO
DATE STARTED 9/18/25 **COMPLETED** 9/18/25
GROUND ELEVATION ____ **HOLE SIZE** inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Daniel **CHECKED BY** M.O.H
AT END OF DRILLING ---
NOTES ____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**TOPSOIL** (8")											
		Stiff, Dark Brown, **SILTY CLAY** (CL), trace sand, Moist.		SS 1	72	4-4-5 (9)	3.0		17				
		Stiff, Brown with trace Gray, **SANDY CLAY** (CL), little gravel [Glacial Till], Moist. ---Interbedded **SILTY SAND** and **GRAVEL**---		SS 2	94	3-7-8 (15)	2.0		19	29	17	12	47
5													
		Stiff, Mottled Brown and Gray, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist.		SS 3	83	3-4-5 (9)	2.5		11				
				SS 4	17	3-4-4 (8)				28	16	12	44
10													
		Stiff, Grayish Brown, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist. ---Saturated **SILTY SAND** seams---		SS 5	72	2-5-7 (12)	4.0		10				
		Very Stiff, Gray, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist.		SS 6	89	7-7-9 (16)	2.5		10				
15		---Coarse **GRAVEL** and/or **COBBLE** within the soil matrix--- ---**SANDY SILT** layer at about 17.0 feet--- ---Occasional saturated **SILTY SAND** and **GRAVEL** seams---		SS 7	89	8-12-12 (24)	1.5		14				
20				SS 8	78	6-7-11 (18)	4.5+		9				

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BORING NUMBER B-4

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants **PROJECT NAME** Preble Truck Stop

PROJECT NUMBER D25-056 **PROJECT LOCATION** OHIO

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
20		Very Stiff, Gray, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist. ---Coarse **GRAVEL** and/or **COBBLE** within the soil matrix--- ---**SANDY SILT** layer at about 17.0 feet--- ---Occasional saturated **SILTY SAND** and **GRAVEL** seams--- *(continued)*											
				SS 9	100	5-8-8 (16)	3.25		9				
25													
				SS 10	100	7-9-13 (22)	3.5		10				
30													

Boring discontinued at 30.0 feet depth
Boring caved in at 22.3 feet

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BORING NUMBER B-5

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants
PROJECT NAME Preble Truck Stop
PROJECT NUMBER D25-056
PROJECT LOCATION OHIO
DATE STARTED 9/18/25 **COMPLETED** 9/18/25
GROUND ELEVATION **HOLE SIZE** inches
DRILLING CONTRACTOR DHDC
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Daniel **CHECKED BY** M.O.H
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		**TOPSOIL** (8")											
		FILL: Dark Brown, **SANDY CLAY**, little gravel, Moist.		SS 1	83	5-7-6 (13)			12				
		Stiff, Black, **SILTY CLAY** (CL), trace sand, trace gravel, Moist.		SS 2	89	7-6-4 (10)	1.25		21				
5				SS 3	33	2-3-3 (6)	1.5		22				
		Medium Stiff to Stiff, Brown with trace Gray, **SANDY CLAY** (CL), little gravel [Glacial Till], Moist.		SS 4	33	3-5-6 (11)	2.25		10				
10				SS 5	56	2-3-3 (6)	1.25		9				
		Medium Stiff, Gray, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist.		SS 6	100	2-3-5 (8)	2.25		11				
15		---Occasional coarse **GRAVEL** and/or **COBBLE**---		SS 7	100	4-5-6 (11)	4.25		11				
20				SS 8	100	3-4-9 (13)	3.75		12				

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BORING NUMBER B-5

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants **PROJECT NAME** Preble Truck Stop

PROJECT NUMBER D25-056 **PROJECT LOCATION** OHIO

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
20		Medium Stiff, Gray, **SILTY SANDY CLAY** (CL), little gravel [Glacial Till], Moist. ---Occasional coarse **GRAVEL** and/or **COBBLE**--- *(continued)*											
				SS 9	100	3-5-6 (11)	2.0		11				
25													
				SS 10	100	8-11-17 (28)	1.75, 3.25		11				
30													

Boring discontinued at 30.0 feet depth
Boring caved in at 25.0 feet

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APPENDIX: LAB TEST RESULTS

ATTERBERG LIMITS' RESULTS

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants **PROJECT NAME** Preble Truck Stop

PROJECT NUMBER D25-056 **PROJECT LOCATION** OHIO

	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**B-1**	**6.0**	**28**	**17**	**11**	**50**	**SILTY SANDY CLAY (CL), trace gravel**
⧗	**B-1**	**8.5**	**24**	**14**	**10**	**45**	**SILTY SANDY CLAY (CL), little gravel**
▲	**B-1**	**13.5**	**24**	**13**	**11**	**46**	**SILTY SANDY CLAY (CL), trace silt**
★	**B-4**	**3.5**	**29**	**17**	**12**	**47**	**SANDY CLAY (CL), trace silt**
⊙	**B-4**	**8.5**	**28**	**16**	**12**	**44**	**SANDY CLAY (CL), trace silt**

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GRAIN SIZE DISTRIBUTION

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants **PROJECT NAME** Preble Truck Stop

PROJECT NUMBER D25-056 **PROJECT LOCATION** OHIO

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-1**	**6.0**	**SILTY SANDY CLAY (CL), trace gravel**	**28**	**17**	**11**		
⊠	**B-1**	**8.5**	**SILTY SANDY CLAY (CL), little gravel**	**24**	**14**	**10**		
▲	**B-1**	**13.5**	**SILTY SANDY CLAY (CL), trace silt**	**24**	**13**	**11**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-1**	**6.0**	**19**	**0.187**			**7.9**	**41.9**	**50.2**	
⊠	**B-1**	**8.5**	**19**	**0.234**			**11.5**	**43.9**	**44.5**	
▲	**B-1**	**13.5**	**19**	**0.221**			**8.1**	**45.8**	**46.1**	

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GRAIN SIZE DISTRIBUTION

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PROJECT NUMBER D25-056 **PROJECT LOCATION** OHIO

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-2**	**3.5**	**SILTY SAND (CL), trace gravel**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-2**	**3.5**	**12.7**	**0.484**	**0.079**		**8.7**	**62.0**	**29.3**	

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GRAIN SIZE DISTRIBUTION

DHDC Engineering Consulting Services, Inc.

CLIENT Star Consultants **PROJECT NAME** Preble Truck Stop

PROJECT NUMBER D25-056 **PROJECT LOCATION** OHIO

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-4**	**3.5**	**SANDY CLAY (CL), trace silt**	**29**	**17**	**12**		
⊠	**B-4**	**8.5**	**SANDY CLAY (CL), trace silt**	**28**	**16**	**12**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-4**	**3.5**	**19**	**0.186**			**8.9**	**44.3**	**46.8**	
⊠	**B-4**	**8.5**	**12.7**	**0.259**			**7.7**	**46.0**	**43.5**	

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

General Info

Alt Total: Bid Total:

Deadline
03/13/2026 01:00 AM/PM EDT/EST

Posted
02/12/2026

Number
DOT-250005

Business Name
Ohio Department of Transportation (ODOT)

Description
Project Name: FACD08 Restrooms at Preble Truck Parking Facility.

This project involves the construction of a new 1-story, non-sprinkled restroom for a highway Truck Parking area. The facility will be constructed of CMU bearing walls with a pre-engineered roof truss system. This project will also involve plumbing, mechanical and electrical

Procurement Documents

M160-00_10_00.EB-Solicitation_GC
→ Notice to Bidders

DOT-250005_FACD08 Restrooms at PTPF_Specifications
→ Procurement & Contracting Requirements and Specifications

DOT-250005_FACD08 Restrooms at PTPF_Plan Set
→ Plans, elevations, sections, details, and schedules

«3» Attachments

Contract Times and Addenda

Contract Times

The time for Substantial Completion of all Work is 300 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

Allowance Instructions

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

Allowances (General Contract)

Item	Description	Allowance Amount*	Extension
Allowance A-1	Water Well. Delegated design, drilling, installation, testing, & inspection	$38,000	
Allowance A-2	Underground Propane Tank	$34,000	
«2» Items		Total:	

Unit Price Instructions

Enter the price per unit of measure in the Bid Form and the extension will be automatically calculate. Include the Extension for each and every Unit Price in the Base Bid. Unit prices will be used solely for the purpose of determining the adjustment to the Contract Sum for differences between the estimated quantities on the electronic Bid Form and the actual quantities provided.

Unit Prices (General Contract)

Item	Description	Quantity	Unit Price*	Unit of Measure	Extension
Unit Price U-1	Unsatisfactory soil		_____	Cubic Yards	
«1» Items				Total:	

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		Total:	

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:

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

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

Subcontractor Name*	**Address, City, State, and Zip***

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

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

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

Subcontractor Name	**Address, City, State, and Zip**

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.

Certifications (Federal 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. 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.

6. 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.

7. 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.

8. 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.

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

10. 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.

11. 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.

12. 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.

13. The Bidder understands that the Contract is subject to all the provisions, duties, obligations, remedies and penalties of the Davis Bacon Act, 40 United States Code Section 3141 and following, and that the Bidder shall pay any wage increase in the locality during the term of the Contract. Federal Prevailing Wage rates may be subject to change prior to the final award of this Contract.

14. The Bidder represents that the individual that is submitting and digitally signing the electronic Bid is legally authorized to do so.

15. 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

2 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 any of the following: (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"); or (3) an electronic verification through an electronic verification and security system.

Submission of Original Bid Guaranty

In addition to the electronic facsimile above, if not using an electronic verification and security system, 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. Refer to Section 2.10.1.2 of the Instructions to Bidders.

Carrie Yost, Project Manager
Ohio Department of Transportation
ODOT Division of Statewide Facilities
1980 West Broad Street, 4th Floor, Columbus, Ohio 43223

Non-responsive Bid for Failure to Submit Bid Guaranty

If not using an electronic verification and security system, the 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 an acceptable 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

The Bidder is encouraged to submit background information with its Bid using Document 00 45 13 - "Bidder’s Qualifications" (forms provided for the Bidder's convenience in the block above). If the Bidder does not submit the Bidder's Qualifications 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	Select file... no file selected ☐ I am NOT enclosing this document because the omission terms have been met. (Bidder submitted a Cashier’s Check OR Electronic Verification below)
Power of Attorney → 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	Select file... no file selected ☐ I am NOT enclosing this document because the omission terms have been met. (Bidder submitted a Cashier’s Check OR Electronic Verification below OR included with the Bid Security Form above)
Cashier’s Check for 10% of the Bid → Upload a scan of the Cashier’s Check AND submit the original check to the Contracting Authority within 3 days of the bid deadline	Select file... no file selected ☐ I am NOT enclosing this document because the omission terms have been met. (Bidder submitted the Bid Security Form AND Power of Attorney above, OR Electronic Verification below)
Electronic Verification and Security System → Upload a secure authorization code uniquely and electronically assigned to the Bid Guaranty and Power of Attorney	Select file... no file selected ☐ I am NOT enclosing this document because the omission terms have been met. (Bidder submitted a Bid Security Form AND Power of Attorney, OR Cashier’s Check above)

4 Required Documents

Bidder's Qualifications

Name	File*
Document 00 45 13 - Bidder's Qualifications → Upload fully completed form and attachments	Select file... no file selected ☐ I am NOT enclosing this document because the omission terms have been met. (Must be submitted to the Contracting Authority within 3 days of request)
1 Required Document	

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:*

Email Address:*

Federal Tax ID Number:*

State of Incorporation (if applicable):

Contact person for Contract processing:*

Date enrolled in an OBWC-approved SUPR (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

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

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

_____, as Principal,

and _____ as Sureties,

are hereby held and firmly bound unto _____

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

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

Project Number: _____

Project Name: _____

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

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

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

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

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

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

SIGNED AND SEALED this _____ day of _____ , _____ .

PRINCIPAL:

_____
Signature

By: _____
Name

_____
Title

SURETY:

_____
Signature

By: _____
Attorney-in-Fact

SURETY INFORMATION:

_____
Name

_____
Address 1

_____
Address 2

_____
City State Zip

_____
Telephone

_____
Email

SURETY AGENT'S INFORMATION:

_____
Name

_____
Address 1

_____
Address 2

_____
City State Zip

_____
Telephone

_____
Email

END OF DOCUMENT

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

Project Number: _____

Project Name: _____

1. **Company Name**: _____

Physical Address: _____
Street, Building, Unit

_____
City, State, Zip

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

_____
City, State, Zip

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

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

Email address: _____

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

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

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

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

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

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

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

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

   a) State or federal Prevailing Wage violations or judgments

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

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

   d) Debarment by state, federal, or local jurisdictions

e) EPA/OSHA violations

f) Liquidated damages and Statutory Delay Forfeiture assessed

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

7. **Management.** Identify individuals assigned to this Project.

Principal _____ Years with firm _____ Total Exp._____

Project Manager _____ Years with firm _____ Total Exp._____

Field Superintendent _____ Years with firm _____ Total Exp._____

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

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

Company Name _____

Authorized Official (please print or type) _____

Signature of Authorized Official _____ Date _____

END OF DOCUMENT

Document 00 52 00 - Agreement Form
State of Ohio Standard Requirements for Public Facility Construction

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

Project Number:	**DOT-250005**
Project Name:	**FACD08 Restrooms at Preble Truck Parking Facility**
Site Address:	I-70 WB @ MM 01 New Paris, Ohio 45347 Preble County
Owner:	**Ohio Department of Transportation (ODOT)**
Owner's Representative:	Cory Fidler
Address:	1980 West Broad Street Columbus, Ohio 43223
Contracting Authority:	**Ohio Department of Transportation (ODOT)**
Project Manager:	Carrie Yost
Address:	1980 West Broad Street Columbus, Ohio 43223
Contractor:	**«insert name»**
Contractor's Principal Contact:	«insert name»
Address:	«insert street address» «insert city, state zip code»
Architect/Engineer ("A/E"):	Star Consultants, Inc.
A/E's Principal Contact:	Ali Alghothani, Ph.D, PE.
Address:	1910 Crown Park Court Columbus, Ohio 43235

ARTICLE 1 – COMPENSATION

1.1 The Owner 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:

1.1.1 Base Bid: .....$«Insert Base Bid Amount»

1.1.2 Alternate «Insert Alternates Awarded»: $«Insert Alternate Amount»

1.1.3 Alternate «Insert Alternates Awarded»: $«Insert Alternate Amount»

1.1.4 Alternate «Insert Alternates Awarded»: $«Insert Alternate Amount»

1.1.5 Alternate «Insert Alternates Awarded»: $«Insert Alternate Amount»

1.2 The funding for the Project, including funds retained from payments to the Contractor, will not accrue interest for the benefit of the Project or the Contractor.

ARTICLE 2 - CONTRACT TIMES

2.1 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	300 calendar days	«insert date»

2.1.1 The projected dates listed under "Projected Date (as of the date of this Agreement)" are **(1)** based upon an anticipated, but not guaranteed, Date of Commencement of «insert date»; and **(2)** 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 3 - KEY PERSONNEL

3.1 The Contractor's key personnel for the Project are:

3.1.1 «insert name», Project Manager;

3.1.2 «insert name», Lead Scheduling Engineer;

3.1.3 «insert name», General Superintendent.

3.2 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 4 - GENERAL PROVISIONS

4.1 Effectiveness.

4.1.1 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 Owner'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.

4.1.2 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 Owner gives the Contractor written notice that such funds are available from the Owner's funding source.

4.1.3 Subject to **Section 4.1.1**, the Contract shall become binding and effective upon execution by the Contracting Authority, Owner, Contractor, and Ohio Attorney General.

4.1.3.1 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.

4.1.3.2 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.

4.1.4 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.

4.2 Representations.

4.2.1 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 Owner any funds paid under this Contract.

4.2.2 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.

4.2.3 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.

4.2.4 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.

4.2.5 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.

4.2.6 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**.

4.2.7 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 5 - Enumeration of Documents

5.1 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.

SIGNATURES

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

«INSERT CONTRACTOR'S NAME»	**STATE OF OHIO**
_____	_____
Signature	*Signature*
_____	_____
Printed Name	*Printed Name*
_____	_____
Title	*Title*
	OHIO ATTORNEY GENERAL Approval as to Form
_____	_____
	Signature
_____	_____
	Printed Name
_____	_____
	Title
	_____
	Date

«INSERT CONTRACTOR'S NAME» by «insert Joint Venturer/Member's name»	STATE OF OHIO by «insert Contracting Authority'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*
Title	*Title*
Date	*Date*

END OF DOCUMENT

Document 00 52 14 - State of Ohio Subcontract Form
State of Ohio Standard Requirements for Public Facility Construction

This Agreement is made as of the date set forth below between the Contractor and the Subcontractor in connection with the Project.

Project Number:	DOT-250005
Project Name:	FACD08 Restrooms at Preble Truck Parking
Site Address:	I-70 WB @ MM 01 New Paris, Ohio 45347
Contractor:	**«insert name»**
Contractor's Principal Contact:	«insert name»
Address:	«insert street address» «insert city, state zip code»
Subcontractor:	**«insert name»**
Subcontractor's Principal Contact:	«insert name»
Address:	«insert street address» «insert city, state zip code»
Public Authority:	Ohio Department of Transportation (ODOT)
Public Authority Contact:	Carrie Yost
Address:	1980 West Broad Street Columbus, Ohio 43223

ARTICLE 1 - NATURE OF SUBCONTRACT

1.1 The Subcontractor shall perform the entire Subcontract Work as specified in Exhibit «N» and described in the Contract Documents for the Project.

ARTICLE 2 - COMPENSATION

2.1 The Contractor agrees to pay for the performance of this Subcontract, subject to additions and deductions as provided in the Contract Documents, the Subcontract Sum of «insert Subcontract Sum», comprised of the following:

«insert Subcontract Sum component»..... $«insert amount»

«insert Subcontract Sum component»..... $«insert amount»

«insert Subcontract Sum component»..... $«insert amount»

«insert Subcontract Sum component»..... $«insert amount»

ARTICLE 3 - TIME OF PERFORMANCE

3.1 Time is of the essence. The Subcontractor shall diligently prosecute and complete all Subcontract Work in accordance with the construction progress schedule agreed between the parties.

ARTICLE 4 - CONTRACT DOCUMENTS

4.1 To the extent that the contract between the Public Authority and the Contractor applies to the Subcontract Work:

4.1.1 The Contractor and the Subcontractor agree to be mutually bound by the terms of the Contract Documents;

4.1.2 The Contractor assumes toward the Subcontractor the rights, remedies, obligations, and responsibilities that the Public Authority has and assumes toward the Contractor;

4.1.3 The Subcontractor assumes toward the Contractor the rights, remedies, obligations, and responsibilities that the Contractor assumes toward the Public Authority; and

4.1.4 The Subcontractor agrees to perform its portion of the Work in accordance with the Contract Documents.

4.2 The Subcontract and any modifications, amendments, or alterations thereto shall be governed, construed, and enforced by and under the laws of the State of Ohio.

4.3 If any term or provision of the Subcontract, 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 the Subcontract or the application of such term or provision to other Persons or circumstances, shall not be affected thereby, and each term and provision of the Subcontract shall be valid and enforced to the fullest extent permitted by law.

4.4 The Subcontract shall be binding on the Contractor and Subcontractor, their successors and assigns, in respect to all respective covenants and obligations contained in the Contract Documents, but the Subcontractor may not assign the Subcontract without the prior written consent of the Contractor and the Public Authority.

ARTICLE 5 - EFFECTIVENESS

5.1 The Subcontract shall become binding and effective upon execution by the Contractor.

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

5.3 Any signatory may deliver a copy of its counterpart signature page to this Subcontract via fax or e-mail. Each signatory shall be entitled to rely upon a signature of any other signatory delivered in such a manner as if such signature were an original.

ARTICLE 6 - REPRESENTATIONS

6.1 Contingent Assignment. The Contractor's contingent assignment of this Subcontract to the Public Authority, as provided in the Contract, is effective after termination of the Contractor by the Public Authority and the Public Authority's acceptance of the assignment in writing to the Subcontractor. The Subcontractor consents to the assignment and shall be bound at the same price and terms as in the Subcontract to the Public Authority. Unless the Public Authority takes assignment of the Subcontract, the Subcontractor will not have any contractual rights against the Public Authority.

6.2 Intended Third-Party Beneficiary. The Public Authority is an intended third party beneficiary of the Subcontract, entitled to enforce any rights thereunder for its benefit.

6.3 Insurance. The Subcontractor shall maintain insurance in accordance with the Contract Documents. Exhibit «N» sets forth the minimum limits of liability for the insurance required in the Contract Documents.

6.4 Right to Audit. The Subcontractor agrees that the Public Authority or any agents designated by the Public Authority have access to and the right to audit and the right to copy at the Public Authority's cost all of the Subcontractor's books, records, contracts, correspondence, instructions, drawings, receipts, vouchers, purchase orders, and memoranda relating to the Work for a period of not less than 3 years following completion of the Work consistent with Ohio Revised Code ("ORC") Section 149.43 with regard to the Public Authority's obligation to maintain confidentiality of trade secrets.

6.5 Indemnity. To the fullest extent permitted by law, the Subcontractor shall indemnify, defend, and hold harmless the Public Authority, the Contractor, their consultants and employees from all claims and expenses for bodily injury and property damage other than to the Work itself that may arise from the performance of the Subcontract Work, including reasonable attorneys' fees, costs and expenses, but only to the extent caused by the negligent acts or omissions of the Subcontractor or a person or entity for whom the Subcontractor may be liable. This Subcontract does not require a Subcontractor to waive its immunity under the Workers Compensation laws of Ohio from claims brought against the Subcontractor by the Subcontractor's employees.

6.6 Prompt Pay. The Contractor shall at a minimum make payments to the Subcontractor in accordance with Applicable Law, including ORC Section 4113.61. Progress payments to the Subcontractor for satisfactory performance of Subcontract Work shall be made no later than 10 days after receipt by the Contractor of payment from the Public Authority for Subcontract Work.

6.7 Warranty. The Subcontractor fully warrants, for the benefit of the Public Authority, that all materials and equipment shall be new unless otherwise specified, of good quality, in conformance with the Contract Documents and free from defective workmanship or materials.

6.8 Non-Waiver of Lien Rights or Payment Bond Rights. This Subcontract shall not prohibit a Subcontractor from exercising its rights under ORC Chapter 1311 or under any Contractor-provided payment bond.

6.9 Non-Discrimination. The Subcontractor agrees to fully comply with Applicable Law regarding equal opportunity, including ORC Section 153.59 and, to the extent applicable, all Executive Orders issued by the Governor of the state of Ohio.

6.10 Dispute Resolution. The supplemental conditions to this Subcontract shall provide for a dispute resolution process comparable to the Contract's dispute resolution process in terms of timing, notice, substantiation, and informal dispute resolution efforts. The dispute resolution process provided in the supplemental conditions shall result in prompt access to the ultimate dispute resolution mechanism selected by the parties.

6.11 In the event that any supplemental conditions or other Subcontract terms conflict with the **State of Ohio Subcontract Form**, the **State of Ohio Subcontract Form** takes precedence and this Subcontract shall be read and enforced to include the provisions of the **State of Ohio Subcontract Form**.

6.12 The following exhibits are attached to and are a part of this Subcontract:

6.12.1 Exhibit A:

6.12.2 Exhibit B:

6.12.3 Exhibit C:

6.12.4 Exhibit D:

SIGNATURES

IN WITNESS WHEREOF, the parties have executed this Subcontract Form.

«INSERT SUBCONTRACTOR'S NAME»	**«INSERT CONTRACTOR'S NAME»**
Signature	*Signature*
Printed Name	*Printed Name*
Title	*Title*
	Date

END OF DOCUMENT

Document 00 61 13 - Performance and Payment Bond Form
State of Ohio Standard Requirements for Public Facility Construction

(Form of Bond prescribed by Ohio Revised Code Section 153.57 - Not to be used as Bid Guaranty)

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 _____ dollars, for the payment of which well and truly to be made, we jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

SIGNED AND SEALED this _____ day of _____, _____.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above-named Principal did on the _____ day of _____, _____, enter into a Contract with the Obligee, which said Contract is made a part of this Bond the same as though set forth herein and which is more fully described as:

Project Number: _____

Project Name: _____

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

NOW, THEREFORE, if the above-named Principal shall well and faithfully do and perform the things agreed by the Obligee to be done and performed according to the terms of said Contract; 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 Supplier 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 Sureties 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 the said Contract or in or to the Plans and Specifications therefor shall in any wise 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.

PRINCIPAL:

_____
Principal Signature

By: _____

Title: _____

SURETY:

_____
Surety Signature

By: _____
Attorney-in-Fact

SURETY INFORMATION:

_____
Street

_____
City State Zip

_____
Telephone Number

SURETY AGENT'S INFORMATION:

_____
Agency Name

_____
Street

_____
City State Zip

_____
Telephone Number

_____
Email Address

END OF DOCUMENT

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

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 Signature

By: _____
Attorney-in-Fact

_____
Date

SURETY INFORMATION:

_____
Street

_____
City State Zip

_____
Telephone Number

SURETY AGENT'S INFORMATION:

_____
Agency Name

_____
Street

_____
City State Zip

_____
Telephone Number

END OF DOCUMENT

Acceptable Component A component listed in the Specifications after the Basis of Design Component.

Addenda or Addendum 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.

A/E See "Architect/Engineer."

Agreement 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.

Allowance 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.

Alternate 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.

Alternative Dispute Resolution 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.

Applicable Law 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.

Architect/Engineer 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 **(1)** registered architect holding a license and certificate of authorization issued by the Ohio Architects Board pursuant to ORC Chapter 4703, **(2)** landscape architect holding a license and certificate of authorization issued by the Ohio Landscape Architects Board pursuant to ORC Chapter 4703, or **(3)** 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.

As-Built Documents Documents, including but not limited to Drawings, Addenda, Specifications, executed Change Orders, 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.

Base Bid 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.

Basis of Design 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.

Basis of Design Component A component listed first in the Specifications.

Bid 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.

Bidder	A Person that submitted a Bid.
BIM	See “Building Information Model.”
Bid Form	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.
Bid Guaranty	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.
Bond	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.
Building Information Model	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.
Certificate of Contract Completion	A form used to document that the Contractor’s achievement of Contract Completion. This form may also be used to document partial Contract Completion.
Certificate of Substantial Completion	A form used to document **(1)** 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 **(2)** the date on which the associated Substantial Completion of the Work was achieved.
Change Directive	A written document prepared by the A/E and executed by the Contracting Authority that directs a change in the Work.
Change Order	A document recommended by the A/E and executed by the Contracting Authority and the Contractor that modifies the Contract.
Claim	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.
Claim Affidavit	A sworn document used in conjunction with filing a lien, which contains a claim on the funds that are due to a Contractor, in favor of a Person supplying labor, materials, or services for the value of labor, materials, or services supplied.
Combined Bid	A Bid that combines bid items for separate Contracts stated on the Bid Form.
Commission	See “Ohio Facilities Construction Commission.”
Commissioning Agent	The Person identified by the Contracting Authority who leads, plans, schedules, and coordinates the commissioning team to implement the Commissioning Process for the Project.
Commissioning Plan	A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the Commissioning Process.
Commissioning Process	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.

Commissioning Report 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.

Conformed Documents 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.

Construction Budget The amount identified in the Agreement as adjusted by the Owner and Contracting Authority.

Construction Cost The sum of the Contract Cost amounts for a phase of the Project.

Construction Progress Schedule 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.

Contract 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.

Contract Completion 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 **(1)** all governmental authorities have given final, written approval of the Work, **(2)** a final unconditional certificate of occupancy has been granted and issued to the Owner by the appropriate governmental authorities, **(3)** the Contractor's Work is 100 percent complete, and **(4)** all Punch List items have been completed or corrected, and **(5)** the Contractor has complied with conditions precedent to final payment and release of retained funds.

Contract Documents Collectively, the documents that constitute the substance of the Contract including but not limited to 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 Change Orders if any.

Contract Sum 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.

Contract Times 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.

Contracting Authority The party identified 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.

Contractor A firm, which is party to the Contract for the performance of Work on the Project in accordance with the Contract Documents.

Contractor's Documents All Project-related documents, including those in electronic form, prepared by the Contractor and its Subcontractors.

Contractor's Fee	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.
Contractor Payment Request	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.
Contractor's Punch List	A document prepared by the Contractor that consists of a list of items of Work to be completed or corrected by the Contactor as a condition precedent to Contract Completion.
Coordination Drawings	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.
Correction Period	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.
CxA	See "Commissioning Agent."
Date of Commencement	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.
day	A calendar day of 24 hours measured from midnight to midnight, unless otherwise expressly specified to mean a business day.
Defective Work	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.
Differing Site Condition	Either **(1)** a subsurface or otherwise concealed physical condition encountered at the Site that differs materially from the conditions indicated in the Contract Documents or **(2)** 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.
Dispute Review Board	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.
Drawings	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.
Electronic File	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.
Enclosure, Permanent	The condition in which the permanent exterior walls and roofs are in place, insulated and weathertight, and permanent windows and entrances are in place.
Enclosure, Temporary	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.

Estimated Construction Cost The sum of the Estimated Contract Cost amounts published in the Solicitation, as modified by Addenda, for a phase of the Project.

Estimated Contract Cost 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.

Extra Materials 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.

Final Inspection 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.

furnish Supply and deliver to the Site, or other specified location, ready for installation.

General Conditions The State's Standard General Conditions currently in effect, which may be modified by the Commission from time to time.

General Conditions Costs 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 **(1)** Bond premiums and **(2)** premiums for builder's risk insurance if the Contractor purchases the builder's risk policy for the Project.

Hazardous Materials 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.

Indemnified Parties 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.

install Put into use or place in final position, complete and ready for intended service or use.

Institutional Designee 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.

Institution of Higher Education 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.

Liquidated Damages 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.

Material Supplier 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.

mediation 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.

Milestone A principal event specified in the Contract relating to an intermediate completion date or time prior to and including Substantial Completion of all Work.

Modification A **(1)** written amendment to the Contract signed by both parties, **(2)** Change Order, **(3)** Change Directive, or **(4)** an order for a minor change in the Work.

negotiation 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.

Neutral Facilitator An 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.

Notice of Commencement 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.

Notice of Intent to Award 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.

Notice to Proceed 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.

OAC Ohio Administrative Code

Ohio Facilities Construction Commission The authorized contracting agent for public improvement projects in accordance with ORC Chapters 123 and 153, acting by and through its Executive Director.

ORC Ohio Revised Code

Owner 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.

Owner's Project Requirements A written document that details the functional requirements of the Project and the expectations of how it will be used and operated. These include project goals, measureable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

Partial Occupancy 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 having jurisdiction, and items of Work cannot be completed until a subsequent date.

partnering 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.

Person An individual, corporation, business trust, estate, partnership, association, or other public or private entity.

Phase A separation in the Work of the Project by sequence or time intervals, which may include separate contractors for each Phase.

Plan Holder A prospective Bidder that received a set of Contract Documents prior to the bid opening.

Product Data Manufacturer's standard illustrations, schedules, diagrams, performance charts, instructions, and brochures that illustrate physical appearance, size, and other characteristics of materials and equipment.

Project The public improvement, of which the Work performed under the Contract Documents may be the whole or a part.

Project Manager A permanent employee of the Contracting Authority assigned to the Project and authorized to perform specific responsibilities.

Project Manual 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.

Proposal The offer of a Contractor to perform the Work set forth in a Proposal Request.

Proposal Request 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.

provide Furnish and install, complete and ready for intended use.

Punch List A document listing items of Work requiring correction or completion by the Contractor as a condition precedent to Contract Completion.

Record Documents 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, Change Directives, Proposal Requests, Requests for Interpretation, Addenda, Change Orders, Balancing Reports, and the final version of the approved Construction Progress Schedule.

Record Drawings 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.

Record Model 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.

Record Project Manual 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.

Request for Change Order A written notice from the Contractor accompanied by a Proposal for a change in the Work.

Request for Interpretation A written request to the A/E seeking an interpretation or clarification of the Contract Documents.

RFI See "Request for Interpretation."

Samples 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.

Schedule of Values A full, accurate, and detailed statement furnished by the Contractor reflecting a defined breakdown of the Contract Sum.

School District 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.

School District Board The board of education of a School District.

Separate Consultant 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.

Separate Contract The contract between the Owner or Contracting Authority and a Separate Consultant or a Separate Contractor.

Separate Contractor 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.

Shop Drawings 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.

Site The location designated for the Project.

Specifications 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.

Stage 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.

Standard Requirements 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; currently in effect, which the Commission may modify from time to time.

State 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, any state institution of higher education as defined in ORC Section 3345.011, or any School District Board as defined in ORC Section 3318.01.

Subcontract Any contract or agreement between the Contractor and a Subcontractor for performance of a portion of the Work.

Subcontract Form The **State of Ohio Subcontract Form** prescribed by OAC Section 153:1-3-02 and required for use with the General Contracting method of project delivery.

Subcontractor 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.

Substantial Completion 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.

Substantially Complete See "Substantial Completion."

Substitution 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.

Supplementary Conditions 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.

Supplementary Instructions 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.

Surety 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.

Systems Manual 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.

Unit Price 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.

Work 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

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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).

1.2 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 for load bearing structural purposes on all projects funded in whole or in part with State funds. 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 Project Management Software

1.7.1 If the Contracting Authority decides, in its sole discretion, to use project management software for the Project, the Contractor shall use that software for all compatible services required under this Contract.

1.7.2 All costs for the Contractor's use of the project management software for the Project shall be included in the Contract Sum. If the Contractor is unfamiliar with the proper use of the 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 Ohio Department of Development.

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 the OAC.

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 Ohio Department of Development 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 shall initiate a Change Request **(1)** as required under **Section 7.6**; and **(2)** within the time period required under **Section 7.6**, which begins to run on the day that the emergency began.

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, rules, policies, and procedures adopted by the Ohio Facilities Construction Commission establishing Sustainability Requirements for Capital Improvements Projects, including but not limited to the applicable provisions of OAC 3318-3.

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

ARTICLE 2 - STATE'S RIGHTS AND RESPONSIBILITIES

2.1 Contracting Authority

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

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

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

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

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

2.1.4.2 If the Project is administered using project management software, the Contractor shall utilize the web-based forms and reports within the applicable business process. The project management software is sponsored by the Commission, and the 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 shall send a response in writing to the Contracting Authority within 30 days after 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 shall 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, directly or through a consultant, shall manage, 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. The Contractor shall coordinate with the A/E and cooperate in the A/E's effort to complete the testing and inspection services required in this **Section 3.3**

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. If the A/E returns such incomplete forms to the Contractor, the Contractor shall resubmit the forms with revisions complying with the corrective action identified by the A/E.

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 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.

4.2 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.

4.3 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 its Subcontractors.

4.4.1.2 The Contractor shall require each of its Subcontractors to 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 Sections 153.12 and 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 Neutral Facilitation

5.1.1 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.

5.1.1.1 For example, a Neutral Facilitator may facilitate a preconstruction organizational meeting, a partnering session, or efforts to resolve disputes throughout the Project, all of which the Contractor shall participate in at the Contracting Authority's request. The Contractor's compensation for participating in those meetings, sessions,

efforts, and related activities is included in the Contract Sum, and the Contractor will not be entitled to an increase of the Contract Sum for participating as requested.

5.1.2 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.

5.1.3 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.

5.1.4 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.

5.1.5 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.

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, unless the reinspection is required because the design does not comply with Applicable Law.

5.2.2 Trade Permits and Licenses.

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

5.2.3 Local Permits.

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

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

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

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

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

ARTICLE 6 - CONSTRUCTION AND CLOSEOUT

6.1 Commencement of Work on the Site

6.1.1 The Construction Stage will start and the Contract Times will begin to run on the Date of Commencement established in a Notice to Proceed, which the Contracting Authority will issue to the Contractor. The date on which the Contracting Authority issues the Notice to Proceed **(1)** is not relevant to the running of the Contract Times, and **(2)** may differ from Date of Commencement. Unless the Contracting Authority agrees otherwise in writing, the Contractor shall begin to perform the Work within seven days after the Date of Commencement and thereafter diligently prosecute the Work. The Construction Stage terminates upon Contract Completion.

6.2 Contractor's General Responsibilities

6.2.1 The Contractor shall **(1)** maintain a competent, full-time staff at the Site at all times that Work is in preparation or progress on the Project, **(2)** shall supervise the Work; **(3)** establish and implement on-Site organization and authority so that the Work is accomplished in conformance with the Project Schedule; and **(4)** complete portions of the Work in the sequence and time in the Construction Progress Schedule.

6.2.2 The Contractor shall 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 shall cooperate and coordinate fully with all Separate Consultants and Separate Contractors and shall 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.

6.2.3 The Contractor shall 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.

6.2.4 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.

6.2.5 The intent of **Sections 6.2.2** through **6.2.4** 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.

6.2.6 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 shall 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.

6.2.7 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.

6.2.8 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.

6.2.9 The Contractor shall monitor the progress of the Work for conformance with the Construction Progress Schedule and shall initiate revisions as required by **Section 6.5.6**.

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

6.2.11 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.

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

6.2.13 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.

6.2.14 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 Within ten days after the Date of Commencement, the Contractor shall submit to the Contracting Authority an outline of the qualifications and experience of the Contractor's proposed project manager and proposed superintendent, including references. Upon receiving a request from the Contracting Authority, the Contractor shall submit to the Contracting Authority an outline of the qualifications and experience of any Subcontractor's proposed project manager and proposed superintendent.

6.4.3.1 The Contracting Authority may reject the Contractor's 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 6.12.2** or any other provision relative to that project manager or superintendent.

6.4.3.2 If the Contracting Authority rejects the Contractor's 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's or Subcontractor's (as applicable) proposed replacement project manager or superintendent.

6.5 Construction Progress Schedule

6.5.1 General Requirements

6.5.1.1 The Contractor shall prepare and maintain the Construction Progress Schedule using the critical path method of scheduling and commercially available computer software acceptable to the Contracting Authority.

.1 In the Construction Progress Schedule, the Contractor shall **(1)** organize all Work activities into a logical work breakdown structure; **(2)** set forth a reasonable, efficient, economical, and practical plan to complete the Work within the Contract Times, and **(3)** convey the prosecution and progress of the Work in a manner that accounts for **(a)** normal adverse weather, as defined under **Section 7.10**, through reasonably anticipated productivity variations for weather-sensitive activities, **(b)** Legal Holidays, and **(c)** similar reasonably anticipated events.

6.5.1.2 The Contractor shall use the most-current, accepted Construction Progress Schedule **(1)** to plan, organize, execute, and manage the Work using early start dates and early finish dates; **(2)** to record and report actual performance and progress of the Work; **(3)** to show how it plans to coordinate and complete all remaining Work within applicable Milestones; and **(4)** as the basis for requests for extensions of the Contract Times.

6.5.1.3 The Project participants will use the Construction Progress Schedule as a tool for scheduling and reporting sequenced progress of the Work.

6.5.1.4 The Contracting Authority's, Owner's, or A/E's review, acceptance, or approval of any Construction Progress Schedule will not **(1)** relieve the Contractor of any of the Contractor's responsibilities under the Contract including the responsibility to perform the Work in accordance with the Construction Progress Schedule and within the Contract Times, or **(2)** imply, warrant, or acknowledge the reasonableness or accuracy of the logic, durations, cost, resource loading, or any other attributes of the Construction Progress Schedule.

6.5.1.5 The Contracting Authority may withhold payment from the Contractor on account of the Contractor's failure to prepare, maintain, or update the Construction Progress Schedule as required under the Contract.

6.5.2 Submission Requirements

6.5.2.1 The Contractor shall provide each submission of the Construction Progress Schedule **(1)** as a Gantt chart in PDF; **(2)** as a Gantt chart in hardcopy if the Contracting Authority requests; and **(3)** an Electronic File.

.1 The hardcopy format for the Construction Progress Schedule shall be 11x17 inch.

.2 The Electronic File of the Construction Progress Schedule shall be in .xer, .xml, or .mpp format.

6.5.2.2 At the Contracting Authority's request, the Contractor shall prepare and submit to the Contracting Authority reports produced through the scheduling software (collectively "Schedule Reports").

.1 Unless the Contracting Authority requests otherwise, the Contractor shall submit each Schedule Report in Electronic File format, PDF format, and 8.5x11 hardcopy format.

6.5.3 Schedule Information Requirements

6.5.3.1 General Requirements. The Contractor shall include at least the following information in the Construction Progress Schedule:

.1 a clear graphics legend;

.2 the Contracting Authority's Project number and Project name;

.3 a graphic presentation of the sequence of all of the Work;

.4 identification of each stage of the Work and any Milestone dates;

.5 identification of activities and durations for **(1)** entering into each Subcontract with an anticipated value in excess of 10% of the Construction Budget or as otherwise requested by the Contracting Authority; **(2)** preparation, review, and approval of Shop Drawings and other action submittals; **(3)** fabrication and review of mock-up Work; **(4)** product review and procurement, fabrication, shop inspection, and delivery, including, but not limited to, lead time and coordination drawing delivery; **(5)** Date of Commencement identified as "Start Milestone"; **(6)** date(s) of Substantial Completion identified as "Finish Milestone"; **(7)**

Punch List development; **(8)** Punch List correction; **(9)** Project close-out requirements; **(10)** occupancy requirements; and **(11)** Contract Completion;

.6 for each activity:

1. Activity ID, Activity Description, and Calendar ID;

2. identification of the single organization responsible for performing the activity;

3. early start, early finish, late start, late finish, duration, and total float;

4. in other than the baseline Construction Progress Schedule: original duration, remaining duration, and percentage of completion;

5. identification of predecessor and successor activities, constraints, and percentage of completion; and

6. a maximum duration that is appropriate for the activity but not in excess of 15 days except **(1)** non-construction activities such as procurement of materials, delivery of equipment, concrete curing, etc.; and **(2)** other activities for which the Contracting Authority may approve a longer duration;

.7 identification of disruptions and shutdowns due to other operations;

.8 identification of all planned work hours for each Work Day;

.9 identification of the longest path of the Work (in red) and all critical paths of the Work;

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

.11 other items required by the Contracting Authority, Owner, or A/E; and

.12 the Contractor's signature approval and date lines, which the Contractor shall complete indicating approval of each submitted schedule.

6.5.3.2 Activity Identifications ("ID")

.1 Activity ID's shall follow the naming convention agreed upon between the Contracting Authority and the Contractor before the Contractor begins to prepare the baseline Construction Progress Schedule.

.2 Each Activity ID for a specific Activity Description shall remain unchanged and connected to its original Activity Description throughout the Project.

6.5.3.3 Activity Descriptions

.1 Each activity shall have a clear and concise Activity Description..

6.5.3.4 Activity Relationships

.1 All activities except Date of Commencement shall have at least one predecessor, and all activities except Contract Completion shall have at least one successor.

.2 To link activities, the Contractor may use **(1)** finish-to-start relationships with no leads or lags; **(2)** start-to-start relationships with lags no greater than the predecessor duration; or **(3)** finish-to-finish relationships when both activities are already aligned with a start-to-start relationship.

6.5.3.5 Project Level Activity Codes

.1 For each activity, the Contractor shall assign responsibility to an identified, single performing organization.

6.5.3.6 Project Level Calendars

.1 The Contractor shall create and maintain calendars at the project level.

6.5.3.7 No Global Data

.1 The Contractor may not use global data of any kind (e.g., codes, calendars, etc.).

6.5.3.8 Float and Critical Activities

.1 "Float" is the amount of time between the early start date and the late start date (or the early finish date and the late finish date) for each activity. Float is for the benefit of both the Contracting Authority and the Contractor; i.e., float is not for the Contractor's exclusive benefit. Either the Contracting Authority or the Contractor may use float on a first-come-first-served basis without cost impact. The Contractor may not suppress or consume float by artificially extending activity durations, creating dummy activities, or applying preferential sequencing.

1. The Contractor shall exhaust existing float before claiming additional time for a Modification, or show that it is not possible to use float to cover the time requirements of the Modification.

2. The Contractor may not suppress or sequester float through, for example, artificial/illogical sequencing, excessive durations, date constraints, float constraints, improper use of lag, or calendar manipulation.

.2 "Critical Activities" are activities **(1)** occurring on the longest path through the Construction Progress Schedule; or **(2)** with float of less than one day; or **(3)** both. The Contractor shall monitor and diligently pursue any activities with ten or fewer days of total float.

6.5.4 Baseline Construction Progress Schedule

6.5.4.1 Unless the Contracting Authority and Contractor agree otherwise, within 45 days after the execution of the Agreement, the Contractor shall submit to the Contracting Authority and A/E a fully developed, baseline Construction Progress Schedule in compliance with this **Section 6.5** that demonstrates the longest path and all critical paths for all of the Work.

.1 The Contracting Authority's approval of the baseline Construction Progress Schedule is a condition precedent to the Contractor's entitlement to payment under the Contract.

6.5.4.2 The Contractor shall develop the baseline Construction Progress Schedule based upon **(1)** the Contract Times defined in the Agreement, and **(2)** the schedule information included in the Bidding Documents.

6.5.4.3 In the event of a significant change or combination of changes, as determined by the Contracting Authority in its discretion, the Contracting Authority may identify a Contracting Authority-approved, updated or revised Construction Progress Schedule as the new baseline Construction Progress Schedule for future updates and reports.

6.5.5 Monthly Construction Progress Schedule Updates

6.5.5.1 The Contractor shall include a monthly Construction Progress Schedule update as a component of each of the Contractor's Progress Status Reports.

6.5.5.2 The Contractor shall generate monthly Construction Progress Schedule updates based upon and relative to the Contracting Authority-approved baseline Construction Progress Schedule and using retained logic (as opposed to logic override) to reflect and include:

.1 the actual progression and sequence of the Work;

.2 actual and projected start and completion dates;

.3 actual Modifications; and

.4 the longest path of the Work and all critical paths of the Work.

6.5.5.3 The Contractor shall use the first date of the next month at 12:01 a.m. as the data date for calculating the monthly Construction Progress Schedule update (e.g., progress through March will have a data date of April 1 @ 12:01 am).

6.5.5.4 The Contractor shall accurately input actual start and actual completion dates and correct all logic errors. If the Contractor changes/corrects any actual dates in any following month, the Contractor shall clearly identify the change/correction and provide a written explanation for it.

6.5.5.5 If the Contracting Authority requests, the Contractor shall include with each monthly Construction Progress Schedule update any of the associated Schedule Reports produced by the scheduling software.

6.5.5.6 The Contractor’s submission of a monthly Construction Progress Schedule update shall serve as an affirmation that the Contractor intends to and is capable of performing the Work consistent with the associated monthly Construction Progress Schedule update.

6.5.5.7 The Contracting Authority and the A/E will review and may approve or reject and return the monthly Construction Progress Schedule update to the Contractor with recommendations for revisions.

6.5.6 Revised Construction Progress Schedules

6.5.6.1 Unless and until the Contracting Authority agrees in writing, the Contractor shall not change any of the accepted activities, activity durations, schedule logic, interdependencies, Milestones, planned sequence of operations, or resource loading set forth in the Construction Progress Schedule.

6.5.6.2 Once the Contracting Authority accepts a Modification involving Construction Progress Schedule changes (including no-cost time extensions such as on account of excessive weather days and other excusable delays), but not before then, the Contractor shall promptly incorporate the associated activity, duration, and logic changes, additions, combinations, eliminations, or other modifications into the then-current Construction Progress Schedule and submit for the Contracting Authority's approval **(1)** that revised Construction Progress Schedule; and **(2)** if the Contracting Authority requests, any of the associated Schedule Reports produced by the scheduling software.

6.5.6.3 If the Contractor incurs an inexcusable delay, the Contractor shall promptly incorporate any associated activity, duration, and logic changes, additions, combinations, eliminations, or other modifications into the then-current Construction Progress Schedule and submit for the Contracting Authority's approval **(1)** that revised

Construction Progress Schedule; and **(2)** if the Contracting Authority requests, any of the associated Schedule Reports produced by the scheduling software. The Contracting Authority's approval will not constitute an extension of the Contract Times due to the inexcusable delay.

6.5.6.4 The Contractor's submission of a revised Construction Progress Schedule shall serve as an affirmation that the Contractor intends to and is capable of performing the Work consistent with the associated revised Construction Progress Schedule update.

6.5.6.5 If the Contracting Authority and the Contractor cannot reach agreement on Construction Progress Schedule modifications resulting from a Modification or inexcusable delay, and the Contracting Authority requests, the Contractor shall prepare and submit a time-impact analysis when and as described under **Section 7.9.3**.

6.5.7 Short-Interval Schedules and Weekly Schedule Reports

6.5.7.1 A "Short-Interval Schedule" is a three- to four-week (past week, current week, and the next one to two weeks) schedule window that **(1)** breaks down existing schedule activities into smaller and more-manageable components with relatively short durations; and **(2)** is consistent with the then-current Construction Progress Schedule.

6.5.7.2 On a weekly basis, and no less than 24 hours before the next regularly scheduled Progress Meeting, the Contractor shall prepare and submit a Short-Interval Schedule to the A/E. The Contractor shall present and be prepared to discuss the Short-Interval Schedule during that Progress Meeting, and the A/E shall attach the Short-Interval Schedule to the minutes of that Progress Meeting.

6.5.8 Recovery Plan and Revised Construction Progress Schedule

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

6.5.8.2 A recovery plan shall include, but is not limited to, adjustments to the following:

- **.1** workforce;
- **.2** hours per shift;
- **.3** shifts per workday;
- **.4** workdays per week;
- **.5** material and equipment procurement; and
- **.6** activity logic.

6.5.8.3 The Contractor's submission of a recovery plan shall serve as an affirmation that the Contractor **(1)** prepared the recovery plan in consultation with its Subcontractors, and **(2)** intends to and is capable of performing the Work consistent with that recovery plan.

6.5.8.4 If the Owner and Contracting Authority approve the recovery plan, within seven days after the plan approval, the Contractor shall incorporate that plan into a revised Construction Progress Schedule which the Contractor shall prepare and submit for review and approval in accordance with **Section 6.5.6**. If the Owner and Contracting Authority do not approve the recovery plan, the Contractor shall submit an alternate recovery plan within three days.

6.5.9 Small-Project Exceptions

6.5.9.1 This **Section 6.5** applies to a Small Project, which is a Project for which the initial Contract Sum is less than $500,000, except as explicitly provided in this **Section 6.5.9.**

6.5.9.2 In lieu of **Section 6.5.2**, the Contractor shall provide each submission of the Construction Progress Schedule **(1)** as a Gantt chart in PDF; **(2)** as a Gantt chart in hardcopy if the Contracting Authority requests; and **(3)** an Electronic File in its native format.

6.5.9.3 In lieu of **Section 6.5.3**, the Contractor shall include at least the following information in the Construction Progress Schedule:

- **.1** a clear graphics legend;
- **.2** the Contracting Authority's Project number and Project name;
- **.3** identification of each stage of the Work and any Milestone dates;
- **.4** identification of activities and durations for **(1)** date(s) of Substantial Completion; **(2)** Project close-out requirements; and **(3)** and Contract Completion;
- **.5** for each activity, a maximum duration that is appropriate for the activity but not in excess of 15 days;
- **.6** other items required by the Contracting Authority, Owner, or A/E; and

.7 the Contractor's signature approval and date lines, which the Contractor shall complete indicating approval of each submitted schedule.

6.5.9.4 In lieu of **Section 6.5.4.1**, unless the Contracting Authority and Contractor agree otherwise, within 15 days after the execution of the Agreement, the Contractor shall submit to the Contracting Authority and A/E a fully developed, baseline Construction Progress Schedule in compliance with this **Section 6.4.**

6.5.9.5 In lieu of **Section 6.5.5.2,** the Contractor shall generate monthly Construction Progress Schedule updates based upon and relative to the Contracting Authority-approved baseline Construction Progress Schedule to reflect and include **(1)** the actual progression and sequence of the Work; **(2)** actual and projected start and completion dates; and **(3)** actual Modifications.

6.5.9.6 The Contractor may, but is not obligated to comply with **Sections 6.5.3.4**, **6.5.3.5**, **6.5.3.6**, **6.5.3.7**, **6.5.5.3**, **6.5.5.4**, and **6.5.5.5**.

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 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.

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 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 promptly respond to each 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 shall initiate a Change Request **(1)** as required under **Section 7.6**, and **(2)** within the time period under **Section 7.6**, which begins to run on the day that the Contractor receives the A/E's RFI response.

6.9 Differing Site Conditions

6.9.1 If the Contractor reasonably believes that it has encountered a Differing Site Condition, the Contractor shall immediately stop Work on that suspected Differing Site Condition 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.

6.9.1.1 The Contractor's failure to give notice of the Differing Site Condition as required under this **Section 6.9** will constitute an irrevocable waiver of any associated Claim.

6.9.1.2 The written notice of a Differing Site Condition under this **Section 6.9** shall be required before submission of a Change Request under **Section 7.6** or notice of Claim under **Article 8**.

6.9.2 Promptly after receiving notice from the Contractor under **Section 6.9.1**, 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.

6.9.2.1 If the A/E determines that the Contractor has encountered a Differing Site Condition and the Contracting Authority and Contractor agree with the A/E's determination, the A/E shall process an associated Change Order or Change Directive as appropriate.

6.9.2.2 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 associated Change Directive through which the Contracting Authority may convey its disagreement with the A/E's determination.

6.9.2.3 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 shall initiate a Change Request **(1)** as required under **Section 7.6**; and **(2)** within the time period required under **Section 7.6** which begins to run on the day that the A/E issues its determination.

6.10 Protection of the Project

6.10.1 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.

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

6.10.1.2 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.

6.10.1.3 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.

6.10.1.4 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.

6.10.2 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.

6.10.3 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.

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

6.10.5 Vibration, Noise, and Dust Control.

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

6.10.5.2 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.

6.10.5.3 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.

6.10.5.4 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.

6.11 Materials and Equipment

6.11.1 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.

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

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

6.11.2 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.

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

6.11.4 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.

6.11.5 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:

6.11.5.1 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

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

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

6.12 Labor

6.12.1 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.

6.12.2 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.

6.12.3 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.

6.13 Safety Precautions

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

6.13.1.1 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).

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

6.13.3 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.

6.13.4 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.

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

6.13.4.2 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.

6.13.4.3 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.

6.13.5 Work Stoppage Due to Hazardous Materials.

6.13.5.1 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.

6.13.5.2 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.

6.13.5.3 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.

6.13.5.4 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.

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

6.13.6 Safety Data Sheets.

6.13.6.1 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.

6.13.6.2 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.

6.14 Construction Facilities, Utilities, and Equipment

6.14.1 Facilities.

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

6.14.1.2 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, furnishings, and services to conduct progress meetings including Wi-Fi internet access and the ability to conduct internet-based video conferences, and a large-format electronic display of suitable scale for the meeting room;

.3 adequate space to store approved documents and permits; and

.4 adequate sanitary facilities for use by all Persons at the Site.

6.14.2 Environmental Controls.

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

6.14.2.2 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.

6.14.2.3 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.

6.14.2.4 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.

6.14.2.5 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.

6.14.3 Water and Drainage.

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

6.14.3.2 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.

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

6.14.3.4 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.

6.14.3.5 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.

6.14.3.6 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.

6.14.4 Electric Service.

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

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

6.14.4.3 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.

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

6.14.4.5 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.

6.14.5 Hoisting Facilities.

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

6.14.5.2 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.

6.14.5.3 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.

6.15 Progress Cleaning

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

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

6.15.3 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.

6.15.4 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.

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

6.15.5 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.

6.15.5.1 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.

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

6.15.6.1 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.

6.16 Use of Premises

6.16.1 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.

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

6.16.3 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.

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

6.16.5 Site Logistics Plan.

6.16.5.1 No later than seven days after the Date of Commencement, the Contractor shall prepare a Site Logistics Plan and submit it to the Contracting Authority and Owner for their review and approval. Through the Site Logistics Plan, the Contractor shall indicate how the Contractor intends to use the Site, and illustrate things such as 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.

6.16.6 Smoking and Tobacco Products.

6.16.6.1 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.

6.17 Interruption of Existing Services

6.17.1 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.

6.17.2 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.

6.18 Explosives and Blasting

6.18.1 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.

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

6.18.2.1 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.

6.19 Building Commissioning

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

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

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

6.19.4 To facilitate the Commissioning Process, the Contractor shall submit one hard copy and one electronic copy 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.

6.20 Action Submittals

6.20.1 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:

6.20.1.1 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;

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

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

6.20.2 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.

6.20.2.1 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 project management software under **Section 2.1.4.2**.

6.20.2.2 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.

6.20.2.3 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.

6.20.3 Delegated Design.

6.20.3.1 If the Contract Documents require the Contractor to provide professional design services or certifications by a design professional related to systems, materials, or equipment, the Contractor shall confirm with the A/E the appropriate performance and design criteria that such services shall satisfy. The Contractor shall submit Shop Drawings and other submittals related to the Work designed or certified by the design professional retained by the Contractor to the A/E for review.

6.20.4 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.

6.20.4.1 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 or an order for a minor change in the Work (as appropriate).

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

6.20.4.3 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.

6.20.5 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.

6.20.5.1 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.

6.20.5.2 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 as required under Applicable Law.

6.20.5.3 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.

6.20.6 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.

6.20.6.1 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.

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

6.20.6.3 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.

6.20.6.4 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.

6.20.6.5 If coordinating submittals are not received within the period required for action on previously received submittals that are held in accordance with **Section 6.20.6.4**, review of the previously received submittals may be delayed.

6.20.6.6 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.

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

6.20.7 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.

6.21 Warranty

6.21.1 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.

6.21.2 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.

6.22 Additional Tests and Inspections

6.22.1 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.

6.22.1.1 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.

6.22.1.2 The Contracting Authority may deduct the costs described under **Section 6.22.1.1** 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.

6.22.1.3 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 shall initiate a Change Request **(1)** as required under **Section 7.6**, and **(2)** within the time period required under **Section 7.6** which begins to run on the day of the special inspection, testing, or approval.

6.22.2 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.

6.22.3 Except as described under **Section 6.22.1**, the Owner shall pay for any inspection, testing, or approval that did not become a requirement until after it awarded the Contract.

6.22.4 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.

6.22.5 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.

6.23 Uncovering the Work

6.23.1 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.

6.23.2 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.

6.23.2.1 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.

6.23.2.2 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 shall initiate a Change Request **(1)** as required under **Section 7.6**, and **(2)** within the time period required under **Section 7.6** which begins to run on the day that the Contracting Authority or A/E observes the uncovered Work.

6.24 Correction of the Work

6.24.1 Before Substantial Completion.

6.24.1.1 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 three days after the Contracting Authority issues the written notice ("72-Hour Notice").

6.24.1.2 If the Contractor fails to promptly commence and diligently pursue correction of the Defective Work and recovery of schedule deficiencies required under **Section 6.24.1.1**, 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.

6.24.2 After Substantial Completion.

6.24.2.1 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 6.25.1**. 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.

6.24.2.2 During the Correction Period. If the Contracting Authority or Owner issues a notice under **Section 6.24.2.1** 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.

6.24.2.3 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 6.24.2**.

6.24.2.4 After the Correction Period. If the Owner issues a notice under **Section 6.24.2.1** 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.

6.24.3 Emergency Correction of Defective Work.

6.24.3.1 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.

6.24.4 Responsibility for Costs of Correction.

6.24.4.1 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 6.24**. 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.

6.25 Acceptance of Defective Work

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

6.25.1.1 The Owner may only accept Defective Work through a deduct Change Order that makes explicit reference to this **Section 6.25**.

6.25.1.2 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.

6.25.2 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:

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

6.25.2.2 the making of any payment;

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

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

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

6.25.2.6 any review or approval of a submittal;

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

6.25.2.8 any correction of Defective Work by the Owner.

6.26 Project Document Maintenance and Submittal

6.26.1 During Construction.

6.26.1.1 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 6.2.14**.

6.26.1.2 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.

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

6.26.1.4 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.

6.26.1.5 The Contractor shall at all times permit access to the documents described in this **Section 6.26.1** to authorized representatives of the State, local authorities with jurisdiction over the Project, Contracting Authority, Owner, and A/E.

6.26.2 Before Contract Completion.

6.26.2.1 As a condition precedent to execution of the Certificate of Contract Completion and final payment, the Contractor shall submit to the A/E:

.1 all LEED-related documents not previously submitted (if applicable); and

.2 the As-Built Documents including one electronic version and one hard-copy version organized into suitable sets of manageable size bound with durable cover sheets and appropriate identification marked on the front and the spine of each binder.

6.26.2.2 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;

.1 The Contractor shall organize the hard copy of the Operation and Maintenance Manuals into suitable sets of manageable size, and include indexed data bound in individual binders, with pocket folders for folded sheet information.

.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.

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

6.26.3 Record Documents.

6.26.3.1 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.

6.26.3.2 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.

6.27 Final Cleaning

6.27.1 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.

6.27.2 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.

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

6.28 Substantial Completion

6.28.1 Contractor's Punch List.

6.28.1.1 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.

6.28.2 Substantial Completion Inspection.

6.28.2.1 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 9.6.1**.
- **.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 for the Substantial Completion inspection 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.

6.28.3 Completion of Punch List Items.

6.28.3.1 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 Contractor's request for the Final Inspection, 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 and re-inspections. 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.

6.29 Partial Occupancy

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

6.29.1.1 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 (if applicable);

6.29.1.2 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

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

6.29.2 Before the Owner commences Partial Occupancy, the Owner, Contracting Authority, A/E, and Contractor shall proceed as described under **Section 6.28** for the area designated for Partial Occupancy. The Owner may commence Partial Occupancy before the Contractor has achieved Substantial Completion of the area designated for Partial Occupancy.

6.29.3 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.

6.30 Demonstration and Training, Operating Appurtenances

6.30.1 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.

6.30.2 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:

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

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

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

6.31 Contract Completion

6.31.1 Partial Contract Completion.

6.31.1.1 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.

6.31.1.2 The A/E shall submit the partial Certificate of Contract Completion to the Contracting Authority, Owner, and Contractor for their written acceptance. After they accept the partial Certificate of Contract Completion and the Contractor has submitted the Contractor's Surety's consent to payment, the Contracting Authority may release payment to the Contractor in the Contracting Authority's sole discretion.

6.31.2 Final Contract Completion.

6.31.2.1 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 6.26** through **6.30** have been fulfilled, the A/E shall prepare and recommend execution of a final Certificate of Contract Completion.

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

6.31.2.2 Within 30 days after the Contracting Authority executes the final Certificate of Contract Completion, the Contracting Authority will make final payment to the Contractor of all remaining funds then due and payable including any funds retained following Substantial Completion as described under **Section 9.7**.

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 **7.4**.

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 will prejudice the Owner and Contracting Authority and constitute a waiver by the Contractor of any 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, Change 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 If the actual quantity of a Unit Price item exceeds or appears that it will exceed the scheduled quantity, the Contractor shall immediately notify the A/E in writing. The A/E, after consulting with the Contracting Authority, will issue a Change Order or Change Directive to authorize an adjustment of the scheduled quantity or to otherwise address the excess.

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 performed or reasonably expected to be performed would create an undue hardship on either the Owner or Contractor:

.1 the Contractor shall initiate a Change Request seeking an adjustment of the Unit Price **(1)** as required under **Section 7.6**, and **(2)** within the time period required under **Section 7.6** which begins to run on the day that the Contractor knew or should have known that the actual quantity of a Unit Price item would differ from the scheduled quantity by 20 percent or more; or

.2 the A/E, after consulting with the Contracting Authority, will issue a Change Directive to adjust the Unit Price.

7.1.5.4 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.

7.1.5.5 Before final payment, the A/E shall issue a Change Order to reconcile any difference between the scheduled and actual quantities of Unit Price Work performed and materials furnished.

7.1.5.6 Notwithstanding **Section 7.1.5.3**, if the actual quantity of any item of Unit Price Work is zero, there shall be no adjustment of the Unit Price.

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 Orders

7.2.1 A Change Order is a written instrument prepared by the A/E and executed by the Contracting Authority, Owner, 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 **Sections 7.3.9**, **7.3.10**, **7.6.2**, and **7.6.3**, 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 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 Change Directives

7.3.1 A Change Directive is a written order prepared by the A/E and executed by the Contracting Authority and Owner directing a change in the Work or the performance of disputed Work as described under **Section 7.3.4.1**.

7.3.1.1 The parties will endeavor to resolve each Change Directive through the Field Meeting described under **Section 7.7**.

7.3.2 Through a Change Directive, the Contracting Authority may:

7.3.2.1 propose a basis for adjustment, if any, in the Contract Sum or Contract Times, or both; or

7.3.2.2 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.

7.3.3 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 7.3.1**, authorizing the Contractor to proceed.

7.3.4 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.

7.3.4.1 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 but not limited to the situations described under **Sections 6.9.2** and **7.4.3**.

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

7.3.6 If the Change Directive contains a proposed basis for adjustment of the Contract Sum or Contract Times, or both, within ten days after receiving it, the Contractor may sign the Change Directive to accept the proposed basis for adjustment, and return it to the A/E. 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**.

7.3.7 Within ten days after receiving the Change Directive, or other period as mutually agreed by the Contractor and Contracting Authority, the Contractor shall submit to the A/E and Contracting Authority a Proposal meeting the requirements of **Section 7.5** 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 7.3.2.2**. If the Change Directive is performed on a time and materials basis, the Contractor shall submit its Proposal within ten days after completing the changed Work, which is the subject of the Change Directive.

7.3.8 If the Contractor does not respond to a Change Directive as and when required under **Section 7.3.6** or **Section 7.3.7** **(1)** the Contracting Authority shall determine the adjustments, if any, of the Contract Sum and Contract Times and issue its determination to the Owner, A/E, and Contractor, and **(2)** the A/E shall prepare a Change Order consistent with that determination and issue it to the Contractor as described under **Section 7.2.3**. If the Contractor does not agree with the Contracting Authority's determination, the Contractor shall initiate a Claim as and when required under **Article 8**.

7.3.9 Pending final determination of the total adjustment of the Contract Times on account of a Change Directive, to the extent that the Contracting Authority, Owner, and Contractor agree on a portion of the adjustment of the Contract Times, that the period of time not in dispute may be included in the Construction Progress Schedule accompanied by a Change Order indicating the parties' agreement with only that portion of the time adjustment.

7.3.10 Pending final determination of the total adjustment of the Contract Sum on account of a Change Directive, to the extent that the Contracting Authority, Owner, and Contractor agree on a portion of the adjustment of the Contract Sum, the amount not in dispute for that change in the Work may be included in a Contractor Payment Request accompanied by a Change Order indicating the parties' agreement with only that portion of the cost adjustment.

7.3.11 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. The A/E, Contracting Authority, Owner, and Contractor shall sign the Change Order as described under **Section 7.2**.

7.3.12 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, **(1)** the Contracting Authority shall determine the adjustments, if any, of the Contract Sum and Contract Times and issue its determination to the Owner, A/E, and Contractor, and **(2)** the A/E shall prepare a Change Order consistent with that determination and issue it to the Contractor as described under **Section 7.2.3**. If the Contractor does not agree with the Contracting Authority's determination, the Contractor shall initiate a Claim as and when required under **Article 8.**

7.3.13 The Contracting Authority may at any time reject the Contractor's Proposal submitted under **Section 7.3.7**. If the Contractor does not agree with the Contracting Authority's rejection, the Contractor shall initiate a Claim as and when required under **Article 8**.

7.3.14 If a Change Directive or portion of a Change Directive remains pending or otherwise unresolved 60 days after the date on which the Change Directive was issued, the associated Contractor's Proposal or portion of the Contractor's Proposal still pending will be deemed rejected by the Contracting Authority. If the Contractor does not agree with the deemed rejection, the Contractor shall initiate a Claim as and when required under **Article 8**.

7.3.15 The Contractor's failure to comply with the requirements of this **Section 7.3** will constitute an irrevocable waiver of the Contractor's Proposal and any related Claim.

7.4 Minor Changes in the Work

7.4.1 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.

7.4.2 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.

7.4.3 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 five 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.

7.4.4 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:

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

7.4.4.2 failing to give the notice described under **Section 7.4.3** within five business days after receiving the order for a minor change in the Work.

7.5 Proposal Requests and Contractor Proposals

7.5.1 Proposal Requests. 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 Contract Times, or both, associated with a contemplated change in the Work.

7.5.1.1 The Contractor shall respond with a Proposal to the A/E and Contracting Authority within ten 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.

7.5.1.2 If the Contractor does not submit a Proposal within the time required in **Section 7.5.1.1**, the Contractor waives its right to an adjustment of the Contract Sum or Contract Times, or both, associated with the contemplated change in the Work.

7.5.1.3 A Proposal Request does not authorize the Contractor to proceed with a change in the Work.

7.5.2 Contractor Proposals in General.

7.5.2.1 In any Proposal for an adjustment of the Contract Sum, the Contractor shall specifically identify the items set forth in **Section 7.8**. By submitting a Proposal for an adjustment of the Contract Sum, the Contractor represents to the Contracting Authority and Owner that the proposed adjustment is the entire adjustment of the Contract Sum to which the Contractor is entitled on account of the associated change or proposed change in the Work.

7.5.2.2 In any Proposal for an adjustment of the Contract Times, the Contractor shall specifically identify the items set forth in **Section 7.9**. By submitting a Proposal for an adjustment of the Contract Times, the Contractor represents to the Contracting Authority and Owner that the proposed adjustment is the entire adjustment of the Contract Times to which the Contractor is entitled on account of the associated change or proposed change in the Work.

7.5.2.3 The Contractor shall hold every 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.

7.5.2.4 A Proposal may be accepted by the Contracting Authority and Owner only through a Change Order.

7.5.2.5 The Contractor's cost of preparing and providing Proposals is included in the Contract Sum and shall not be included in any cost or credit determination under the Contract.

7.5.3 Contractor Proposals Related to Change Requests. In addition to complying with **Section 7.5.2**, if the Proposal relates to a Change Request, the Contractor shall include in the Proposal the following information to permit timely and appropriate evaluation of the Change Request, determination of responsibility, and opportunity for mitigation:

7.5.3.1 if applicable, the Contractor's planned actions to mitigate costs and delays by avoiding interference, disruption, hindrance, delay, or impact;

7.5.3.2 recommended action to mitigate costs and delays by avoiding interference, disruption, hindrance, delay, or impact; and

7.5.3.3 additional information **(1)** the Contracting Authority requests or **(2)** the Contractor believes is relevant to resolution of the Change Request.

7.6 Change Requests

7.6.1 The Contractor shall initiate a change in the Work by submitting to the Contracting Authority and A/E a Change Request accompanied by a Proposal meeting the requirements of **Section 7.5** within ten days after the occurrence of the event giving rise to the Change Request.

7.6.1.1 The parties will endeavor to resolve each Change Request through the Field Meeting described under **Section 7.7**.

7.6.2 Pending final determination of the total adjustment of the Contract Times on account of a Change Request, to the extent that the Contracting Authority, Owner, and Contractor agree on a portion of the adjustment of the Contract Times, that period of time not in dispute may be included in the Construction Progress Schedule accompanied by a Change Order indicating the parties' agreement with only that portion of the time adjustment.

7.6.3 Pending final determination of the total adjustment of the Contract Sum on account of a Change Request, to the extent that the Contracting Authority, Owner, and Contractor agree on a portion of the adjustment of the Contract Sum, the amount not in dispute for that change in the Work may be included in a Contractor Payment Request accompanied by a Change Order indicating the parties' agreement with only that portion of the cost adjustments.

7.6.4 If the Contracting Authority, Owner, and Contractor agree on the adjustments of the Contract Sum and Contract Times associated with a Change Request, the A/E shall prepare an appropriate Change Order. The A/E, Contracting Authority, Owner, and Contractor shall sign the Change Order as described under **Section 7.2**.

7.6.5 If the Contracting Authority, Owner, and Contractor do not agree on the adjustments of the Contract Sum and Contract Times associated with a Change Request, **(1)** the Contracting Authority may determine the adjustments, if any, of the Contract Sum and Contract Times and issue its determination to the Owner, A/E, and Contractor, and **(2)** the A/E shall prepare a Change Order consistent with that determination and issue it to the Contractor as described under **Section 7.2.3**. If the Contractor does not agree with the Contracting Authority's determination, the Contractor shall initiate a Claim as and when required under **Article 8**.

7.6.6 The Contracting Authority may at any time reject the Contractor's Change Request and Proposal submitted under **Section 7.6.1**. If the Contractor does not agree with the Contracting Authority's rejection, the Contractor shall initiate a Claim as and when required under **Article 8**.

7.6.7 If a Change Request or portion of a Change Request remains pending or otherwise unresolved 60 days after the date on which the Change Request was submitted, the Change Request or portion of the Change Request still pending will be deemed rejected by the Contracting Authority. If the Contractor does not agree with the deemed rejection, the Contractor shall initiate a Claim as and when required under **Article 8**.

7.6.8 The Contractor's failure to comply with the requirements of this **Section 7.6** will constitute an irrevocable waiver of the Change Request and any related Claim.

7.7 Field Meeting

7.7.1 The Contracting Authority, Owner, and Contractor shall meet to review and endeavor to resolve **(1)** a Change Directive within 14 days after the Contracting Authority and Owner issue it under **Section 7.3.1** and **(2)** a Change Request within seven days after the Contractor initiates it under **Section 7.6.1**.

7.7.2 Notwithstanding **Section 7.7.1**:

7.7.2.1 a Field Meeting is not a condition precedent to the exercise of any right or the performance of any obligation under the Contract;

7.7.2.2 whether and when a Field Meeting is convened does not alter any right or any obligation under the Contract; and

7.7.2.3 the Contracting Authority, Owner, and Contractor may convene a Field Meeting at any time to address and attempt to resolve any pending Change Directive, Change Request, or other matter.

7.8 Change Order Cost or Credit Determination

7.8.1 General.

7.8.1.1 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 7.8.1.4**.

.2 A Unit Price Proposal shall only be valid when incorporated into the Contract by Change Order except for Unit Price Work included in the Contract.

.3 The maximum cost or credit includes all compensation for impact costs. Additional costs for impacts shall not be allowed.

7.8.1.2 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.

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

7.8.1.4 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 7.8.2**. Any Subcontractor pricing shall be itemized on the appropriate **Proposal Worksheet Summary Form**.

.1 The Contractor's cost of preparing and providing Proposals is included in the Contract Sum and shall not be included in any cost or credit determination under the Contract.

7.8.1.5 Section 7.8.2 establishes the exclusive and maximum amount that the Owner shall pay for any change in the Work, 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 Change Directive, Change Request, 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 7.8.2**.

7.8.2 Pricing Criteria.

7.8.2.1 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 7.8.2.1** exceed those additional Contractor Personnel Costs the Contractor actually incurs.

7.8.2.2 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 7.8.2.2** 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 7.8.2.1** for the Contractor and under **Section 7.8.2.10** for Subcontractors.

7.8.2.3 Fringes. Fringe benefit credit for labor provided under **Section 7.8.2.2** 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.

7.8.2.4 Allowable Payroll Expenses. Allowable payroll expenses for labor provided under **Section 7.8.2.2** 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.

7.8.2.5 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. The Contractor shall submit copies of actual paid invoices to substantiate rental costs.

7.8.2.6 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 Blue 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.

7.8.2.7 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.

7.8.2.8 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.

7.8.2.9 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 7.8.2.9.1**, 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 7.8.2.9.1**, and **(2)** include the actual adjustment of the builder's risk insurance premium attributable to an associated change in the Contract Sum.

7.8.2.10 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 7.8.2.2** through **7.8.2.8** 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 7.8.2.10** 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 7.8.2.10**, **(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 7.8.2.11**, 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 Subcontractor general conditions costs, home office overhead, and profit including, but not limited to: payroll costs, 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 costs related to Subcontractor-provided insurance, 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 7.8.2.10.2**, 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 7.8.2.2**, **7.8.2.3**, and **7.8.2.4** of these Pricing Criteria.

.4 An exception is allowed for field supervision labor on items in **Section 7.8.2.10.2**, 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 7.8.2.2**, **7.8.2.3**, and **7.8.2.4** of these Pricing Criteria.

7.8.2.11 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 7.8.2.1** through **7.8.2.10** that are associated with that changed Work.

7.8.2.12 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 7.8.2.11** or Subcontractor overhead and profit under **Section 7.8.2.10**.

.1 The premium portion only for approved overtime (labor and fringes). The straight time portion is included in items in **Sections 7.8.2.2**, **7.8.2.3**, and **7.8.2.4**.

.2 State sales tax shall be allowed on items as defined by **Section 12.7**.

7.8.3 Costs that shall not be reimbursed for changes in the Work include the following:

7.8.3.1 Voluntary employee deductions including, but not limited to, deductions for charitable donations or U.S. savings bonds.

7.8.3.2 Employee profit sharing.

7.9 Time Extension

7.9.1 Every adjustment of the Contract Times associated with any change in the Work shall be determined as provided in this **Section 7.9**, 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 7.9** also governs time adjustments for deduct Change Orders and the Contractor's entitlement to additional time through the Change Directive, Change Request, Claims, and dispute resolution processes on account of changes in the Work.

7.9.2 The Contractor shall substantiate all changes in the Contract Times with:

7.9.2.1 a written description of the nature of the interference, disruption, hindrance, or delay;

7.9.2.2 identification of Persons and events responsible for the interference, disruption, hindrance, or delay;

7.9.2.3 date or anticipated date of commencement of the interference, disruption, hindrance, or delay;

7.9.2.4 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;

7.9.2.5 anticipated duration of the interference, disruption, hindrance, or delay and of any remobilization period;

7.9.2.6 specific number of days of extension requested and specific number of days for remobilization requested;

7.9.2.7 recommended action to avoid or minimize any future interference, disruption, hindrance, or delay; and

7.9.2.8 If the Contracting Authority requests, a Proposal as described under **Section 7.8** 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.

7.9.3 If the Contracting Authority requests, in addition to the requirements under **Section 7.9.2**, the Contractor shall also substantiate changes in the Contract Times with a prospective time-impact analysis (in native format), which illustrates the influence of each change on all affected Milestones and all affected activities. The Contractor shall submit the time-impact analysis within 30 days after the Contracting Authority requests, unless the Contracting Authority and Contractor agree otherwise.

7.9.3.1 The Contractor shall prepare the time-impact analysis consistent with a currently published, recognized standard for construction schedule analysis.

7.9.3.2 The Contractor shall prepare the time-impact analysis on the basis of **(1)** the last Construction Progress Schedule the Contracting Authority approved before the first day of the delay which is the subject of the analysis or **(2)** an interim update of the Construction Progress Schedule if the Contracting Authority determines that the period between the last approved Construction Progress Schedule and first day of the delay which is the subject of the analysis is too long.

7.9.3.3 The time-impact analysis shall include a fragmentary network analysis (fragnet), which **(1)** illustrates the sequence of new activities, activity revisions, or both, that the Contractor proposes to add to the Construction Progress Schedule upon which the time-impact analysis is based and **(2)** mathematically and graphically demonstrates the influence and proper measurement of the delay and how the Contractor proposes to incorporate that delay into the Construction Progress Schedule.

7.9.3.4 The time-impact analysis shall include a written narrative of the analysis.

7.9.4 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.

7.9.4.1 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.

7.10 Weather Delays

7.10.1 The parties expect adverse weather to delay the Work to some extent, and have included in the Contract Times a certain number of Work Days lost on account of adverse weather as follows:

Month	Expected Number of Work Days Lost Due to Weather
January	8
February	8
March	7
April	6
May	5
June	5
July	4
August	4

September	5
October	6
November	6
December	6

7.10.2 The Contractor will not be entitled to an extension of the Contract Times on account of adverse weather unless the actual number of Work Days lost due to adverse weather in a particular calendar month exceed the expected number of Work Days lost in that calendar month due to adverse weather. The Contractor shall reconcile lost Work Days with the A/E on a weekly basis.

7.10.3 A Work Day will be "lost" if adverse weather reduces the Contractor's efficiency on the Work on the critical path that Work Day to less than 50%. The Contractor shall substantiate its claim that its efficiency on the Work on the critical path that Work Day was less than 50%.

7.10.4 If the Contractor reasonably believes that it is entitled to an extension of the Contract Times on account of Work Days lost due to adverse weather in a particular month, the Contractor shall initiate a Change Request **(1)** as required under **Section 7.6,** and **(2)** within the time period required under **Section 7.6** which begins to run on the last calendar day of that month.

7.11 Examination and Audit of Contractor's Records

7.11.1 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.

7.11.2 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 ten years after the date of Substantial Completion of all Work.

7.11.2.1 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.

7.11.3 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 Applicable Law, as trade secrets of the Contractor or Subcontractor, as applicable.

7.11.3.1 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.

7.11.4 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.

7.11.5 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 ten years from the date of any applicable final settlement or payment, as applicable.

7.11.6 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, including:

8.1.2.1 with regard to a Change Directive, the ten-day time limit on initiating a Claim begins to run on the earlier of the date that **(1)** the Contracting Authority issues its determination under **Sections 7.3.8** or **7.3.12; (2)** the A/E issues

a Change Order to the Contractor under **Sections 7.3.8** or **7.3.12**; **(3)** the Contracting Authority rejects the Contractor's Proposal in whole or in part under **Section 7.3.13**; or **(4)** the Contracting Authority is deemed to have rejected the Contractor's Proposal in whole or in part under **Section 7.3.14**; and

8.1.2.2 with regard to a Change Request, the ten-day time limit on initiating a Claim begins to run on the earlier of the date that **(1)** the Contracting Authority issues its determination under **Section 7.6.5**; **(2)** the A/E issues a Change Order to the Contractor under **Section 7.6.5**; **(3)** the Contracting Authority rejects the Contractor's Proposal in whole or in part under **Section 7.6.6**; or **(4)** the Contracting Authority is deemed to have rejected the Change Request in whole or in part under **Section 7.6.7**.

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 7.8** 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 completed and 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** will constitute the Contractor's irrevocable waiver of the Claim.

8.2 Substantiation of Claims – General Requirements

8.2.1 Within 30 days after the initiation of a Claim, the Contractor shall submit three 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 three copies by delivering one copy to the A/E, one copy to the Owner, and one copy 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 6.2.14**) 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 and complete and detailed job-cost report, 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** will constitute an irrevocable waiver of any related Claim.

8.3 Substantiation of Claims – 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 7.8** of the actual additional costs to the Contractor due to the event giving rise to the Claim; and

8.3.1.2 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** will constitute an irrevocable waiver of any related Claim.

8.4 Substantiation of Claims – 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 7.9** 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 Proposal as described under **Section 7.8** 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 8.3.1.1**; and

8.4.1.3 the general substantiating documentation described under **Section 8.2**.

8.4.2 The Contractor's failure to comply with the requirements of this **Section 8.4** will 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** 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; 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 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** will 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 as indicated under **Section 7.10** 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 The Liquidated Damages described in this **Section 8.7** are only intended to compensate the Owner for the damages it incurs as a direct result of the Contractor's failure to achieve the Milestones within their associated Contract Times.

8.7.3 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 as a result of the Contractor's failure to achieve the Milestones within their associated Contract Times 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.

8.7.4 The parties acknowledge that the above-listed Liquidated Damages per day sums are not penalties but are a reasonable estimate of the damages the Owner itself would incur as a direct result of the Contractor's failure to achieve the Milestones within their associated Contract Times. The parties 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.

8.7.5 In addition to other rights that the Owner may have relative to the Liquidated Damages, the Contracting Authority may deduct 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 7.8**; 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 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 will 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 complete and detailed 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 Unless otherwise explicitly stated in the Agreement, Allowance amounts cover all compensation to which the Contractor would be entitled for completing the associated Work, including without limitation the cost to the Contractor (less any applicable trade discounts) of materials and equipment required by the Allowances delivered, unloaded, handled, and installed at the Site; all associated labor costs of every kind; all applicable taxes; and the Contractor's Fee.

9.1.3 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 Unless otherwise explicitly stated in the Agreement:

9.2.1.1 The Contract Sum includes the Unit Price Work (if any) identified in the Agreement.

9.2.1.2 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, which is included in the Unit Prices.

9.2.1.3 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.

9.2.2 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 including an associated adjustment on account of the Contractor's Fee.

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, for each EDGE-certified Business used in the performance of the Work. The amount(s) shall indicate labor and materials, as appropriate, and separate items for Contractor's Fee.

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 and include Contractor's Fee. Separate line items shall not be shown for Contractor's Fee, except as provided under **Section 9.3.1.1**.

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 After the Date of Commencement, the Contractor may request payment of the Contract Sum. The Owner will pay the Contract Sum to the Contractor on a percent-complete progress basis.

9.4.2 The Contractor may submit a Contractor Payment Request 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. The Contractor shall base each Contractor Payment Request on the Schedule of Values current as of the date that the Contractor submits the Contractor Payment Request.

9.4.2.1 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.

9.4.2.2 The Contracting Authority may require proof of the renewal of required insurance as a condition precedent to payment.

9.4.2.3 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**.

9.4.2.4 The Contractor may list on the Contractor Payment Request any Change Orders approved and performed prior to submission of the Contractor Payment Request.

9.4.2.5 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.

9.4.2.6 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.

9.4.2.7 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.

9.4.2.8 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.

9.4.3 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.

9.4.4 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.

9.5 Retainage on Labor Payments

9.5.1 Partial payments to the Contractor for labor shall be made at the rate of 96 percent of the amount invoiced through the Contractor Payment Request.

9.5.2 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 Release of Retainage on Labor Payments

9.6.1 When the Contractor has achieved Substantial Completion of all Work, and there is no other reason to retain funds, the retained funds shall be paid to the Contractor within 30 days after the Contractor's request, except to the extent necessary, in the Contracting Authority's sole discretion, to assure the Contractor's faithful completion of the Work including but not limited to compliance with **Section 6.26.2**.

9.6.2 Upon consent of the Contractor's Surety, the Contracting Authority may reduce the amount of funds retained for the faithful performance of Work by up to 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:

9.6.2.1 completion of the Work;

9.6.2.2 all interference, disruption, hindrance, and delay claims;

9.6.2.3 all Liquidated Damages; and

9.6.2.4 all additional expenses incurred by the State.

9.6.3 Funds retained until Contract Completion will be paid to the Contractor as described under **Section 6.31.2.**

9.6.4 If the funds retained under **Section 9.5** accrued interest while withheld from the Contractor, the payments of those retained funds to the Contractor will include that accrued interest.

9.6.5 If the Project involves more than one Phase as explicitly identified in the Agreement, this **Section 9.6** will apply on a per-Phase basis.

9.7 Retainage on Material Payments

9.7.1 The Owner shall pay the Contractor at the rate of 100 percent of the scheduled value for materials incorporated into the Project.

9.7.2 The Owner shall pay the Contractor at the rate of 92 percent of the invoice cost, not to exceed the scheduled value , 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:

9.7.2.1 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

9.7.2.2 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.

9.7.3 The Owner shall pay the balance of the scheduled value when the materials are incorporated into and become a part of the Project.

9.7.4 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.

9.7.4.1 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.

9.8 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 reject any Contractor Payment Request or part thereof, or withdraw 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 The Contracting Authority shall notify the Owner, Contractor, and A/E in writing of the Contracting Authority's exercise of its rights under **Section 9.8.2**. 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.

9.8.4 If the Contractor takes exception to the withholding of payments under **Section 9.8.2**, the Contractor shall initiate a Claim as and when required under **Article 8**.

9.9 Final Contractor Payment Request

9.9.1 The Contractor, as a condition precedent to Contract Completion and final payment, shall complete all requirements of the Contract Documents.

9.9.1.1 The Contractor and each of its Subcontractors, regardless of tier, shall execute a Payment Release Affidavit to certify that the Contractor and each of its Subcontractors, regardless of tier, have complied with all requirements of ORC Chapter 4115, and to certify that all of its Subcontractors have been paid in full for all Work performed or materials furnished for the Project.

9.9.2 The Owner shall pay the final Contractor Payment Request within 30 days after the date the A/E recommends acceptance of the final Contractor Payment Request.

9.9.3 Acceptance of final payment by the Contractor or a Subcontractor constitutes the payee's waiver of all claims against the State except those previously made in writing under **Article 8** and identified by that payee as unsettled at the time of the final Contractor Payment Request.

ARTICLE 10 - BONDS, INSURANCE, AND INDEMNIFICATION

10.1 Payment and Performance Bonds

10.1.1 Before signing the Agreement, the Contractor shall provide the Bond required under Applicable Law and below:

10.1.1.1 If the Contractor provided **Document 00 43 13 - Bid Security Form** as its Bid Guaranty, then that form shall be the Bond.

10.1.1.2 If the Contractor provided another form of Bid Guaranty, then **Document 00 61 13 - Performance and Payment Bond Form** shall be the Bond.

10.1.1.3 Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Contracting Authority.

10.1.1.4 If there is more than one Surety under the Bond, each of them shall be jointly and severally liable as surety under the Bond.

10.1.1.5 Unless the Contracting Authority and the Owner are the same entity, the Bond shall name as co-obligees **(1)** the State by and through the Contracting Authority and **(2)** the Owner.

.1 If any document is used to name the required co-obligees of the Bond (e.g., a form commonly known as a "dual obligee rider"), that document will not alter the terms of the Contract in any way or the terms of the Bond in any way beyond merely naming the co-obligees notwithstanding any term of that document to the contrary.

.2 The Surety will not be obligated to more than the Penal Sum of any Bond solely on account of the existence of more than one obligee under that Bond.

10.1.1.6 The penal sum of the Bond, when initially submitted, shall be equal to one-hundred percent of the Contract Sum.

10.1.2 The Contractor shall submit with the executed Bond **(1)** a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and **(2)** a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.

10.1.3 If the Contract Sum increases at any time such that it exceeds the penal sum of the Bond, the Contractor shall cause the penal sum of the Bond to be increased such that the penal sum equals one-hundred percent of the increased Contract Sum.

10.1.4 Any time the Contractor increases the penal sum of the Bond under **Section 10.1.3**, the Contractor shall deliver to the Contracting Authority an Acknowledgment of Surety from the affected Surety or Sureties to evidence the Surety's or Sureties' receipt of notice of the increased penal sum.

10.1.4.1 The Contracting Authority's receipt of the required Acknowledgement(s) of Surety is a condition precedent to the Owner's obligation to pay the Contractor for any portion of the Work associated with the increase of the penal sum.

10.1.4.2 The Contractor's failure to submit a required Acknowledgment of Surety or a Surety's failure or refusal to provide an Acknowledgment of Surety will not relieve the Surety of its obligation for the increased penal sum.

10.1.4.3 If any Surety fails or refuses to provide a required Acknowledgement of Surety, the Contracting Authority may require the Contractor to deliver to the Contracting Authority a new Bond showing the increased penal sum and written consent of the affected Surety or Sureties confirming the increased penal sum. In that event, the Contracting Authority's receipt of replacement Bonds will be a condition precedent to the Owner's obligation to pay the Contractor for any portion of the Work associated with the increase of the penal sum.

10.1.4.4 Each Acknowledgment of Surety shall be **(1)** on a form provided by the Contracting Authority and **(2)** subject to the acceptance of the Contracting Authority.

10.1.5 If at any time prior to final payment, any surety providing a Bond for the Project **(1)** is adjudged bankrupt or has made a general assignment for the benefit of its creditors; **(2)** has liquidated all assets or has made a general assignment for the benefit of its creditors; **(3)** is placed in receivership; **(4)** otherwise petitions a state or federal court for protection from its creditors; or **(5)** allows its license to do business in Ohio to lapse or to be revoked, then the Contractor shall, within 21 days after any such action listed above, provide the Contracting Authority with a new Bond in the form and

amount described in this **Section 10.1**. The Contracting Authority's receipt of a replacement Bond is a condition precedent to the Owner's obligation to pay the Contractor.

10.1.6 If notice of any change affecting the Contract is required by any Surety or by the provision of any Bond, the Contractor shall provide that notice.

10.2 Contractor's General Insurance Requirements

10.2.1 Throughout the performance of the Work or longer as may be described below, the Contractor shall obtain, pay for, and keep in force, the minimum insurance coverage described in this **Article 10**.

10.2.1.1 Each requirement of this **Article 10** applies to Subcontractors just as it applies to the Contractor.

10.2.1.2 If a Subcontractor's usual insurance coverage does not meet the minimum coverage requirements, before entering into an agreement with that Subcontractor, the Contractor shall submit to the Contracting Authority **(1)** a certificate of insurance evidencing the insurance the Subcontractor will carry without additional compensation and **(2)** if the Contracting Authority requests, a written proposal from the Subcontractor to provide coverage that meets the minimum coverage requirements. The Contracting Authority will decide whether to accept the non-conforming insurance coverage or the proposal to provide conforming coverage.

.1 Notwithstanding any other provision of the Contract to the contrary, the Contractor will not be entitled to any increase of the Contract Sum, Contract Times, or both on account of the Contracting Authority's refusal to accept a Subcontractor's nonconforming insurance coverage.

10.2.1.3 On a case-by-case basis, the Contracting Authority and Contractor may agree to adjust the below requirements for any particular Subcontractor.

10.2.2 Before starting the Work on the Site, upon renewal of any policy, and upon a change of any insurance carrier, the Contractor shall deliver to the Contracting Authority certificates evidencing that the required insurance is in force.

10.2.2.1 Certificates of insurance for other than government-controlled workers' compensation insurance shall identify **(1)** all below-required additional insureds and **(2)** the Project name.

10.2.3 With the exception of government-controlled workers' compensation coverage:

10.2.3.1 the Contractor shall place the insurance with companies that **(1)** are satisfactory to the Contracting Authority, **(2)** hold an A.M. Best Rating of A-, X, or higher, and **(3)** are authorized to conduct business in Ohio;

10.2.3.2 the policies shall be endorsed to require the Contractor's insurance carrier to **(1)** provide 30-days' written notice to the Contracting Authority (as certificate holder) of the cancellation or non-renewal of the insurance and **(2)** provide at least ten-days' written notice to the Contracting Authority (as certificate holder) of the cancellation of the insurance for non-payment of premium; and

10.2.3.3 within 30 days after the Contracting Authority's request, the Contractor shall submit insurance-company certified copies of the policies, the policy endorsements, loss-run reports, or all three.

10.2.4 The Contractor shall pay all deductibles, or self-insured retentions, or both contained in the Contractor's policies of insurance required or provided in connection with the Project. The Contracting Authority reserves the right to approve or reject all levels of self-insured retention, captive insurance programs, or other alternative risk financing the Contractor may use to comply with any insurance requirement.

10.2.5 The Contractor shall pay a proportionate share of the deductibles, or self-insured retentions, or both contained in any insurance policy the Contracting Authority purchases for the Project. The Contractor's proportionate share will derive from the percentage of the associated claim or loss attributable to the alleged or actual negligence of the Contractor or a Subcontractor.

10.2.6 The Contracting Authority and Owner do not represent that required coverage or limits are adequate to protect the Contractor.

10.2.7 Failure of the Contracting Authority to demand a certificate or other evidence of full compliance with the insurance requirements or failure of the Contracting Authority to identify a deficiency from evidence that is provided shall not be construed as a waiver of the Contractor's obligation to maintain the required insurance.

10.2.8 The Contracting Authority may terminate the Contract for cause on account of the Contractor's failure to maintain required insurance.

10.3 Contractor's Minimum Coverage Requirements

10.3.1 Workers Compensation. The Contractor shall maintain workers' compensation coverage meeting the requirements of Applicable Law including, without limitation, the Jones Act and the Longshore & Harbor Workers Compensation Act if Work involves hazards arising from work on or near navigable waterways, including vessels and docks.

10.3.2 Employers' Liability Coverage. The Contractor shall maintain employers' liability coverage with **(1)** an each-accident limit of not less than $1,000,000, **(2)** a disease each-employee limit of not less than $1,000,000, and **(3)** a disease policy limit of not less than $1,000,000.

10.3.3 Commercial General Liability. The Contractor shall maintain commercial general liability ("CGL") coverage that provides **(1)** an each-occurrence limit of not less than $1,000,000, **(2)** a general-aggregate limit of not less than $2,000,000, and **(3)** a products and completed-operations aggregate limit of not less than $2,000,000.

10.3.3.1 The CGL insurance shall be written on ISO occurrence form CG 00 01 04 13 or a substitute form, providing at least equivalent coverage for liability arising from premises, operations, independent contractors, products/completed-operations, personal and advertising injury, and liability assumed under an insured contract.

10.3.3.2 The Contractor shall include the State, Contracting Authority, Owner, and A/E as additional insureds under the CGL policy using ISO endorsement CG 20 10 07 04 and ISO endorsement CG 20 37 07 04 or a substitute form(s) providing equivalent coverage.

10.3.3.3 The CGL policy shall be endorsed using ISO endorsement CG 25 03 or a substitute form providing equivalent coverage to provide that the general aggregate limit applies separately to each of the insured's projects.

10.3.3.4 The CGL policy shall not exclude coverage for property damage to the Work arising out of the products/completed-operations hazard where a Subcontractor performed the damaged Work or the Work out of which the damage arises.

10.3.3.5 The CGL insurance shall not exclude coverage for property damage to electronic data.

10.3.3.6 The CGL insurance shall apply as primary and non-contributory insurance with respect to any other insurance or self-insurance programs that cover the additional insured(s).

10.3.3.7 The CGL policy shall not exclude coverage to the additional insured(s) for bodily injury or property damage arising out of the products/completed-operations hazard.

10.3.3.8 The Contractor shall maintain the CGL insurance in effect for no less than five years after the earlier of termination of the Contract or Substantial Completion of all Work.

10.3.4 Business Automobile Liability. The Contractor shall maintain business automobile ("BA") coverage written on ISO form CA 00 01 04 13 or a substitute form, providing at least equivalent coverage with a limit of not less than $1,000,000 each accident.

10.3.4.1 The coverage shall extend to any auto (owned, not owned, leased, rented, hired, or borrowed).

10.3.4.2 The Contractor shall include the State, Contracting Authority, Owner, and A/E as additional insureds under the BA policy.

10.3.4.3 The BA policy shall include an MCS-90 endorsement if transporting hazardous wastes/materials.

10.3.5 Umbrella/Excess Liability. The Contractor may employ an umbrella/excess liability policy to achieve the above-required minimum coverage.

10.3.5.1 The Contractor shall maintain umbrella/excess liability coverage with a limit of not less than $2,000,000 (in addition to the above-required limits) if the Work (or the Work to be performed by the Subcontractor) includes any of the following:

- **.1** brick/block masonry;
- **.2** exterior caulking/sealant;
- **.3** cast-in-place or precast concrete;
- **.4** curtain wall;
- **.5** dampproofing/waterproofing;
- **.6** electrical;
- **.7** elevator;
- **.8** exterior glass and/or glazing;
- **.9** exterior marble, granite, and/or other stonework;
- **.10** miscellaneous metals;

.11 plaster/stucco;
.12 plumbing;
.13 HVAC;
.14 roofing and/or sheet metal;
.15 scaffolding;
.16 spray-on fireproofing;
.17 sprinkler and/or fire protection; or
.18 structural steel and/or metal deck.

10.3.5.2 The Contractor shall maintain umbrella/excess liability coverage with a limit of not less than $5,000,000 (in addition to the above-required limits) if the Work (or the Work to performed by the Subcontractor) includes any of the following:

.1 caissons and/or piles;
.2 demolition;
.3 excavation and/or utility work;
.4 sheeting, shoring, and/or underpinning;
.5 window washing equipment; or
.6 wrecking.

10.3.6 Contractor's Pollution Liability. If the Work includes environmentally sensitive, hazardous types of activities (such as demolition, exterior insulation finish systems, Asbestos abatement, storage-tank removal, or similar activities), or involves Hazardous Materials, the Contractor shall maintain a contractor's pollution liability ("CPL") policy with **(1)** a per-claim limit of not less than $1,000,000 and **(2)** an annual-aggregate limit of not less than $1,000,000, covering the acts, errors and/or omissions of the Contractor for damages (including from mold) sustained by the Owner by reason of the Contractor's performance of the Work.

10.3.6.1 The CPL policy shall have an effective date, which is on or before the date that the Contractor first started to perform any Project-related services.

10.3.6.2 Upon submission of the associated certificate of insurance and at each policy renewal, the Contractor shall advise the Contracting Authority in writing of any actual or alleged claims that may erode the CPL policy's limits.

10.3.6.3 The Contractor shall maintain the CPL insurance in effect for no less than five years after the earlier of termination of the Contract or Substantial Completion of all Work.

10.3.7 Professional Liability—Contractor. The Contractor shall maintain contractor's professional liability ("PL") insurance (including without limitation for sprinkler and/or fire protection and other design-build work included in the Work, and services related to coordination and scheduling of construction activities, and means and methods) without design-build exclusions with limits not less than as identified in the following table:

Contract Sum	Each Claim	Annual Aggregate
Up to $50,000,000	$1,000,000	$2,000,000
More than $50,000,000	$2,000,000	$4,000,000

10.3.7.1 The PL policy shall have an effective date on or before the date that the Contractor first started to provide any Project-related services.

10.3.7.2 Upon submission of the associated certificate of insurance and at each policy renewal, the Contractor shall advise the Contracting Authority in writing of any actual or alleged claims that may erode the PL policy's limits.

10.3.7.3 The Contractor shall maintain the PL insurance in effect for no less than five years after the earlier of termination of the Contract or Substantial Completion of all Work.

10.3.7.4 If the Contractor is authorized under Applicable Law to directly provide professional design services, the Contractor may satisfy the requirements of this **Section 10.3.7** by providing a professional liability insurance policy.

10.3.7.5 If the Contractor is a joint venture:

.1 the Contractor may meet the requirements of this **Section 10.3.7** by providing a PL policy under which each joint venturer is the insured; or
.2 each joint venturer shall individually meet the requirements of this **Section 10.3.7** by providing a PL policy **(1)** under which the individual joint venturer is the insured and **(2)** that covers that joint venturer's interests

in the joint venture by endorsement or otherwise. The certificate of insurance shall reflect that the PL policy covers the joint venturer's interest in the joint venture.

Example: Assume that the Contractor **(1)** is the "XY joint venture" of company "X" and company "Y"; and **(2)** is required under **Section 10.3.7** to maintain PL insurance limits of $1M/$2M. In order to comply with **Section 10.3.7.5.2**, "X" must maintain PL insurance limits of $1M/$2M and "Y" must maintain PL insurance limits of $1M/$2M.

10.3.7.6 If the Contractor is a limited-liability company, which members consist of two or more separate firms:

.1 the Contractor may meet the requirements of this **Section 10.3.7** by providing a PL policy under which the limited-liability company is the insured; or

.2 each member of the limited-liability company shall individually meet the requirements of this **Section 10.3.7** by providing a PL policy **(1)** under which the individual member is the insured and **(2)** that covers that member's interests in the limited-liability company by endorsement or otherwise. The certificate of insurance shall reflect that the PL policy covers the member's interest in the limited-liability company.

Example: Assume that the Contractor **(1)** is the "XY limited-liability company," the members of which are "X" and "Y"; and **(2)** is required under **Section 10.3.7** to maintain PL insurance limits of $1M/$2M. In order to comply with **Section 10.3.7.6.2**, "X" must maintain PL insurance limits of $1M/$2M and "Y" must maintain PL insurance limits of $1M/$2M.

10.3.8 Professional Liability—Subcontractors. If the Work to be performed by a Subcontractor includes any professional design services (including without limitation sprinkler and/or fire protection and other design-build work) the Subcontractor shall maintain contractor's PL insurance without design-build exclusions with limits not less than as identified in the following table:

Subcontract Sum	Each Claim	Annual Aggregate
Up to $50,000,000	$1,000,000	$2,000,000
More than $50,000,000	$2,000,000	$4,000,000

10.3.8.1 The PL policy shall have an effective date on or before the date that the Subcontractor first started to provide any Project-related services.

10.3.8.2 Upon submission of the associated certificate of insurance and at each policy renewal, the Contractor shall advise the Contracting Authority in writing of any actual or alleged claims that may erode the Subcontractor's PL policy's limits.

10.3.8.3 The Subcontractor shall maintain the PL insurance in effect for no less than five years after the earlier of termination of the Contract or Substantial Completion of all Work.

10.3.8.4 If the Subcontractor is authorized under Applicable Law to directly provide professional design services, the Subcontractor may satisfy the requirements of this **Section 10.3.7.5** by providing a professional liability insurance policy.

10.3.9 Aviation Liability. If the Contractor or a Subcontractor uses manned or unmanned aircraft, including helicopters, in performance of the Work, the Contractor shall maintain aircraft or aviation liability coverage in an amount of no less than $10,000,000. The Contracting Authority and Owner will not be liable for any damage to any aircraft owned, leased, rented, or borrowed by the Contractor or a Subcontractor.

10.3.10 Watercraft Liability. If the Contractor or a Subcontractor uses watercraft in performance of the Work, the Contractor shall maintain watercraft liability coverage including protection and indemnity insurance in an amount of no less than $5,000,000. The Contracting Authority and Owner will not be liable for any damage to any watercraft owned, leased, rented, or borrowed by the Contractor or Subcontractor.

10.3.11 Equipment Coverage. The Contracting Authority and Owner will not insure or be liable for damage to any Contractor or Subcontractor owned, leased, rented, or borrowed tools, equipment, or vehicles. The Contractor and Subcontractors are solely responsible for maintaining all insurance necessary to cover their tools, equipment, and vehicles.

10.3.12 Ocean Marine Insurance. If the shipment of equipment or materials for the Work will not be covered by the builder's risk insurance described under **Section 10.4**, the Contractor shall maintain ocean marine insurance to the Site including cost, insurance, and freight with limits of not less than an amount equal to the full replacement cost of equipment/materials shipped to final destination point.

10.3.12.1 The insurance shall include the following minimum requirements:

.1 all-risk basis including war risk and all forms of terrorism;
.2 coverage for general average and salvage charges;
.3 "on deck" coverage;
.4 warehouse-to-warehouse coverage;
.5 coverage to include losses from strikes, riots, and civil commotions ("SR&CC coverage");
.6 coverage to include losses from free of capture and seizure warranty ("FC&S Warranty coverage");
.7 "Inchmaree" clause;
.8 sue and labor;
.9 "both-to-blame" coverage;
.10 free of particular average;
.11 inland coverage including on-land shipment, port storage, and barge transit upon inland waterways; and
.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 7** and **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.

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 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 proceed as described under **Section 11.3.4;** ;

11.2.2.3 proceed with Work not terminated; and

11.2.2.4 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 After terminating the Contract for convenience, the Owner shall pay the Contractor in accordance with the Schedule of Values for Work completed, including Contractor's Fee, 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 In no event shall the Contractor be entitled to **(1)** Contractor's Fee on or any other compensation for 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, 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 6.24.1** 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 6.24.1** 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 After termination, the Contractor shall to the extent related to the performance of the discontinued portion of the Work, unless the notice of termination directs otherwise:

11.3.4.1 immediately discontinue the Work on that date, place no further orders or Subcontracts for materials, equipment, services, facilities, or otherwise, except as may be necessary for completion of such portion of the Work as is not discontinued;

11.3.4.2 subject to the Contracting Authority's exercise of its rights under **Section 4.5**, promptly make every effort to procure cancellation upon terms satisfactory to the Contracting Authority of all Subcontracts;

11.3.4.3 promptly work with the Contracting Authority in good-faith to develop and implement plans to **(1)** secure the Site and off-Site stored materials; **(2)** inventory and verify **(a)** the location and quantity of materials stored on and off-Site and **(b)** the status of the progress of the Work; and **(3)** identify all Project-related permits;

11.3.4.4 no less than five days after the effective date of the termination, deliver to the Contracting Authority all Contractor-maintained, Project-related permits;

11.3.4.5 no less than seven days after the effective date of the termination, deliver to the Contracting Authority the following information and documents concerning each Subcontractor: **(1)** name and address; **(2)** name, address, telephone number, and email address of the Subcontractor's primary point of contact for the Project; **(3)** scope of the Subcontract Work (including equipment supplied); **(4)** a complete and unredacted copy of the Subcontract(s); **(5)**

complete and unredacted copies of all Subcontract modifications (e.g., change orders, amendments, etc.) and related documents; **(6)** complete and unredacted copies of all pending claims, requests for additional compensation, requests for additional time, unexecuted change orders, and related documents; **(7)** complete and unredacted copies of all pay applications (paid and pending); **(8)** a complete and unredacted copy of the Contractor's accounts-payable report for the Subcontractor; **(9)** complete and unredacted copies of any non-conforming Work reports/notices and related documents; and **(10)** complete and unredacted copies of any surety bond(s) or other performance security provided by the Subcontractor.

11.3.4.6 no less than 21 days after the effective date of the termination, pay all undisputed amounts due to each Subcontractor for Work performed before the effective date of termination and deliver to the Contracting Authority lien waivers to evidence those payments; and

11.3.4.7 do only such Work as may be necessary to protect the Work already in progress and to protect materials and equipment on the Project Site or in transit thereto.

11.3.5 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 Owner has paid.

11.3.6 If the Contract is terminated, the Contractor shall not be entitled to further payment. If the unpaid balance of the Contract Sum is exceeded by 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.

11.3.7 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.

11.3.8 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.

11.3.9 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 shall 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 of the Contractor's Documents 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 delivered by facsimile, email, or project management software.

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 in the Contracting Definitions.

12.8.3 The standard workdays for State projects are Monday through Friday, excluding Legal Holidays.

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 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 Substantial Completion within the associated Contract Time.

12.9.1.2 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.

12.9.1.3 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. In the event of a conflict or inconsistency between these General Conditions and any other Contract Documents (except Supplementary General Conditions), these General Conditions take precedence. In the event of a conflict or inconsistency between these General Conditions and Supplementary Conditions, the Supplementary Conditions take precedence.

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 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 6.2.2** through **6.2.5** 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
State of Ohio Standard Requirements for Public Facility Construction

Certifications

These Supplementary Conditions amend and supplement the General Conditions 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.

Contracting Authority

Department of Transportation – Office of Statewide Facilities
1980 West Broad Street, Mail Stop #2310
Columbus, Ohio 43223
(614) 325-5616
Facilities & Equipment Management | Ohio Department of Transportation

MODIFICATIONS TO 00 21 13 INSTRUCTIONS TO BIDDERS (GENERAL CONTRACTING / ELECTRONIC BID)

No goals are established for the 'Encouraging Diversity, Growth and Equity' ("EDGE") Program. A 'Commitment to Participate in the EDGE Business Assistance Program' is not required to be completed per Section 2.6.1.1.

Add Section 2.6.4: Limitation on Use of Contract Funds for Lobbying:

.1 The prospective bidder certifies, by signing and submitting this bid proposal, to the best of his or her knowledge and belief that:

a. No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any federal agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal,
b. amendment, or modification of any federal contract, grant, loan, or cooperative agreement.
c. If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any federal agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying" in accordance with its instructions.

.2 This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. This certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

.3 The prospective bidder also agrees by submitting his or her bid proposal that he or she shall require the language of this certification be included in all lower tier subcontracts which exceed $100,000 and that all such subcontractors shall certify and disclose accordingly.

Delete *'a description of Encouraging Diversity Growth and Equity ("EDGE") participation and performance'* from Section 2.10.3.2.

Delete Section 2.10.3.9 in its entirety pertaining to the EDGE Program.

Delete references to EDGE from Section 3.5.3.4.

Delete Section 6.1.9 in its entirety pertaining to the EDGE Program.

Delete references to EDGE from Section 6.2.1.2.

Replace Section 6.5.1 Prevailing Wage Rates with: Proposal Note 061 denoted in Exhibit B. (See also Specification Section 00 73 43)

MODIFICATIONS TO 00 71 00 CONTRACTING DEFINITIONS

Replace 'Bid' with: **Bid:** The offer of a Bidder, on the prescribed form properly signed and guaranteed, to perform the Work and to furnish the labor and materials at the prices quoted. 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.

Replace 'Bidder' with: **Bidder:** An individual, firm, or corporation submitting a Bid for the advertised Work, acting directly or through the duly authorized representative.

Replace 'Change Order' with: **Change Order:** A written order issued by the Director to the Contractor, covering changes to the terms and conditions, plans and/or quantities, within or beyond the scope of the Contract and establishing the basis of payment and time adjustments for the work affected by the changes.

Replace 'Contract' with: **Contract:** The written agreement between the Department and the Contractor setting forth the obligations of the parties, including, but not limited to, the performance of the Work and the basis of payment**.**

Replace 'Contract Documents' with: **Contract Documents:** The Contract Documents include the Invitation for Bids, Addenda, Proposal, contract form and required bonds, Specifications, Supplemental Specifications, Special Provisions, general and detailed plans, Plan notes, standard construction drawings identified in the Plans, notice to contractor, Change Orders, Supplemental Agreements, Extra Work Contracts, "Accepted" and "Accepted as Noted" Working Drawings, and any other document designated by the Department as a Contract Document, all of which constitute one instrument.

Replace 'Contract Times' with: **Contract Time:** The number of workdays or calendar days, including authorized adjustments, allowed for completion of the Project. When a specified Completion Date is shown in the Contract Documents instead of the number of workdays or calendar days, completion of the Project shall occur on or before that date. Specified Completion Date and Calendar Day Contracts shall be completed on or before the day indicated even when that date is a Saturday, Sunday, or holiday.

Replace 'Contractor' with: **Contractor:** The individual, firm, or corporation contracting with the Department for performance of prescribed Work, acting directly or through a duly authorized representative.

Add 'Department' as: **Department:** The Department of Transportation, State of Ohio.

Add 'Director' as: **Director:** Administrative head of the Department appointed by the Governor.

Add 'ODOT' as: **ODOT:** The Department of Transportation, State of Ohio or Department.

Add 'Prime Contractor' as: **Prime Contractor:** Contractor

Replace 'Proposal' with: **Proposal:** The approved form on which the Department requires Bids to be prepared and submitted for the Work.

Add 'Proposal Note (PN)' as: **Proposal Note (PN):** A formal, published document that contains legal and technical requirements necessary for the proper bidding and execution of an individual construction project contract.

Add Sale Date definition as: : **Sale Date:** Bid Opening.

Replace 'Shop Drawings' with: **Shop Drawings:** 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. Drawings accepted by the Contractor and submitted to the Department that describe portions of the Work fabricated off site that are incorporated permanently with the project. Department acceptance is not required.

Add the following to the Definition for **Specifications:** The directions, provisions, and requirements contained herein as supplemented by the Supplemental Specifications and Special Provisions

Replace 'State' with: **State:** The State of Ohio acting through its authorized representative.

Add the following to the Definition for **Subcontractor:** An individual, firm, or corporation to whom the Contractor sublets part of the Contract to be performed on the job site, who prior to such undertaking receives the written consent of the Director.

In the Definition for **Supplementary Conditions***, replace the last sentence with the following:* 'The General Conditions shall not be superseded or amended by Drawings and Specifications, unless so provided in Supplementary Conditions prepared by the Department.'

Add the following to the Definition for **Surety:** The corporation, partnership, or individual, other than the Contractor, executing a bond furnished by the Contractor.

MODIFICATIONS TO 00 72 13 GENERAL CONDITIONS

Add Section 1.1.1.5: Federally Required Equal Employment Opportunity Certification Form
The bidder hereby certifies that he or she **has ...., has not ....,** participated in a previous contract or subcontract subject to the equal opportunity clause, and that he or she **has ...., has not ....,** filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity ('EEO"), all reports due under the applicable filing requirements. **The bidder must circle the appropriate "has" or "has not" above.**

Delete Section 1.1.3 Affirmative Action in its entirety.

Replace Section 1.2 Prevailing Wages with: Proposal Note 061 denoted in Exhibit B. (See also Specification Section 00 73 43)

Replace Section 1.4 with:

The Prime Contractor should recognize that in actual economic practice, overcharges resulting from antitrust violations are usually borne by ODOT. As consideration for the award of the contract and intent to be legally bound, the Prime Contractor acting herein by and through the person signing this contract on behalf of the contractor as a duly authorized agent, hereby assigns, sells, conveys, and transfers to ODOT any and all right, title, and interest to any and all claims and causes of action the Prime Contractor now has or hereafter requires under state or federal antitrust laws provided the claims or causes of action related to the goods or services are the subject to the contract. In addition, the Prime Contractor warrants and represents that it will require all of its subcontractors and first-tier suppliers to assign all federal and state antitrust claims and causes of action to ODOT. The provisions of this article shall become effective at the time the Contracting Authority executes this contract without further acknowledgment by any of the parties.

All contracting entities shall assign their rights and responsibilities to ODOT for all antitrust claims and causes of action regarding subcontractors. (PN 039 - 10/15/2004 - ASSIGNMENT OF ANTITRUST CLAIMS IN STATE CONTRACT LANGUAGE)

Delete Section 1.8 EDGE Participation and Reporting in its entirety. This project will NOT have participate in the 'Encouraging Diversity, Growth and Equity' ("EDGE") Program.

In Section 9.3.1 add the following sentence. A detailed template Schedule of Values will be provided to the Contractor at the time of Notice to Proceed for the Contractor to complete.

Delete Section 9.3.1.1 in its entirety pertaining to the EDGE Program.

Delete Section 9.4.1.7 in its entirety pertaining to the EDGE Program.

Delete Section 9.8.2.6 in its entirety pertaining to the EDGE Program.

Insert Section 10.3.1.1: Ohio Workers' Compensation Coverage

The Prime Contractor must secure and maintain valid Ohio workers' compensation coverage until the project has been finally accepted by ODOT. A certificate of coverage evidencing valid workers' compensation coverage must be submitted to the Contracting Authority before the contract is executed by the Contracting Authority.

The Prime Contractor must immediately notify the Contracting Authority in writing if it or any subcontractor fails or refuses to renew their workers' compensation coverage. Furthermore, the Prime Contractor must notify the Contracting Authority in writing if it's or any of it's subcontractor's workers' compensation policies are canceled, terminated, or lapse.

The failure to maintain valid workers' compensation coverage shall be considered a breach of contract which may result in the Prime Contractor or subcontractor being removed from the project, withholding of pay estimates, and/or termination of the contract.

Insert Article 13 with associated Sections as follows in its entirety:

ARTICLE 13 - MISCELLANEOUS SUPPLEMENTARY CONDITIONS

13.1 Exhibits

13.1.1 The Exhibits identified and attached to this document are hereby incorporated into and made a part of these Supplementary Conditions as if fully set forth at length herein. Notwithstanding any other provision in this contract, the parties agree that all applicable federal laws, regulations, and mandatory governmental requirements, including those incorporated by reference, shall take precedence and supersede any conflicting or inconsistent terms, conditions, or provisions within this contract, or any exhibit that are attached and incorporated into the Contract.

13.1.1.1 Exhibit A: Required Contract Provisions for Federal-Aid Construction Contracts (FHWA-1273 Revised October 23, 2023)

.1 Clarifications:

a. EDGE Program: No goals are established for the 'Encouraging Diversity, Growth and Equity' ("EDGE") Program. Section 2.6.1.1 (Commitment to Participate) is waived for this project.

b. DBE Program: This project is not subject to measured 'Disadvantaged Business Enterprise (DBE)' Program or FHWA approved reporting.

c. SBE Program: This project is not subject to measured 'Small Business Enterprise (SBE)' Program participation requirements.

13.1.1.2 Exhibit B: Proposal Notes (PN) 017, 024, 026, 029, 031, 045, 050, 059, 061, and 133

END OF DOCUMENT

Exhibit A
FHWA-1273

CONTRACT PROVISIONS FOR FEDERAL-AID CONSTRUCTION CONTRACTS

The required contract provisions for federal-aid construction contracts (contained in Form FHWA 1273 revised October 23, 2023 and located here) are hereby incorporated by reference as if rewritten herein. Form FHWA-1273 shall be physically incorporated in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreement for supplies or services related to a construction contract). The prime contractor shall be responsible for ensuring that the FHWA-1273 is physically incorporated into all lower-tier subcontracts.

SANCTIONS AND ADMINISTRATIVE REMEDIES

Failure by the prime contractor to include the provisions of FHWA-1273 in their contract or in their lower-tier subcontracts may result in the issuance of sanctions as follows:
1st Tier: Letter of Reprimand
2nd Tier: Damages equivalent to the daily liquidated damages amount found in section 108.07 for each incident of non-compliance
3rd Tier: If a pattern of paying damages persists or the Contractor has falsified, misrepresented or withheld information, ODOT can pursue other remedies available by law including suspension, revocation, and/or debarment.

Factors to be considered in issuing sanctions may include, but are not limited to the following:
· the magnitude and the type of offense;
· the degree of the Contractor's culpability;
· any steps taken to rectify; and
· the Contractor's record of performance on other projects
· the number of times the Contractor has been previously sanctioned by ODOT.

1273 – Revised October 23, 2023

REQUIRED CONTRACT PROVISIONS FEDERAL-AID CONSTRUCTION CONTRACTS

I. General
II. Nondiscrimination
III. Non-segregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
XI. Certification Regarding Use of Contract Funds for Lobbying
XII. Use of United States-Flag Vessels:

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid design- build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or request-for-proposals documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

II. NONDISCRIMINATION (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)

The provisions of this section related to 23 CFR Part 230, Subpart A, Appendix A are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60- 1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR Part 230, Subpart A, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (*see* 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action or are substantially involved in such action, will be made fully cognizant of and will implement the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action

within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors, suppliers, and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurances Required:

a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.

b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:
(1) Withholding monthly progress payments;
(2) Assessing sanctions;
(3) Liquidated damages; and/or
(4) Disqualifying the contractor from future bidding as non-responsible.

c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of more than $10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, the contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location under the contractor's control where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101.
Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA- 1273 format and FHWA program requirements.

1. Minimum wages (29 CFR 5.5)

a. *Wage rates and fringe benefits.* All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of 29 CFR 5.5, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act (40 U.S.C. 3141(2)(B)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.e. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph 4. of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph 1.c. of this section) and the Davis-Bacon poster (WH–1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. *Frequently recurring classifications.* (1) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in 29 CFR part 1, a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph 1.c. of this section, provided that:

(i) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

(ii) The classification is used in the area by the construction industry; and

(iii) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

(2) The Administrator will establish wage rates for such classifications in accordance with paragraph 1.c.(1)(iii) of this section. Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

c. *Conformance.* (1) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is used in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(3) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to *DBAconformance@dol.gov*. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(4) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to *DBAconformance@dol.gov,* refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(5) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division under paragraphs 1.c.(3) and (4) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 1.c.(3) or (4) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

d. *Fringe benefits not expressed as an hourly rate.* Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor may either pay the benefit as stated in the wage determination or may pay another bona fide fringe benefit or an hourly cash equivalent thereof.

e. *Unfunded plans.* If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

f. *Interest.* In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

2. Withholding (29 CFR 5.5)

a. *Withholding requirements.* The contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph 3.d. of this section, the contracting agency may on its own initiative and after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph

2.a. of this section or Section V, paragraph 3.a., or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

3. Records and certified payrolls (29 CFR 5.5)

a. *Basic record requirements* (1) *Length of record retention.* All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(2) *Information required.* Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(3) *Additional records relating to fringe benefits.* Whenever the Secretary of Labor has found under paragraph 1.e. of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(4) *Additional records relating to apprenticeship.* Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

b. *Certified payroll requirements* (1) *Frequency and method of submission.* The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the contracting agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(2) *Information required.* The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph 3.a.(2) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (*e.g.,* the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH–347 or in any other format desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division website at *https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347/.pdf* or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the contracting agency.

(3) *Statement of Compliance.* Each certified payroll submitted must be accompanied by a “Statement of Compliance,” signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(i) That the certified payroll for the payroll period contains the information required to be provided under paragraph 3.b. of this section, the appropriate information and basic records are being maintained under paragraph 3.a. of this section, and such information and records are correct and complete;

(ii) That each laborer or mechanic (including each helper and apprentice) working on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification(s) of work actually performed, as specified in the applicable wage determination incorporated into the contract.

(4) *Use of Optional Form WH–347.* The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 will satisfy the requirement for submission of the “Statement of Compliance” required by paragraph 3.b.(3) of this section.

(5) *Signature.* The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(6) *Falsification.* The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 3729.

(7) *Length of certified payroll retention.* The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

c. *Contracts, subcontracts, and related documents.* The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

d. *Required disclosures and access* (1) *Required record disclosures and access to workers.* The contractor or subcontractor must make the records required under paragraphs 3.a. through 3.c. of this section, and any other documents that the contracting agency, the State DOT, the FHWA, or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(2) *Sanctions for non-compliance with records and worker access requirements.* If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under 29 CFR part 6 any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(3) *Required information disclosures.* Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address of each covered worker, and must provide them upon request to the contracting agency, the State DOT, the FHWA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

4. Apprentices and equal employment opportunity (29 CFR 5.5)

a. *Apprentices* (1) *Rate of pay.* Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) *Fringe benefits.* Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(3) *Apprenticeship ratio.* The allowable ratio of apprentices to journeyworkers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph 4.a.(4) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph 4.a.(1) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) *Reciprocity of ratios and wage rates.* Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

b. *Equal employment opportunity.* The use of apprentices and journeyworkers under this part must be in conformity with

the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

c. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeyworkers shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

6. Subcontracts. The contractor or subcontractor must insert FHWA-1273 in any subcontracts, along with the applicable wage determination(s) and such other clauses or contract modifications as the contracting agency may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate. 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract as provided in 29 CFR 5.5.

9. Disputes concerning labor standards. As provided in 29 CFR 5.5, disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility. a. By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

c. The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, 18 U.S.C. 1001.

11. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or 29 CFR part 1 or 3; or

d. Informing any other person about their rights under the DBA, Related Acts, this part, or 29 CFR part 1 or 3.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Pursuant to 29 CFR 5.5(b), the following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchpersons and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph 1. of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or

mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph 1. of this section, in the sum currently provided in 29 CFR 5.5(b)(2)* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this section.

* $31 as of January 15, 2023 (See 88 FR 88 FR 2210) as may be adjusted annually by the Department of Labor, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990.

3. Withholding for unpaid wages and liquidated damages

a. *Withholding process.* The FHWA or the contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this section on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with Section IV paragraph 2.a. or paragraph 3.a. of this section, or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

4. Subcontracts. The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1. through 5. of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 5. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower- tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

5. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or

d. Informing any other person about their rights under CWHSSA or this part.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” in paragraph 1 of Section VI refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions: (based on longstanding interpretation)

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract. 23 CFR 635.102.

2. Pursuant to 23 CFR 635.116(a), the contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. Pursuant to 23 CFR 635.116(c), the contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract. (based on long-standing interpretation of 23 CFR 635.116).

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR Part 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. 23 CFR 635.108.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR Part 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 11, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)

This provision is applicable to all Federal-aid construction contracts in excess of $150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.327.

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.327.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200. 2 CFR 180.220 and 1200.220.

1. **Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction. 2 CFR 180.330.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 180.300.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/). 2 CFR 180.300, 180.320, and 180.325.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;.

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification, 2 CFR 180.700 and 180.800; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

* * * * *

3. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 – 180.1020, and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 1200.220.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily

excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

* * * * *

4. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:

(1) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(2) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(3) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements)

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000. 49 CFR Part 20, App. A.

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

XII. USE OF UNITED STATES-FLAG VESSELS:

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. 46 CFR 381.7.

2. To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, ‘on-board’ commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b)(1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

END OF DOCUMENT

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Exhibit B
Proposal Notes

1. PN 017 - 10/15/2004 - FEDERALLY REQUIRED EEO CERTIFICATION CLAUSE

The EEO Certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7 (b) (1)) and must be submitted by bidders and proposed subcontractors only in connection with contracts and subcontracts which are subject to the equal opportunity clause (41 CFR 60-1.4). Contracts and subcontracts that are exempt from the equal opportunity clause are set forth in 41 CFR 60-1.5.

Currently, Standard Form 100 (EEO-1) is the only report required by the implementing regulations.

Proposed Prime Contractors and subcontractors who have participated in a previous contract or subcontract and have not filed the required reports should note that 41 CFR 60-1.7 (b) (1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration (FHWA) or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.

2. PN 024 – 04/21/2006 – US ARMY CORPS OF ENGINEERS AND OHIO ENVIRONMENTAL PROTECTION AGENCY PERMITS

The above-referenced permits are incorporated and made a part of this contract as special provisions incorporated herein. Therefore, in the event the contractor or its agents refuse or fail to adhere to the requirements of the US Army Corps of Engineers 404 Permit and/or the Ohio Environmental Protection Agency's 401 Water Quality Certification and an assessment or fine is made or levied against ODOT, the Prime Contractor shall reimburse ODOT within 30 calendar days of the notice of assessment or fine, or ODOT may withhold the amount of the fine from the Prime Contractor's next pay estimate. All money collected or withheld from the Prime Contractor shall be delivered to the permitting agencies issuing the assessment or fine.

These fines are not to be construed as a penalty but are liquidated damages to recover costs assessed against ODOT due to the Prime Contractor's refusal or failure to comply with the permits.

3. PN 026 - 10/15/2004 - CERTIFICATION OF NONSEGREGATED FACILITIES

(a) A Certification of Nonsegregated Facilities, as required by the May 9, 1967, Order of the Secretary of Labor (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities (is included in the proposal and must be submitted prior to the award of a Federal-aid highway construction contract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause).

(b) Bidders are cautioned as follows: By signing this bid, the bidder will be deemed to have signed and agreed to the provisions of the "Certification of Nonsegregated Facilities" in this proposal. This certification provides that the bidder does not maintain or provide for his employees facilities which are segregated on a basis of race, creed, color, or national origin, whether such facilities are segregated by directive or on a de facto basis. The certification also provides that the bidder will not maintain such segregated facilities.

(c) Bidders receiving Federal-aid highway construction contract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause, will be required to provide for the forwarding of the following notice to prospective subcontractors for construction contracts and material suppliers where the subcontracts or material supply agreements exceed $10,000 and are not exempt from the provisions of the Equal Opportunity clause.

"Notice to Prospective Subcontractors and Material Suppliers of Requirement for Certification of Nonsegregated Facilities" -

(a) A Certification of Nonsegregated Facilities as required by the May 9, 1967, Order of the Secretary of Labor (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, which is included in the proposal, or attached

hereto, must be submitted by each subcontractor and material supplier prior to the award of the subcontract or consummation of a material supply agreement if such subcontract or agreement exceeds $10,000 and is not exempt from the provisions of the Equal Opportunity clause.

(b) Subcontractors and material suppliers are cautioned as follows: By signing the subcontract or entering into a material supply agreement, the subcontractor or material supplier will be deemed to have signed and agreed to the provisions of the "Certification of Nonsegregated Facilities" in the subcontract or material supply agreement. This certification provides that the subcontractor or material supplier does not maintain or provide for his employees facilities which are segregated on the basis of race, creed, color, or national origin, whether such facilities are segregated by directive or on a de facto basis. The certification also provides that the subcontractor or material supplier will not maintain such segregated facilities.

(c) Subcontractors or material suppliers receiving subcontract awards or material supply agreements exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause will be required to provide for the forwarding of this notice to prospective subcontractors for construction contracts and material suppliers where the subcontracts or material supply agreements exceed $10,000 and are not exempt from the provisions of the Equal Opportunity clause.

4. PN 029 – 01/20/2023– ON THE JOB TRAINING (OJT) PROVISIONS

The primary objective of the OJT Program is to offer equal opportunity for the training and upgrading of minorities, women, and disadvantaged persons toward journeyperson status in the highway construction trades, and to establish a plentiful and well diverse pool of skilled workers for the highway construction industry.

The Contractor shall adhere to all requirements of the OJT Program as set forth in the most recent version of the ODOT On the Job Training Program Plan located here OJT+Program+Plan+2020+Final+-+12.16.2020.pdf (ohio.gov) and incorporated in its entirety herein by reference.

FHWA 1391 PROVISIONS: The FHWA annual Equal Employment Opportunity (EEO) Report is required for all federal-aid construction contracts (as required by Form FHWA-1273 and 23 CFR Part 230, Subpart C). The annual EEO Report collects employment data, specifically highlighting employment of racial/ethnic minorities and women, from all construction contractors with active federal-aid contracts valued at $10,000 or more (except for those contracts awarded under 23 U.S.C. 117), during the designated reporting period. Accurate reporting of data is imperative in order to maintain federal funding for future ODOT Federal-Aid Highway Construction projects.

Records and Reports: The contractor shall maintain records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work. These records shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and nonminority group members and women employed in each work classification on the project;
(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and
(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and nonminority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project workforce on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the workforce on board during all or any part of the last payroll period preceding the end of July.

SANCTIONS AND ADMINISTRATIVE REMEDIES

Failure by the prime contractor and sub-contractors to submit the provisions of FHWA-1391 by the dates provided by the administrating agency in their contract, or in their lower tier subcontracts, may result in the issuance of sanctions as follows:

1st Tier: Damages equivalent to the administrative fee's amount of ($100/day) established in section 109.12 for each incident of non-compliance, beginning the 1st day after the deadline date established in the 2nd written request for submittal of the FHWA 1391 Report.

2nd Tier: If a pattern of occurring administrative fee's persists or the Contractor has falsified, misrepresented or withheld information, ODOT can pursue other remedies available by law including suspension, revocation, and/or debarment.

Factors to be considered in issuing sanctions may include, but are not limited to the following:

- the magnitude and the type of offense;
- the degree of the Contractor's culpability;
- any steps taken to rectify; and
- the Contractor's record of performance on other projects
- the number of times the Contractor has been previously sanctioned by ODOT.

SUGGESTED SUB AGREEMENT LANGUAGE – FEDERAL-AID CONTRACTS

Suggested language for the federal-aid Prime Contractor to include in its subcontractor agreements:

As a Subcontractor, and/or trucking firm, you are contractually obligated to comply with the state administrating agency request for the submittal of the FHWA 1391 – Contractors Annual Equal Employment Opportunity (EEO) Report. It should reflect the total employment on all Federal-Aid Highway Projects in the State as of July 31st. The staffing figures to be reported should represent the project work force on board in all or any part of the last payroll period preceding the end of July. The staffing figures to be reported in Table A should include journey-level men and women, apprentices, and on-the-job trainees. Staffing figures to be reported in Table B should include only apprentices and on-the-job trainees as indicated.
All lower-tier Subcontractor (DBE and non-DBE), and trucking firm (DBE and non-DBE) sub agreements must include this EEO reporting obligation.

5. PN 031 - 7/21/2023 – PROMPT PAYMENT

Prompt payment requirements apply to ODOT and, by extension, its Prime Contractors and subcontractors (including traditional subcontractors as well as material suppliers and trucking firms, collectively referred to herein as subcontractors). The state of Ohio's laws related to prompt payment are published in O.R.C. 4113.61. O.R.C. 4113.61 applies to all contracts. The Prime Contractor must comply with this Proposal Note, O.R.C. 4113.61, C&MS 107.21 and, for contracts with USDOT financial assistance (*i.e.*, federally funded contracts), 49 CFR 26.29.

The Department will monitor payments made by prime contractors and subcontractors for compliance with this Proposal Note, C&MS 107.21 and, where applicable, 49 CFR 26.29. To facilitate this monitoring, the Department requires both prime **and** subcontractors to report their payments to all subcontractors/second-tier subcontractors with the submission of each invoice. The payment data reported must include any retainage withheld and any previously withheld retainage released. All such reporting must take place through a web-based submission on GoFormz. Invoices will not be approved and processed for payment unless this reporting form has been submitted and received by the Department.

The prime/subcontractor must report the following information:

- The name of the payee
- The dollar amount of the payment to the payee

- The date the payee was paid
- The amount of retainage withheld (if any)

Ohio's 10-day prompt payment requirement is based on the payer's payment issuance date and NOT the payee's payment receipt date.

The prime/subcontractor must sign each reported payment and submit to ODOT via the GoFormz website.

The second-tier subcontractor is responsible for completing the affirmation of payment form in GoFormz.

The prime contractor is responsible for ensuring that all subcontractors and second-tier subcontractors are correctly completing all prompt payment forms via the GoFormz website.

If the prime or subcontractor(s) fail to submit the aforementioned documentation with each invoice, they will be determined to be non-compliant, and invoices will not be processed for payment.

Payees must verify each payment reported by the payer within thirty (30) days of the payment being signed by the payer. This verification must include:

- Whether the payment was received, and if so, whether it was or was not as expected
- The dollar amount of the payment received
- The date the payment was received

The prime contractor shall fully complete the last prompt payment form upon receipt of final payment.

SANCTIONS AND ADMINISTRATIVE REMEDIES

Failure by the prime contractor and/or subcontractor(s) to follow Prompt Payment requirements may result in the issuance of sanctions as follows:

1st Tier: Notice of Violation via a Letter of Reprimand

2nd Tier: If corrective actions are not taken within the specified three (3) business days, a pay estimate in the amount due to the subcontractor(s) that was not reported or paid may be withheld.

3rd Tier: If a pattern of paying damages persists or the contractor or subcontractor(s) has falsified, misrepresented, or withheld information, ODOT can pursue other remedies available by law including suspension, revocation, and/or debarment.

Factors to be considered in issuing sanctions may include, but are not limited to the following:

- the Prime Contractor's past project practices;
- the magnitude and the type of offense;
- the degree of the Prime Contractor's culpability;
- any steps taken to rectify;
- the Prime Contractor's record of performance on other projects; and
- the number of times the Prime Contractor has been previously sanctioned by ODOT.

6. PN 045 - 10/15/2004 - NON -COLLUSION AFFIDAVIT

In accordance with 23 U.S.C. 112 and O.R.C. Chapter 1331 *et. seq*. and Sections 2921.11 and 2921.13, the bidder hereby states, under penalty of perjury and under other such penalties as the law provides, that he/she or his/her agents or employees have not entered, either directly or indirectly, into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this proposal. Execution of this proposal on the signature portion thereof shall also constitute signature of this Non-Collusion Affidavit as permitted by 28 US.C. 1746.

REPORTING BID RIGGING

To report bid rigging activities call:

1-800-424-9071

The U.S. Department of Transportation (USDOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m. Eastern Standard Time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the “hotline” to report such activities.

The "hotline" is part of the USDOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the USDOT Inspector General. All information will be treated confidentially, and caller anonymity will be respected.

Knowledge of possible bid rigging, bidder collusion, or other fraudulent activities can also be reported via e-mail (hotline@oig.dot.gov) or through their website Report Fraud Hotline | DOT OIG

7. PN 050 - 10/15/2004 - LIMITATION ON USE OF CONTRACT FUNDS FOR LOBBYING

1. The prospective bidder certifies, by signing and submitting this bid proposal, to the best of his or her knowledge and belief, that:

    a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

    b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying" in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. This certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective bidder also agrees by submitting his or her bid proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such sub-recipients shall certify and disclose accordingly.

8. PN 059 - 10/15/2004 - WAGE DETERMINATION APPEALS PROCESS

1. Has there been an initial decision in the matter? This can be:
    a. An existing published wage determination
    b. A survey underlying a wage determination
    c. A Wage and Hour Division letter setting forth a position on a wage determination matter
    d. A conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those regional offices have responsibility for the Davis-Bacon survey program. If the response for this initial contact is not satisfactory, the process described in Subsections 2. and 3. should be followed.

Regarding any other matter not yet ready for the formal process described within this section, initial contact should be made with the Branch of Construction Wage Determinations by writing to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D. C. 20210

2. If the answer to the question in Subsection 1. is yes, an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (see 29 CFR 1.8 and 29 CFR Part 7) by writing to:

Wage and Hour Administrator
U. S Department of Labor
200 Constitution Avenue, N.W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requester considers relevant to the issue.

3. If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board) by writing to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4. All decisions by the Administrative Review Board are final.

9. PN 061 – 01/20/2016 -WAGE SCALE ON ALL FEDERAL-AID PROJECTS

The wage rates for this project were determined by the Secretary of Labor in accordance with Federal-Aid requirements.

Contractors shall use only the classifications and wage rates set forth in the United States Department of Labor (USDOL) wage decision found at the website noted below on payrolls submitted to the District Office. Additionally, please note that the wage modification in effect at the time of the project sale date, shall be used by all contractors.

This USDOL wage decision may be viewed at https://sam.gov/wage-determinations.

This contract requires the payment of the total of the basic hourly rates plus the fringe benefits payments for each classification in accordance with the following regulations, which by reference are made part of this contract:

1) The USDOL Regulations, 29 CFR 5.5, 5.31, and 5.32, most recent revision at contract execution.
2) Form FHWA-1273 (most recent revision at contract execution) Part IV. Payment of Predetermined Minimum Wage and Part V. Statements and Payrolls.

The failure to pay prevailing wages to all laborers and mechanics employed on this project shall be considered a breach of contract. Such a failure may result in the termination of the contract and debarment.

The Prime Contractor and all subcontractors shall pay all wages and fringe benefits by company check. All payroll records and canceled pay checks shall be maintained for at least three years after final acceptance. The Prime Contractor's and all subcontractor's payroll records and canceled pay checks shall be made available for inspection by ODOT and USDOL, upon request, anytime during the life of the contract, and for three years thereafter by USDOL. Additionally, the Prime Contractor and all subcontractors shall permit such representatives to interview any employees during working hours while the employee is on the job.

The wage and fringe rates determined for this project shall be posted by the Prime Contractor in a prominent and accessible place on the project, field office, or equipment yard where they can be easily read by the workers.

The Prime Contractor and subcontractors shall submit certified payrolls each week beginning three weeks after the start of work. These payrolls shall include but not limited to the following:

1. Employee name, address, social security number, classification, and hours worked.
2. The basic hourly and overtime rate paid, total pay, and the manner in which fringe benefit payments have been irrevocably made.
3. The contract ID and pay week dates.
4. Signature of an authorized company representative.

Additionally, a copy of the "Apprentice Certification" obtained from the Ohio State Apprenticeship Council, must accompany all certified payrolls submitted for all apprentices working on this project.

Please be aware that it is ultimately the responsibility of the Prime Contractor to ensure that all laws relating to prevailing wages in the USDOL Regulations, 29 CFR Parts 1 and 5, are strictly adhered to by all subcontractors on the project.

If the Prime Contractor or any subcontractor fails to comply with any of the provisions contained in this proposal note, ODOT may terminate the contract, debar the Prime Contractor or subcontractor and/or withhold or suspend pay estimates after written notice and a reasonable opportunity to comply has been provided.

10. PN 133 – 07/18/2025 – PRODUCTS PRODUCED IN THE UNITED STATES

Furnish products that are produced in the United States according to the applicable provisions of the Infrastructure Investment and Jobs Act (IIJA), Pub. L. No. 117-58, which includes the Build America, Buy America Act (BABA) Pub. L. 117-58, §§ 70901-27, and 23 CFR 635.410.

A. Federal Requirements. All steel or iron products incorporated permanently into the work must be made of steel or iron produced in the United States and all subsequent manufacturing must be performed in the United States. "Manufacturing" is any process that modifies the chemical content; physical shape or size; or final finish of a product. Manufacturing as it relates to steel or iron products begins with the initial melting and mixing and continues through the bending and coating stages.

"Manufactured products" means articles, materials, or supplies that have been processed into a specific form and shape, or combined with other articles, materials, or supplies to create a product with different properties than the

individual articles, materials, or supplies. If a domestic product is taken out of the United States for any process, it becomes a foreign source material.

All manufactured products used in the project must be manufactured in the United States ("final assembly requirement") and have greater than 55 percent of the manufactured product's components, by cost, be mined, produced, or manufactured in the United States ("55 percent requirement"). "Component" means an article, material, or supply, whether manufactured or unmanufactured, incorporated directly into a manufactured product or, where applicable, an iron or steel product. If a manufactured product is predominately iron, steel or a combination of both it must meet the above requirements for steel or iron products. Predominately iron or steel or a combination of both means the total cost of the iron and steel content exceeds 50 percent of the total cost of all its components. Manufactured products on projects that receive Federal authorization on or after October 1, 2025 must meet the final assembly requirement. Manufactured products on projects that receive Federal authorization on or after October 1, 2026 must meet the final assembly requirement and the 55 percent requirement.

All construction materials must be manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States.

"Construction materials" includes an article, material, or supply—other than an item of primarily iron or steel; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives—that is or consists primarily of:

- Non-ferrous metals;
- Plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables);
- Glass (including optic glass);
- Fiber optic cable (including drop cable);
- Optical fiber;
- Lumber;
- Engineered wood; and
- Drywall.

To provide clarity to item, product, and material manufacturers and processers, we note that items that consist of two or more of the listed materials that have been combined together through a manufacturing process, and items that include at least one of the listed materials combined with a material that is not listed through a manufacturing process, should be treated as manufactured products, rather than as construction materials. For example, a plastic framed sliding window should be treated as a manufactured product while plate glass should be treated as a construction material.

Construction materials brought on site and combined with other materials are not considered manufactured products.

Precast concrete products that are classified as manufactured products must have their predominantly iron or steel components meet the above requirements for iron and steel. The cabinets or other enclosures of intelligent transportation systems and other electronic hardware systems that are installed in the highway right of way and classified as manufactured products must comply with the above requirements for iron and steel if the cabinet or enclosure is predominately iron or steel.

B. Exceptions. The Director may grant specific written permission to use non-domestic steel or iron products in any type of construction in accordance with 23 CFR 635.410(b)(4). The Director may grant such exceptions under the following condition:

- The cost of products to be used does not exceed 0.1 percent of the total contract cost, or $2,500, whichever is greater. The cost is the value of the product as delivered to the project.

The Director may grant specific written permission to use non-domestic construction materials or manufactured products in any type of construction in accordance with 2 CFR Part 184. The Director may grant such exceptions under the following conditions:

- The total value of the non-compliant products is no more than the lesser of $1,000,000 or 5% of total applicable costs for the project; or
    - applicable costs are defined as the cost of materials (including the cost of any manufactured products) used in the project that are subject to a domestic preference requirement
    - the actual cost of the materials, not the anticipated cost of those materials.
- The total amount of the federal financial applied to the project, through awards or subawards, is below $500,000;

The Prime Contractor may request an exception on forms provided by the Department.

The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.

B. **Proof of Domestic Origin.** Furnish certification to the engineer showing the domestic origin of all products covered by this section before they are incorporated into the work. The Daily Source Report form itself is not acceptable certification of domestic origin. Acceptable documentation could be a specification sheet or cut sheet with the country of origin identified on the sheet. Non-domestic product(s) incorporated into the work does not relieve the Prime Contractor of any responsibility to correct the work up to and including removal and replacement of the non-domestic product(s). Products without a traceable domestic origin will be treated as a non-domestic product.

CONTRACTOR CERTIFICATION STATEMENT

The Contractor shall include the following written certifications on the front cover or initial sheet of each BABA Submittal or Shop Drawing, signed and dated prior to fabrication:

The undersigned Contractor/Supplier hereby certifies and affirms that all Iron and Steel, Manufactured Products, and Construction Materials supplied under this submittal for permanent incorporation into this federally-funded infrastructure project are in full compliance with the domestic content procurement preference requirements of the Build America, Buy America Act (BABA), Title IX of the Infrastructure Investment and Jobs Act (IIJA), Pub. L. 117-58, and all applicable guidance (including 2 CFR 184).

The undersigned further certifies that:

1. Required Step Certifications from manufacturers/subcontractors documenting the domestic manufacturing location for each stage of production are attached or available upon request.

2. No BABA-compliant material, product, or item covered by this submittal has an active, approved waiver on file unless specifically noted in the submittal documents.

3. The Contractor understands and agrees that the provisions of 31 U.S.C. Chapter 38, Administrative Remedies for False Claims and Statements, apply to this certification.

END OF DOCUMENT

PREVAILING WAGE RATES

1.1 Payment of Prevailing Wage Rates

The wage rates for this project were determined by the Secretary of Labor in accordance with Federal-Aid requirements.

Contractors shall use only the classifications and wage rates set forth in the United States Department of Labor (USDOL) wage decision found at the website noted below on payrolls submitted to the District Office. Additionally, please note that the wage modification in effect at the time of the project sale date, shall be used by all contractors.

This USDOL wage decision may be viewed at https://sam.gov/wage-determinations.

This contract requires the payment of the total of the basic hourly rates plus the fringe benefits payments for each classification in accordance with the following regulations, which by reference are made part of this contract:

1) The USDOL Regulations, 29 CFR 5.5, 5.31, and 5.32, most recent revision at contract execution.
2) Form FHWA-1273 (most recent revision at contract execution) Part IV. Payment of Predetermined Minimum Wage and Part V. Statements and Payrolls.

The failure to pay prevailing wages to all laborers and mechanics employed on this project shall be considered a breach of contract. Such a failure may result in the termination of the contract and debarment.

The Prime Contractor and all subcontractors shall pay all wages and fringe benefits by company check. All payroll records and canceled pay checks shall be maintained for at least three years after final acceptance. The Prime Contractor's and all subcontractor's payroll records and canceled pay checks shall be made available for inspection by ODOT and USDOL, upon request, anytime during the life of the contract, and for three years thereafter by USDOL. Additionally, the Prime Contractor and all subcontractors shall permit such representatives to interview any employees during working hours while the employee is on the job.

The wage and fringe rates determined for this project shall be posted by the Prime Contractor in a prominent and accessible place on the project, field office, or equipment yard where they can be easily read by the workers.

The Prime Contractor and subcontractors shall submit certified payrolls each week beginning three weeks after the start of work. These payrolls shall include but not limited to the following:

1. Employee name, address, social security number, classification, and hours worked.
2. The basic hourly and overtime rate paid, total pay, and the manner in which fringe benefit payments have been irrevocably made.
3. The contract ID and pay week dates.
4. Signature of an authorized company representative.

Additionally, a copy of the "Apprentice Certification" obtained from the Ohio State Apprenticeship Council, must accompany all certified payrolls submitted for all apprentices working on this project.

Please be aware that it is ultimately the responsibility of the Prime Contractor to ensure that all laws relating to prevailing wages in the USDOL Regulations, 29 CFR Parts 1 and 5, are strictly adhered to by all subcontractors on the project.

If the Prime Contractor or any subcontractor fails to comply with any of the provisions contained in this proposal note, ODOT may terminate the contract, debar the Prime Contractor or subcontractor and/or withhold or suspend pay estimates after written notice and a reasonable opportunity to comply has been provided.

1.2 Payroll Schedule

1.2.1 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.

1.3 Payroll Reports

1.3.1 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.

1.3.1.1 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.

1.3.1.2 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.

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

1.3.1.4 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

"General Decision Number: OH20260098 01/02/2026

Superseded General Decision Number: OH20250098

State: Ohio

Construction Type: Building

County: Preble County in Ohio.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Modification Number	Publication Date
0	01/02/2026

ASBE0008-010 03/01/2025

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST INSULATOR	$ 35.23	23.04

BROH0022-005 06/01/2024

	Rates	Fringes
BRICKLAYER	$ 33.30	18.28

BROH0022-010 07/01/2024

	Rates	Fringes
TILE FINISHER	$ 28.28	11.05
TILE SETTER	$ 30.98	15.82

ELEC0082-004 12/02/2024

	Rates	Fringes
ELECTRICIAN	$ 38.00	22.49

ELEV0011-002 01/01/2025

	Rates	Fringes
ELEVATOR MECHANIC	$ 57.41	38.435+a+b

PAID HOLIDAYS:

a. New Year's Day, Memorial Day, Independence Day, Labor Day, Vetern's Day, Thanksgiving Day, the Friday after Thanksgiving, and Christmas Day.

b. Employer contributes 8% of regular hourly rate to vacation pay credit for employee who has worked in business more than 5 years; 6% for less than 5 years' service.

ENGI0018-034 05/01/2024

	Rates	Fringes

POWER EQUIPMENT OPERATOR
Crane.....$ 44.14 16.41

ENGI0066-045 06/01/2017

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Forklift	$ 28.87	19.66
Grader/Blade	$ 32.42	19.66
Mechanic	$ 32.92	19.66

IRON0044-020 06/01/2025

	Rates	Fringes
IRONWORKER, ORNAMENTAL	$ 37.77	23.90

IRON0290-006 06/01/2025

	Rates	Fringes
IRONWORKER (Reinforcing and Structural)	$ 37.39	25.35

LABO1410-005 04/01/2024

	Rates	Fringes
LABORER		
Asbestos Abatement (Removal from Ceilings, Floors, and Walls)	$ 31.65	12.95
Mason Tender - Brick	$ 32.25	12.95

PAIN0249-005 05/01/2025

	Rates	Fringes
PAINTER (Brush and Roller)	$ 29.15	13.97

PAIN0387-002 11/01/2023

	Rates	Fringes
GLAZIER	$ 31.95	18.20

PLUM0050-009 06/30/2025

	Rates	Fringes
PIPEFITTER (Excludes HVAC Pipe Installation)	$ 51.00	32.56

PLUM0162-009 06/01/2024

	Rates	Fringes
PLUMBER (Includes HVAC Pipe Installation)	$ 43.05	27.18

ROOF0042-001 08/01/2024

	Rates	Fringes

ROOFER.....$ 33.00 19.42

SFOH0669-009 04/01/2025

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinklers).....	$ 48.28	28.08

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* UAVG-OH-0021 01/01/2019

	Rates	Fringes
OPERATOR: Oiler.....	$ 27.56	16.37

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* UAVG-OH-0025 01/01/2018

	Rates	Fringes
SHEET METAL WORKER, Excludes HVAC Duct and Unit Installation.....	$ 28.10	23.41

SUOH2012-100 08/29/2014

	Rates	Fringes
CARPENTER.....	$ 21.80	7.13
CEMENT MASON/CONCRETE FINISHER...	$ 26.07	12.34
DRYWALL HANGER AND METAL STUD INSTALLER.....	$ 21.02	4.21
FORM WORKER.....	$ 22.41	9.01
LABORER: Common or General.....	$ 20.78	6.36
LABORER: Mason Tender - Cement/Concrete.....	$ 22.95	8.60
LABORER: Pipelayer.....	$ 23.98	8.58
OPERATOR: Backhoe/Excavator/Trackhoe.....	$ 31.97	9.08
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	$ 30.26	12.58
OPERATOR: Bulldozer.....	$ 26.01	4.95
OPERATOR: Loader.....	$ 29.99	12.80
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	$ 30.28	13.29
OPERATOR: Roller.....	$ 28.25	12.61
PAINTER: Spray.....	$ 22.78	12.40
SHEET METAL WORKER (HVAC Duct and HVAC Unit Installation Only).....	$ 24.23	11.25
TRUCK DRIVER: Dump (All Types)...	$ 22.08	11.51

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at
https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at
www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union

whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were

adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION
"

SECTION 01 1000 – SUMMARY

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:

1. Work covered by Contract Documents.
2. Work Phases.
3. Use of premises
4. Owner's occupancy requirements.

1.3 DEFINITIONS

A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

A. Project Identification: DOT-250005.

1. Project Location: FACD08 Restrooms at Preble Truck Parking Facility, Preble County
   I-70 WB @MM 01
   New Paris, Ohio 45347

B. Owner: DOT-250005 - FACD08 Restrooms at Preble Truck Parking Facility, United States.

C. Architect: Star Consultants Inc..

1. 1910 Crown Park Court, Columbus, OH 43235
2. Architect's Representative: Ali Alghothani.

D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:

1. Surveyor : Smart Services, inc. .
   a. Vice President Representative: Brian D. Smart .

b. 88 W. Church St., Newark, OH 43055
2. Geotechnic Services, DHDC Engineering Consulting Services, Inc.
a. Mohammed Haque, President
b. 2390 Advanced Business Center Drive, Columbus, OH 43228

E. General Contractor to be determined

F. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.

1. See Section 013100 "Project Management and Coordination." for requirements for using web-based Project software.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. This Project, located in Preble County, Ohio, involves the construction of a new 1-Story, Non-sprinkled Restroom for a Highway Truck Parking Area. The facility will be constructed of CMU Masonry bearing walls with a Pre-Engineered Truss Roof. This Project will also involve Plumbing, Mechanical and Electrical work, and site excavation and grading. Site work will include lift station, underground water storage tank, and a propane tank as indicated in the construction documents. Geotechnical information from borings and test pits is available.

B. Contractor should be aware that another project for District 8 involves the horizontal construction of the Truck Parking, and the overall layout of the site will kick off in August 31, 2026. At 8/31/2026 and after, site use for the restroom project will be limited. This overlap between the two projects will require Contractor for the Restroom project and Contractor for the Truck Parking planning and coordination.

C. Contractor is required to outline milestones for water well development and sampling / site utilities.

1.6 WORK PHASES

A. The Work shall be conducted as one phase in any order.

B. Before commencing work submit a schedule showing the sequence, commencement and completion dates, and occupancy dates for completed.

1.7 USE OF PREMISES

A. Use of Site: Do not disturb portions of the project site beyond areas in which work is indicated without prior approval from Owner.

B. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Temporary Restrooms: Contractor personnel shall not use existing restroom facilities and Contractor shall provide temporary toilet facilities for all contractor personnel, with locations to be coordinated with the Owner. Contractor shall supply and stock all required disposable materials including toilet paper, paper towels, and soap. Contractor is responsible for daily cleaning of facilities that are to be maintained in an antiseptic condition. Keep facilities neat. Washing of equipment of materials will not be permitted in toilets.

1.8 OWNER'S OCCUPANCY REQUIREMENTS

A. Partial Owner Occupancy: Owner and Public will occupy the premises during construction period, with the exception of areas within the construction fencing. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner and Public usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits, unless otherwise indicated

B. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

SECTION 01 2100 - ALLOWANCES

PART 4 - GENERAL

4.1 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.

4.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:

1. Lump-sum allowances.

4.3 DEFINITIONS

A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

4.4 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect/Engineer's of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.

B. At Architect/Engineer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect/Engineer's from the designated supplier.

4.5 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

4.6 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

4.7 LUMP-SUM ALLOWANCES

A. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect/Engineer's under allowance shall be included as part of the Contract Sum and not part of the allowance.

B. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect/Engineer's, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

4.8 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal as per General Conditions article 7.

PART 5 - PRODUCTS (Not Used)

PART 6 - EXECUTION

6.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

6.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

6.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Water Well: Include $38,000 in the base bid for Water Well delegated design, drilling, installing well shaft, water testing, inspection of new water line installation, and all equipment (Tanks, Pumps, etc.) that are required to make the water available for the building by the contractor.

B. Allowance No. 2: Underground Propane Tank: Include $34,000 in the base bid for delegated design Underground Propane Tank, furnish and install, and finalize connection to the building (Tank shall have capacity to serve at least six month).

END OF SECTION 01 2100

SECTION 01 2200 - UNIT PRICES

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 unit prices.

B. Related Requirements:

1. Section 01 2100 "Allowances" for procedures for using unit prices to adjust quantity allowances.
2. Section 01 4000 "Quality Requirements" for field testing by an independent testing agency.

1.3 DEFINITIONS

A. Unit price is an amount incorporated into the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the Part 3 "Schedule of Unit Prices" Article contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1: Removal of unsatisfactory soil and replacement with satisfactory soil material.

1. Description: Unsatisfactory soil excavation and disposal off-site and replacement with satisfactory fill material or engineered fill from off-site, as required, in accordance with Section 31 2000 "Earth Moving."
2. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 2100 "Allowances."

B. Unit Price No. 1 - Unsatisfactory soil :

1. Unit of Measurement: cubic yard .
2. Cost per cubic yard: $_____ Price extension for one hundred (100) cubic yards: $_____
3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 2100 "Allowances."

END OF SECTION 01 2200

SECTION 01 3000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Photo Documentation

B. Electronic document submittal service.

C. Submittals for review and information.

D. Submittal procedures.

1.2 RELATED REQUIREMENTS

A. Document 00 7223 – General Conditions, Article 6 Construction and Closeout, Paragraph 6.5 Construction Progess Schedule, Paragraph 6.6 Project Meetings, , Paragraph 6.7 Review of Contract Documents and Field Conditions, Paragraph 6.18 Action Submittals and Paragraph 6.29 Contract Completion.

B. In the event of a conflict within the Contract Documents, refer to Document 00 7223 General Conditions, Article 12 General Provisions, Paragraph 12.4 Conditions of the Contract.

C. Section 01 3001 - Submittal Checklist

D. Section 01 3216 - Construction Progress Schedule

E. Section 01 7700 - Closeout Procedures.

1.3 REFERENCE STANDARDS

A. OFCC Form F340-01 – Request for Interpretation.

1.4 PROJECT COORDINATION

A. Project Architect /Engineer: Star Consultants, Inc.

B. Cooperate with the Architect in allocation of mobilization areas of site; for field offices and sheds, for project access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Architect.

D. Comply with instructions of the Architect for use of temporary utilities and construction facilities. Responsibility for Contractor's provisions for temporary utilities and construction facilities is identified in Section 01 5000 Temporary Facilities and Controls.

E. Coordinate field engineering and layout work with the Architect.

F. Make the following types of submittals to Architect as identified in the Section 00 7223 General Conditions:

1. Requests for Interpretation.
2. Shop drawings, product data, and samples.
3. Test and inspection reports.
4. Design data.
5. Manufacturer's instructions and field reports.
6. Applications for payment and change order requests.
7. Progress schedules.
8. Coordination drawings.
9. Correction Punch List and Final Correction Punch List for Substantial Completion.
10. Closeout submittals.

PART 2 - PRODUCTS

2.1 (Not applicable)

PART 3 - EXECUTION

3.1 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via the Owner's Web-based Project Management Software that receives, logs and stores documents, and notifies addresses via email.

1. Besides submittals for review, information, and closeout, this procedure applies to the following items, but is not limited to, Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punch list, and any other document any participant wishes to make part of the project record.
2. Contractor is required to use this service.
3. It is Contractor's responsibility to submit documents in allowable format.
4. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com)
5. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.

6. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Owner's Web-based Project Management Software: The selected service is:

1. OAKS CI (OAKS CAPITAL IMPROVEMENTS).

3.2 PRECONSTRUCTION MEETING

A. The Architect will schedule a meeting after the Notice of Award as identified in Section 00 7223 General Conditions.

B. Attendance Required:

1. Owner.
2. Contracting Authority.
3. Architect.
4. Contractor.

C. Agenda-To Include but not be limited to:

1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Review of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Designation of personnel representing the parties to Contract and Architect.
6. Procedures and processing of field decisions, submittals, applications for payments, proposal requests, Change Orders, and Contract closeout procedures.
7. Scheduling.

D. The Architect will record minutes and submit to the Owner's Web-based Project Management Software.

3.3 PHOTO DOCUMENTATION

A. Architect will photograph and document any and all damage to facilities and site elements that are existing to remain prior to commencing any work on the site.

B. Existing facilities and elements to remain include but are not limited to: paving, curbs, lawn and landscape areas, selected trees and plantings, and certain signage.

C. Photo documentation shall be submitted to the Owner and Contracting Authority

3.4 PROGRESS MEETINGS

A. The Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings as identified in Section 00 7223 General Conditions

3.5 REQUESTS FOR INTERPRETATION (RFI)

A. Requests for Interpretation shall be developed and processed as identified in Section 00 7223 General Conditions

3.6 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.

1. Submit at the same time as the preliminary schedule specified in Section - 01 3216 - Construction Progress Schedule.

3.7 SUBMITTALS FOR REVIEW

A. Submittals shall be prepared and submitted as identified in Section 00 7223 General Conditions.

B. Submittals shall be submitted as identified in Section 01 3001 Submittal Checklist.

3.8 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submittal requirements for Project Closeout are identified in Section 00 7223 General Conditions

3.9 ADHERED MASONRY MOCK-UP PANEL

A. Mock-up Panel: Provide a 5’-0” by 5’-0” mock-up panel constructed to demonstrate the layers of the adhered masonry system and details of the flashing, SIPS, weather barrier, rainscreen component, windowsill and head construction, corner conditions, and top and bottom of wall with fascia board.

END OF SECTION 01 3000

SECTION 01 3216 - 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 11 00 – Summary of Work
2. 01 30 00 – Administrative Requirements
3. 01 77 00 – Execution and Closeout Requirements

1.2 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.

1.3 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).

1.4 QUALIFICATIONS

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

1.5 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

2.1 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

3.1 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.

3.2 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 Section F or I in this note and will not affect contract time.

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 default activity settings below. 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

fragment 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 fragment shall identify the predecessors to the new activities and demonstrate the impacts to succeeding activities. The fragment 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.

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 temperatures 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 ensure 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 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.

3.3 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.

3.4 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.

3.5 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.

3.6 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.

3.7 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.

3.8 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 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 01 3216

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Submittal schedule requirements (See attached submittal log).
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 01 7700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
2. Section 01 7823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
3. Section 01 7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's and Construction Manager'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 Architect's and Construction Manager'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."

1.4 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 Architect and Construction Manager and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal 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 Architect's and Construction Manager's final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL FORMATS

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

1. Project name.
2. Date.
3. Name of Architect.
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. Options: Identify options requiring selection by Architect.

C. 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 Architect and Construction Manager on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

E. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.6 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 them to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
   a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
2. Web-Based Project Management Software: Prepare submittals in PDF form, and upload them to web-based Project management software website (OAKSCI). Enter required data in web-based software sites to fully identify submittal.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. 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 need to review submittals concurrently for coordination.
   a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 14 15 days for review of each resubmittal.
4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 14 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

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 Architect's and Construction Manager'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. Uploaded final approved submittals to OAKSCI and issue them as a business process.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and Construction Manager's action stamp.

1.7 SUBMITTAL REQUIREMENTS

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post electronic submittals as PDF electronic files directly to Project Web site on OAKSCI.
2. Submit electronic submittals via email as PDF electronic files.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard 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.
6. Submit Product Data in the following format:
   a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. 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 are clearly indicated.
   g. Seal and signature of professional engineer if specified.
2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches , but no larger than 30 by 42 inches .
3. Submit Shop Drawings in the following format:
   a. PDF electronic file.

D. 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. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software sites to fully identify submittal.

5. Paper Transmittal: Include paper transmittal, including complete submittal information indicated.
6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in undamaged condition at time of use.
7. 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(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
8. 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 (3) three sets of Samples. Architect and Construction Manager will retain one (1) two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.
        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. 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.
5. Submit product schedule in the following format:
    a. PDF electronic file.

F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

G. Equipment Statement: Shop Drawings on all equipment shall include a written statement in accordance with GC 6.20.7 EQUIPMENT STATEMENT.

H. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 7700 "Closeout Procedures."

I. Maintenance Data: Comply with requirements specified in Section 01 7823 "Operation and Maintenance Data."

J. 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.

K. 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.

1.8 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 Architect.

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.

1.9 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required , and return.

   1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action [**.**]

B. Informational Submittals: Architect will review each submittal and will not return it or will return it if it does not comply with requirements. Architect 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 Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3300

SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

C. Additional testing required by the A/E or Contracting Authority shall be in accordance with Document 00 7223 – General Conditions, Article 6 Construction and Closeout, Paragraph 6.20 Additional Testing.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

I. Revise the number of projects in "Experienced" Paragraph below to suit Project, office policy, and Owner's requirements. Delete if experience requirements are included in individual Specification Sections or are prohibited by law.

J. Experienced: When used with an entity or individual, "experienced" 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.

1.3 CONFLICTING REQUIREMENTS

A. In the event of a conflict within the Contract Documents, refer to Document 00 7223 General Conditions, Article 12 General Provisions, Paragraph 12.4 Conditions of the Contract.

B. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

C. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 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. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

D. 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.

E. 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.

1.5 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 Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time 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.
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.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and specified inspection. Indicate types of corrective actions to be required to bring 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 Architect 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.

1.6 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, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

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, and telephone number 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 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, and telephone number 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 whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

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

1.7 QUALITY ASSURANCE

A. General: 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 service performance, as well as sufficient production capacity to produce required units.

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, 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 are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations.

Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities have jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. 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 installation 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 responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
   d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
   e. When testing is complete, remove test specimens, 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 Architect 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.

1.8 QUALITY CONTROL

A. Owners Responsibilities:

1. The Owner will engage a qualified testing agency to perform these services:
   a. Concrete testing
   b. Soil testing
2. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
3. Payment for these services will be made by the Architect.
4. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be the responsibility of the Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Architect are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

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. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
   a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting 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 inspecting 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. 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 01 3000 "Administrative Requirements."

D. 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.

E. 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.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

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 as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections attached to this Section, and as follows: or

B. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect 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 Architect 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

2.1 (Not applicable)

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 Architect.
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 Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. Correction of the Work shall be in accordance with Document 00 7223 – General Conditions, Article 6 Construction and Closeout, Paragraph 6.22 Correction of the Work and Paragraph 6.23 Acceptance of Defective Work.

B. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

C. Protect construction exposed by or for quality-control service activities.

D. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Document 00 7213 – General Conditions, Article 6 Construction and Closeout, Paragraph 6.12 Construction Facilities, Utilities and Equipment.

B. In the event of a conflict within the Contract Documents, refer to Document 00 7213 General Conditions, Article 12 General Provisions, Paragraph 12.4 Conditions of the Contract.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, security and protection facilities, and erosion and sediment control facilities.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Sewer service is provided to the site by a private sewage treatment plant and is not available during construction.

C. Water Service: Water service to the site is a public water system. Contractor to pay for charges associated with providing a temporary water meter and for all water used during construction.

D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: See Stormwater Pollution Prevention Plan.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3. 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.

E. 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. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. HVAC system isolation schematic drawing.
2. Location of proposed air-filtration system discharge.
3. Waste handling procedures.
4. Other dust-control measures.

F. Products used for erosion and sediment control to confirm compliance with the Storm Water Pollution Prevention Plan.

1.5 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 the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 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. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

B. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, Construction Manager, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
6. Full WIFI capabilities with sufficient bandwidth to conduct Skype meetings.

C. OFCC and A/E Field Office: Provide a separate office, minimum 70 SF, for exclusive use by the OFCC and A/E representatives, and accessible at all times during working hours. Furnish and equip offices as follows:

1. Latching and lockable door
2. Sufficient furniture for two persons to use simultaneously.
3. Two duplex electrical outlets for plugging in laptop computers.
4. Full WIFI capabilities with sufficient bandwidth to conduct Skype meetings.

D. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 7700 "Closeout Procedures".

2.4 EROSION AND SEDIMENT CONTROL

A. Stabilization Stone: Stone for use as the construction entrance, as construction road stabilization, and other erosion and sediment control practices shall be ODOT #2 Stone (1.5” to 2.5”).

B. Silt Fence: Fabric for use as silt fence around inlets or to protect slopes, as manufactured by:

1. Amoco – Propex Silt Stop
2. Mirafi, Inc. – Mirafi 100X, Envirofence
3. Exxon – GTF 101-S

C. Posts for staking silt fence shall be 1” x 2” wood with a minimum length of 48”.

D. Inlet Protection: Proposed catch basins shall have inlet protection:

1. Dandy Products, Inc.
2. Advanced Drainage Systems, Inc.
3. Filtrexx Sustainable Technologies

E. Temporary Seeding: See Division 32 Section “Turfs and Grasses” and Section “Plants”.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary toilet facilities to remove effluent lawfully.

1. The existing sewage treatment plant will be shut down during construction.

C. Water Service:

1. Install water service and distribution piping in sizes and pressures adequate for construction.
2. Water service to the site is provided by a well. The well is available for non-potable construction water. Contractor to provide temporary electric service to the well during construction. At Substantial Completion, restore these facilities to new condition before initial use.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. 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 according to 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.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

1. Connect temporary service to Owner's existing power source, as directed by Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Inside and outside by entrance to temporary office, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Contractor's emergency after-hours telephone number.
   e. Architect's office.
   f. Engineers' offices.
   g. Owner's office.
   h. Principal subcontractors' field and home offices.
3. Provide superintendent with cellular telephone.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 31 2000 "Earth Moving."
3. Retain one of two subparagraphs below. Retain first subparagraph for concrete or hot-mix asphalt pavement if permanent aggregate base may be used for temporary roads and paved areas.
4. Recondition base after temporary use, including removing contaminated material, regrading, proof-rolling, compacting, and testing.
5. Retain subparagraph below for hot-mix asphalt pavement if a first course of hot-mix asphalt may be used as permanent base of temporary roads or paved areas.
6. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 32 1216 "Asphalt Paving."

C. 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.

D. Parking: Provide temporary parking areas for construction personnel in the truck parking area. Car and Van parking areas are not to be used by the contractor or construction personnel.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

3.4 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.

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.

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of 2003 EPA Construction General Permit. The Notice of Intent (NOI) application has been submitted to OEPA. The Contractor shall be a co-permittee with ODOT.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. 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 environmentally safe materials.

G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

H. 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.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 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 01 7700 "Closeout Procedures."

3.7 EROSION AND SEDIMENT CONTROL

A. General:

1. Install erosion control measures prior to any site disturbance activities and according to the Storm Water Pollution Prevention Plan.
2. Maintain erosion control during construction until permanent pavement, plantings and restoration of natural areas is effective in controlling erosion.
3. Plan and execute construction by methods to control surface drainage from cut, fill, borrow and grading areas.
4. Minimize amount of bare soil exposed at one time.
5. Schedule operations so ground surface will be disturbed for shortest possible time before permanent construction is installed.
6. Maintain large areas as flat as practicable to minimize soil transfer through surface flow.

7. Storm Drainage System: Install as much of permanent system as soon as practicable and divert surface water into system, with remainder of system installed as soon as conditions allow. Coordinate with Section 33 4100
8. Repair washed and eroded areas. Re-establish required grades, densities, elevations, profiles and contours.

B. Temporary Construction Entrance:

1. Install and maintain in accordance with Section 7.4 of the ODNR Rainwater and Land Development guidelines.
2. No point of vehicular access onto the site shall be utilized other than that shown on the Drawings.
3. Place stone at a depth of 6 inches minimum.
4. In addition to periodically adding clean stone to the construction entrance and maintaining the edges, the Contractor is required to keep all mud, soil and debris from entering public roadways which originates from the project site.

C. Silt Fence:

1. Install and maintain in accordance with Section 6.3 of the ODNR Rainwater and Land Development guidelines.

D. Inlet Protection:

1. Install and maintain in accordance with Section 6.4 of the ODNR Rainwater and Land Development guidelines.

E. Temporary Seeding:

1. See Division 31 Section “Turf and Grasses” and Section “Plants”.

END OF SECTION 01 5000

SECTION 01 68 00 – BUILD AMERICA, BUY AMERICA (BABA) REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This expanded Division 01 section is tailored for Water/Wastewater, Building, and Site/Civil Construction Projects funded with Federal Financial Assistance.

B. This Section defines project-wide compliance with the Build America, Buy America Act (BABA) as required for water/wastewater utility systems, building construction, and site/civil infrastructure.

C. Requirements apply to all iron, steel, construction materials, and manufactured products permanently incorporated into the Work.

D. Contractor is responsible for assuring compliance by all subcontractors and suppliers.

1.2 RELATED SECTIONS

A. Section 01 30 00 – Administrative Requirements

B. Section 01 33 00 – Submittal Procedures

C. Section 01 40 00 – Quality Requirements

D. Technical Division 02–33 sections for specific product requirements.
   1. Work covered by Contract Documents.
   2. Work Phases.
   3. Use of premises
   4. Owner's occupancy requirements

1.3 REFERENCES

A. CFR Part 184 – BABA Guidance

B. OMB Memos M-22-11 and M-23-09

C. IIJA (Public Law 117-58)

D. Applicable Federal Agency Implementation Guidance

1.4 DEFINITIONS

A. Iron and Steel Products – all manufacturing processes from melting through coatings occur in the U.S.

B. Construction Materials – non-ferrous metals, polymers, glass, lumber, drywall, fiber-optic cable, and cementitious materials manufactured in the U.S.

C. Manufactured Products – manufactured in the U.S. with at least 55% U.S. components or per updated OMB guidance.

D. Waiver – written federal approval only.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Contractor shall provide a BABA Compliance Plan within 30 days of Notice to Proceed including supplier list, tracking system, and documentation procedures.

B. Contractor shall maintain a BABA compliance log updated monthly.

1.6 SUBMITTALS

A. BABA Compliance Certificates for:

1. Iron and steel.
2. Construction materials.
3. Manufactured products.

B. Documentation to include:

1. Origin affidavits.
2. Mill certifications.
3. Component breakdowns.
4. U.S. manufacturing locations.

C. Provide Pre-Installation Verification Submittal for all major materials.

D. Final completion requires compiled BABA Compliance Binder in PDF.

1.7 QUALITY ASSURANCE

A. Contractor shall ensure all suppliers acknowledge BABA requirements in purchase orders.

B. Coordinate with Owner for audits.

C. Provide corrective action plan if deficiencies occur.

1.8 ENFORCEMENT

A. Non-compliant products shall be immediately removed.

B. Contractor bears full cost of replacement and damages.

C. Falsification of records is grounds for termination.

PART 2 - PRODUCTS

2.1 GENERAL BABA PRODUCT REQUIREMENTS

A. All products permanently incorporated must comply.

B. Apply to water/wastewater systems, building structures, and site/civil elements.

2.2 WATER/WASTEWATER PRODUCTS

A. Iron and Steel Examples:

1. Ductile iron pipe and fittings.
2. Steel tanks, frames, and equipment supports.

B. Construction Materials Examples:

1. PVC, HDPE, and CPVC piping.
2. FRP baffles, grating, and covers.
3. Concrete, mortar, coatings.

C. Manufactured Products Examples:

1. Pumps, blowers, mixers, valves.
2. UV systems, chemical feed systems.
3. Process control systems and PLC panels.

2.3 BUILDING PRODUCTS

A. Construction Materials:

1. Aluminum storefronts, doors, and frames.
2. Glass and IGUs.
3. Drywall, lumber, engineered wood.

B. Manufactured Products:

1. HVAC equipment and controls.
2. Lighting and electrical distribution.
3. Fire protection equipment.

2.4 SITE / CIVIL PRODUCTS

A. Iron and Steel:

1. Structural steel for retaining walls.
2. Rebar and steel mesh.

B. Construction Materials:

1. PVC/HDPE site utilities.
2. Precast structures.

C. Manufactured Products:

1. Lift stations, packaged pump systems.
2. Traffic control devices.
3. Electrical enclosures.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Coordinate all procurement early to avoid BABA-related delays.

B. Submit documentation before installation.

3.2 VERIFICATION PROCEDURES

A. Contractor shall verify compliance on arrival at site.

B. Unverified products shall be quarantined.

C. Maintain chain of custody documentation.

3.3 RECORD KEEPING

A. Maintain all BABA documents for 5 years.

B. Provide access for Owner and federal auditors.

3.4 NON-COMPLIANCE PROCEDURES

A. Immediately stop installation of non-compliant product.

B. Notify Owner within 24 hours.

C. Remove and replace product at Contractor cost.

D. Submit corrective documentation.

3.5 CONTRACTOR CERTIFICATION

A. The Contractor shall include the following written certifications on the front cover or initial sheet of each BABA Submittal or Shop Drawing, signed and dated prior to fabrication.

B. The undersigned Contractor/Supplier hereby certifies and affirms that all Iron and Steel, Manufactured Products, and Construction Materials supplied under this submittal for permanent incorporation into this federally-funded infrastructure project are in full compliance with the domestic content procurement preference requirements of the Build America, Buy America Act (BABA), Title IX of the Infrastructure Investment and Jobs Act (IIJA), Pub. L. 117-58, and all applicable guidance (including 2 CFR 184).

C. The undersigned further certifies that:
   1. Required Step Certifications from manufacturers/subcontractors documenting the domestic manufacturing location for each stage of production are attached or available upon request.
   2. No BABA-compliant material, product, or item covered by this submittal has an active, approved waiver on file unless specifically noted in the submittal documents.
   3. The Contractor understands and agrees that the provisions of 31 U.S.C. Chapter 38, Administrative Remedies for False Claims and Statements, apply to this certification.

END OF SECTION 01 6800

SECTION 01 7700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Document 00 7223 – General Conditions, Article 6 Construction and Closeout, Paragraph 6.22 Correction of the Work, Paragraph 6.23 Acceptance of Defective Work, Paragraph 6.25 Final Cleaning, Paragraph 6.26 Substantial Completion, and Paragraph 6.29 Contract Completion.

B. In the event of a conflict within the Contract Documents, refer to Document 00 72 13 General Conditions, Article 12 General Provisions, Paragraph 12.4 Conditions of the Contract.

1.2 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.
5. Repair of the Work.

B. Related Requirements:

1. Section 017 823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
2. Section 017 839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
3. Section 017 900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in 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 a minimum of 10 days 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 and the General Conditions, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, 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 Architect. Label with manufacturer's name and model number where applicable.
5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days 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 01 7900 "Demonstration and Training."

6. Advise Owner of changeover in heat and other utilities.
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, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to The General Conditions.
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, 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 Architect.
   d. Name of Contractor.
   e. Page number.
4. Submit list of incomplete items in the following format:
   a. MS Excel electronic file. Architect will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, 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.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. 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.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

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, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, 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 neither planted nor 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. Sweep concrete floors broom clean in unoccupied spaces.
   i. 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.

j. Remove labels that are not permanent.

k. Revise subparagraphs below to suit Project. Check for conflict or duplication with provisions in other Sections.

l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

o. First subparagraph below describes a major work item that requires coordination with other closeout procedures.

p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

r. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
   a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 7700

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Document 00 7223 – General Conditions, Article 6 Construction and Closeout, Paragraph 6.28 Demonstration and Training, Operating Appurtannces, Paragraph 6.23 Acceptance of Defective Work, Paragraph 6.25 Final Cleaning, Paragraph 6.26 Substantial Completion, and Paragraph 6.29 Contract Completion.

B. In the event of a conflict within the Contract Documents, refer to Document 00 72 13 General Conditions, Article 12 General Provisions, Paragraph 12.4 Conditions of the Contract.

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.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment 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. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
   a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   b. Enable inserted reviewer comments on draft submittals.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect 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. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

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

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: 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 Architect.
7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
8. 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. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. 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.

B. 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.

C. Operating Procedures: Include the following:

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

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

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

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

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

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

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

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

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

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 01 7839 "Project Record Documents."

F. Comply with Section 01 7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 7823

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Document 00 7223 – General Conditions, Article 6 Construction and Closeout, Paragraph 6.24 Project Document Maintenance and Submittal,Subparagraph 6.24.3 Record Documents.

B. In the event of a conflict within the Contract Documents, refer to Document 00 72 13 General Conditions, Article 12 General Provisions, Paragraph 12.4 Conditions of the Contract.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, as identified in the General Conditions, including but not limited to the following:

1. As-Built Documents.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.
5. Warranties.
6. Operation and Maintenance Manuals.

B. Related Requirements:

1. Section 01 7700 "Closeout Procedures" for general closeout procedures.
2. Section 01 7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. As-Built Documents: Comply with the following:

1. Number of Copies: Submit one set of marked-up record prints.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

D. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

E. Additional Documents as identified in the General Conditions.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. As-Built 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 archive 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 below first floor.
   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.
   k. Changes made following Architect'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.
4. Mark record sets 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 Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Annotated PDF electronic file.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.
4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
   a. Project name.
   b. Date.
   c. Designation "PROJECT RECORD DRAWINGS."
   d. Name of Architect.
   e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

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. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
3. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Specifications.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples 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 Architect's reference during normal working hours.

END OF SECTION 01 7839

SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Document 00 7223 – General Conditions, Article 6 Construction and Closeout, Paragraph 6.28 Demonstration and Training, Operating Appurtannces.

B. In the event of a conflict within the Contract Documents, refer to Document 00 72 13 General Conditions, Article 12 General Provisions, Paragraph 12.4 Conditions of the Contract.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

1.3 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.

1.4 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.

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 content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 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.

1. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.
2. Emergencies: Include the following:
   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.
3. Operations: Include the following:
   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.
4. Adjustments: Include the following:
   a. Alignments.

b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

5. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
6. 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.
   h. Repairs: Include the following:
   i. Diagnosis instructions.
   j. Repair instructions.
   k. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   l. Instructions for identifying parts and components.
   m. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 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 01 7823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. 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.

B. 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, through Architect, with at least seven days' advance notice.

C. 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.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance-based test.

END OF SECTION 01 7900

SECTION 02 4100 - DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes:

1. Building demolition excluding removal of hazardous materials and toxic substances.
2. Selective demolition of built and site elements.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
3. Section 01 1000 - Summary: Sequencing and staging requirements.
4. Section 01 1000 - Summary: Description of items to be removed by Owner.
5. Section 01 1000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
6. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
7. Section 31 2200 - Grading: Topsoil removal.
8. Section 31 2323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.2 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:

1. Areas for temporary construction and field offices.

C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill Material: As specified in Section 31 2323 - Fill.

PART 3 - EXECUTION

3.1 SCOPE

A. Remove the entire building within site boundaries including subsurface elements as shown on drawings.

B. Remove paving and curbs as required to accomplish new work.

C. Outside area of new construction, remove foundation walls and footings to a minimum of 2 feet below finished grade.

D. Remove existing waste treatment plant complete (above ground and substructures).

E. Remove concrete slabs on grade within site boundaries.

F. Remove other items indicated, for salvage, relocation, and recycling.

G. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 312200 and 312323.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.
2. Use of explosives is not permitted.
3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
4. Provide, erect, and maintain temporary barriers and security devices.
5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
6. Do not close or obstruct roadways or sidewalks without permit.
7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Do not begin removal until built elements to be salvaged or relocated have been removed.

D. Protect existing structures and other elements that are not to be removed.

1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

E. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

F. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

G. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.3 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.4 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 02 4100

SECTION 02 4119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - 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:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Abandonment of selected site elements.
4. Salvage of existing items to be reused or recycled.

B. Related Sections:

1. Division 01 Section "Summary".
2. Division 02 Section "Demolition".
3. Division 31 Section "Site Clearing".
4. Division 31 Section “Earth Moving”.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless items are to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner. Items to be salvaged shall be cleaned of debris and stored in an enclosed container until turned over to the Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them.

D. Existing to Remain: Existing items of construction that are not to be removed, removed and salvaged, or removed and reinstalled. Existing items to remain shall be adjusted to grade if the grade around the item changes.

E. Abandon Existing: Existing items of construction that are to be disconnected from service and left in place.

1.4 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, commemorative pavers or stones, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1. Coordinate with Owner, who will establish special procedures for removal and salvage.

1.5 SUBMITTALS

A. 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. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Locations of proposed dust- and noise-control temporary partitions and means of egress.
5. Means of protection for items to remain and items in path of waste removal from building.

B. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

C. Pre-demolition: Photographs and/or Videotapes: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations.

D. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6 and NFPA 241.

1.7 PROJECT CONDITIONS

A. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

B. Sale of removed items or materials is not permitted.

C. Utility Service: Maintain existing utilities to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with the extent of selective demolition.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs and/or preconstruction videotapes.

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems to remain and protect them against damage during selective demolition operations.

1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.

3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Existing storm and sanitary structures shall be inspected for structural soundness before adding riser sections and concrete grade rings.
5. Voids left by removal of utilities shall be backfilled with ODOT item 310.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with adjacent facilities.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing site construction as follows:

1. Proceed with selective demolition systematically, so as to minimize utility interruption.
2. Neatly cut openings and holes plumb, square, and true to dimensions. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

C. Clean salvaged items.

1. Pack or crate items after cleaning. Identify contents of containers.
2. Store items in a secure area until delivery to Owner.
3. Transport items to Owner's storage area.
4. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition 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 new locations. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials to make item functional for proposed use.

E. Existing Items to Remain: Protect construction to remain against damage and soiling during selective demolition. Items may be removed to a protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

F. Existing Items to be Abandoned:

1. Clean and repair items to allow for construction of end caps and bulkheads.
2. Abandoned Piping: Close open ends of abandoned underground piping to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
   a. Ductile Iron Pipe:
      1) Close open ends of piping with at least 8-inch-thick, brick or concrete masonry bulkheads.
      2) Close open ends of piping with threaded metal caps or plastic plugs. Do not use wood plugs.
   b. PVC, PE and Other Pipe:
      1) Completely fill interior of pipe greater than 8 inches with Low Strength Mortar according to Division 31 “Earth Moving”.
      2) Close open ends of piping with threaded metal caps or plastic plugs. Do not use wood plugs.
3. Abandoned Manholes and Structures: Excavate around manholes and structures and use one procedure below:
   a. Remove top of manhole or structure down to at least 36 inches below final grade. Fill to within 12 inches of subgrade with drainage fill. Fill to subgrade with Concrete according to Division 31 “Earth Moving”.
   b. Backfill to grade.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Portland Cement Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then break up and remove.

B. Asphaltic Concrete: Cut asphalt full depth at junctures with construction to remain, using power-driven saw, then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Remove demolished materials from Project site and legally dispose of them.

B. Do not allow demolished materials to accumulate on-site.

1. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

C. Burning: Do not burn demolished materials.

D. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 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 02 4119

SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

1.7 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg Ffor three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301and as follows:

1. Maintain concrete temperature below 90 deg Fat time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

C. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

D. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

2.3 STEEL REINFORCEMENT

A. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, plain steel.

2.4 REINFORCEMENT ACCESSORIES

A. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.

B. Zinc Repair Material: ASTM A 780/A 780M.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I, gray.

C. Water: ASTM C 94/C 94M and potable.

2.6 FIBER REINFORCEMENT

A. Carbon-Steel Fiber: ASTM A 820/A 820M, Type 1, cold-drawn wire, deformed, minimum of 1.5 inches long, and aspect ratio of 45 to 50.

2.7 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd.when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.8 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Admixtures: Use admixtures according to manufacturer's written instructions.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Minimum Cementitious Materials Content: 520 lb/cu. yd..
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inchnominal maximum aggregate size.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
6. Steel-Fiber Reinforcement: Add to concrete mixture, according to manufacturer's written instructions, at a rate of 50 lb/cu. yd..

2.10 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 SHORING AND RESHORING INSTALLATION

A. Comply with ACI 318and ACI 301for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

3.2 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.3 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inchesinto concrete.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inchesinto preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.5 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.6 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated.

C. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.7 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 6 inches high unless otherwise indicated, and extend base not less than 6 inchesin each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi at 28 days.

4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inchcenters around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

3.9 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel reinforcement placement.
2. Headed bolts and studs.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.
5. Curing procedures and maintenance of curing temperature.
6. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd.or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd.or fraction thereof of each concrete mixture placed each day.
   a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg Fand below or 80 deg Fand above, and one test for each composite sample.
6. Compression Test Specimens: ASTM C 31/C 31M.
   a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
   a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name

of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155within 24 hours of finishing.

END OF SECTION 03 3000

SECTION 03 35 43 – STAINED CONCRETE FINISHING

PART 1 - **GENERAL**

1.1 SUMMARY

A. Section Includes

1. Surface preparation, application, and sealing of stained concrete finishes on new or existing concrete surfaces.

B. Work Includes

1. Surface cleaning and preparation.
2. Application of chemical, acid-based, dye, or water-based stains.
3. Neutralization, sealing, and finishing.

1.2 REFERENCE STANDARDS

A. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

B. ACI 302.1R - Guide for Concrete ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

C. Floor and Slab Construction.

D. ACI 310R - Guide to Decorative Concrete.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's technical data sheets for stains, sealers, and finishes.

C. Samples: Submit minimum 12 inch by 12 inch samples showing specified color and finish.

D. Maintenance Data: Include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Minimum 3 years of experience in decorative concrete staining with at least 3 completed similar projects.

B. Mock-Up: Provide a minimum 50 sq. ft. sample area showing color, pattern, and sealer sheen. Approved mock-up may remain as part of finished work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original sealed and labeled containers.

B. Store materials in a dry, ventilated area away from direct sunlight, heat, or freezing conditions.

1.6 PROJECT CONDITIONS

A. Do not apply stain when temperature is below 50°F or above 90°F.

B. Protect adjacent finishes, walls, and surfaces from overspray and staining.

PART 2 - **PRODUCTS**

2.1 MANUFACTURERS

A. Acceptable Manufacturers (or equal):

1. Scofield Company.
2. Butterfield Color.
3. Increte Systems.
4. ChemMasters.
5. L. M. Scofield Company (Lithochrome®).

2.2 MATERIALS

A. Concrete Stain:

1. Type: Acid-based chemical stain or water-based stain, as specified.
2. Composition: Metallic salts in acidic solution for acid stains, or water-based pigment dispersion for water-based stains.
3. Color: As selected by Architect from manufacturer's full range.

B. Neutralizer:

1. Diluted ammonia or sodium bicarbonate solution per manufacturer's recommendation.

C. Sealer:

1. Type: Penetrating sealer or acrylic/polyurethane surface sealer compatible with stain.
2. VOC Content: Comply with applicable environmental regulations.
3. Gloss: As specified – matte, satin, or gloss.
4. Wax or Finish Coat (Optional):
5. Type: Non-slip acrylic finish compatible with sealer.

PART 3 - **EXECUTION**

3.1 EXAMINATION

A. Verify that concrete substrate is clean, cured (minimum 28 days for new concrete), and free from sealers, curing compounds, oil, grease, and contaminants.

B. Verify that surface moisture content is below 5 percent.

3.2 PREPARATION

A. Mechanically clean surface using diamond grinder, floor scrubber, or acid wash as required.

B. Rinse thoroughly and allow surface to dry.

C. Protect adjacent areas from staining.

3.3 APPLICATION

A. Apply stain uniformly by low-pressure sprayer, roller, or brush per manufacturer's instructions.

B. Allow stain to react for recommended dwell time (typically 4 to 8 hours for acid stains).

C. Rinse and neutralize surface until rinse water is clear.

D. Allow surface to dry completely.

3.4 SEALING

A. Apply sealer in two thin coats by roller or sprayer.

B. Maintain even coverage without puddling.

C. Allow recommended cure time between coats.

3.5 FINISHING

A. Optional: Apply protective wax finish coat after sealer cures.

B. Buff to uniform sheen.

3.6 CLEANING AND PROTECTION

A. Protect stained surfaces from traffic for a minimum of 72 hours.

B. Prevent water or contaminants from contacting surface during cure period.

END OF SECTION 03 35 43

SECTION 04 2000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Concrete Block.
2. Mortar and Grout.
3. Reinforcement and Anchorage.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.

C. Work Not Included

1. Section 04 2616 Adhered Masonry Veneer

1.2 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries

B. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

C. ASTM A951 - Standard Specification for Masonry Joint Reinforcement

D. ASTM C91/C91M - Standard Specification for Masonry Cement

E. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units

F. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units

G. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar

H. ASTM C150/C150M - Standard Specification for Portland Cement

I. ASTM C270 - Standard Specification for Mortar for Unit Masonry

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

1.4 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:

1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
2. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on the drawings for specific locations.
3. Non-Load-Bearing Units: ASTM C90, normal weight.
   a. Hollow block.

2.2 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C 91, Type N.

1. Cemex - Richmortar
2. Lehigh Hanson - Brixment.
3. Holcim (US) Inc. - Mortamix Masonry

B. Aggregate for Mortar: ASTM C 144.

C. Water: Clean and potable.

2.3 REINFORCEMENT AND ANCHORAGE

A. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

B. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A951steel wire, mill galvanized to ASTM A641 with minimum 0.1 oz of zinc per square foot, Class 3; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

2.4 MORTAR AND GROUT MIXES

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.

1. Interior, loadbearing masonry: Type N.
2. Interior, non-loadbearing masonry: Type N.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

3.4 PLACING AND BONDING

A. Lay hollow masonry units with face shell bedding on head and bed joints.

B. Remove excess mortar and mortar smears as work progresses.

C. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

D. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

E. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

F. Isolate masonry partitions from vertical structural framing members with a control joint.

3.5 REINFORCEMENT AND ANCHORAGE - GENERAL

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place continuous joint reinforcement in first and second joint below top of walls.

C. Lap joint reinforcement ends minimum 6 inches.

3.6 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.7 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

3.8 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 2000

SECTION 04 2616 - ADHERED VENEER MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Manufactured, adhered stone veneer.
2. Mortar.
3. Adhesives.
4. Accessories.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 07 1900 – Water Repellants
3. Section 07 2500 - Weather Barriers: Air barrier over sheathing.
4. Section 07 28000 – Fluid-Applied Membrane Air and Water Barriers
5. Section 07 6200 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.
6. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

1.2 REFERENCE STANDARDS

A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium)

B. ASTM C150/C150M - Standard Specification for Portland Cement

C. ASTM C270 - Standard Specification for Mortar for Unit Masonry

D. ASTM C404 - Standard Specification for Aggregates for Masonry Grout

E. ASTM C476 - Standard Specification for Grout for Masonry

F. ASTM C847 - Standard Specification for Metal Lath

G. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete

H. ASTM C1063 – Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster

I. NCMA Installation Guide and Detailing Options for Compliance with ASTM C1780 for Adhered Manufactured Stone Veneer.

J. TCNA - Handbook for Ceramic, Glass, and Stone Tile Installation

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for thin brick units, mortar, grout, and adhesive.

C. Samples: Submit four samples of adhered stone veneer to illustrate color, texture, and extremes of color range.

D. Mock-up Panel: Provide a 4’-0” by 4’-0” mock-up panel constructed to demonstrate the layers of the adhered masonry system including weather barrier, ventilated rainscreen and details of the flashing, window sill and head construction, and corner conditions.

1.5 QUALITY ASSURANCE

A. Maintain one copy of the ANSI A108/A118/A136.1 and TCNA Handbook on site.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.

C. Pre-Installation Meeting: Conduct a pre-installation meeting a minimum of two weeks prior to commencing the Work of this Section.

1. Agenda shall include review of requirements and submittals for product and system, including surface preparation requirements specified under other sections, status of substrate work and preparation, compatibility of materials, special details and flashings, installation procedures, testing and inspection procedures, protection, and repairs.
2. Attendance by related trades is required.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.7 FIELD CONDITIONS

A. Do not install adhesives in an unventilated environment.

B. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 - PRODUCTS

2.1 ADHERED STONE VENEER

A. Basis of Design Product: Subject to compliance with requirements, provide “Ledgestone”, Color Siena Weatherledge, as manufactured by Dutch Quality Stone: www.dutchqualitystone.com or a comparable product by one of the following:

1. Eldorado Stone: www.eldoradostone.com "Rustic Ledge"
2. Cultured Stone: www.culturedstone.com “Country Ledgestone”

B. Veneer Unit properties: Precast veneer units consisting of portland cement, lightweight aggregates, and mineral oxide pigments.

1. Compressive Strength: ASTM C1670, 5 sample average: greater than 2,100 psi.
2. Shear Bond: ASTM C1670: 50 psi (345kPa). minimum
3. Freeze-Thaw Test: ASTM C1670: Less than 3 percent weight loss and no disintegration.
4. Thermal Resistance: ASTM C177: 0.473 at 1.387 inches thick
5. Weight per square foot: ASTM C1670, 15 pounds, saturated.

C. Utility Accents:

1. Water Hydrant Block – 6-1/2 inch (W) x 8 inch (H) with 1-5/16 inch diameter opening
2. Receptacle Block – 6-1/2inch (W) x 8 inch (H) with 2-1/2 inch (W) x 4 inch (H) opening.
3. Light Block – 8 inch (H) x 11 inch (H) with 4 inch diameter opening
4. 90-degree Jumper corner – 11 inch (H) x 10 inch (H) x 4 inch return.

2.2 ADHESIVE MATERIALS

A. Setting bed mortar for adhered masonry shall meet the requirements of ANSI A118.4

1. Manufacturers:
2. Bostik Inc: www.bostik-us.com
3. LATICRETE International, Inc; LATICRETE Hi-Bond Masonry Mortar: www.laticrete.com
4. Mapei Corporation: www.mapei.com

2.3 MORTAR MATERIALS

A. Mortar for limestone shall meet the requirements of ASTM C270 or ASTM C1714, Type N or S.

B. Setting mortar for adhered masonry shall meet the requirements of ANSI A118.4

C. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.

1. Color(s): As selected by Architect from manufacturer's full range.
2. Manufacturers:
   a. Davis Colors: www.daviscolors.com
   b. Lambert Corporation: www.lambertusa.com
   c. Solomon Colors: www.solomoncolors.com/sle

D. Water: Clean and potable.

2.4 MORTAR MIXES

A. Mortar for Limestone: ASTM C270, Proportion Specification Type N or S..

B. Pointing Mortar for Adhered Masonry Units: ASTM C270 or ASTM C1714, Type N or S.

C. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

2.5 ACESSORIES

A. Flashing

1. Flexible Flashing Materials:
   a. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet laminated between 2 layers of polyethylene film. Use only where flashing is fully concealed in masonry.
   b. Basis of Design:
      1) Hohmann & Barnard, Inc.; Copper-Fabric NA
   c. Acceptable Manufacturers:
      1) Advanced Building Products Inc.
      2) York Manufacturing, Inc.
2. Termination Bar: Stainless steel
3. Flashing Sealant/Adhesives: As recommended by flashing manufacturer; type capable of adhering to type of flashing used.

B. Drip Edge

1. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.

2.6 LATH

A. Diamond Mesh Metal Lath: ASTM C847, galvanized; self-furring.

1. Weight: To suit application and as specified in ASTM C1063.
2. Weight: 2.5 lb/sq yd, minimum.

B. Weep Screed

1. Weep screeds to be minimum 0.0179 inch corrosion resistant metal with a minimum attachment flange of 3-1/2 inches.

2.7 LIMESTONE CAPS

A. Limestone: Indiana Oolitic Limestone; complying with ASTM C568/C568M Classification II - Medium Density.

B. Size: As shown on drawings

2.8 ACCESSORIES

A. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive thin brick veneer.

B. Verify that built-in items are in proper location, and ready for installation of thin brick veneer.

3.2 INSTALLATION

A. Exterior Applications: Comply with TCNA (HB) Method W201, W202, or W244E.

B. Install adhered masonry veneer units in accordance with ASTM C1063 and the manufacturer's written instructions.

C. Lath Installation:

1. Apply metal lath taut, with long dimension perpendicular to supports.
2. Lap ends minimum 1 inch. Secure end laps with tie wire where they occur between supports.
3. Horizontal seams – minimum 1/2" lap
4. Lap sides of diamond mesh lath minimum 1-1/2 inches.
5. Nest outside ribs of rib lath together.
6. Attach metal lath to concrete using wire hair pins. Attach anchors to backup surface; space at maximum 24 inches on center.
7. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches from corner to form the angle reinforcement; fasten at perimeter edges only.
8. Place corner bead at external wall corners; fasten at outer edges of lath only.
9. Place 4 inch wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.

10. Place lath vertically above each top corner and each side of door frames to 6 inches above ceiling line.
11. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

3.3 COURSING

A. Follow manufacturer's recommendations for mixing sizes, shapes, textures and colors.

3.4 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of NCMA Installation Guide and Detailing Options for Compliance with ASTM C1780 for Adhered Manufactured Stone Veneer.

3.5 PLACING AND BONDING

A. Install scratch coat mortar over metal lath in accordance with manufacturer's recommendations.

B. Begin installation of adhered masonry veneer from the top down.

C. Remove excess mortar as work progresses.

D. Interlock intersections and external corners, except for units laid in stack bond.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove and replace.

F. Install pigmented mortar in joints between stones, using a grout bag, after setting bed mortar has cured.

G. Joints to be tooled after pointing mortar is "thumbprint hard".

H. Use a wooden raking stick or pointing tool to tool the joints.

3.6 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.

1. Extend flashings full width at such interruptions at least 6 inches, minimum, to form watertight pan.
2. Remove or cover protrusions or sharp edges that could puncture flashings.
3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Extend metal flashings from behind the weather-proof barrier through the exterior face of masonry and turn down to form drip.

C. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.7 CONTROL AND EXPANSION JOINTS

A. Form joints as detailed on drawings.

3.8 TOLERANCES

A. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

B. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

3.9 CUTTING AND FITTING

A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

3.10 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Clean off remaining grout using a dry, soft bristled brush.

3.11 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 2616

SECTION 05 4000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold-formed structural metal joist.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As follows:
   a. Dead Load: 10 PSF
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
   a. Ceiling Joist: Horizontal deflection of 1/360 of the joist span.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, and accessory indicated.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1. Comply with AISI's "Standard for Cold-Formed Steel Framing"

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI S202.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. 1. Grade: ST33H (18 ga. Or lighter) and ST50H (16 ga. And heavier).
2. Coating: G60

2.2 WALL FRAMING

A. Steel Joist: Manufacturer's standard C-shaped steel joist, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0566 inch.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, un-punched, with straight flanges, and same minimum base-metal thickness as steel studs

2.3 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members, unless otherwise indicated.

B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

C. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.4 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

C. Install framing members in one-piece lengths.

D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

E. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings

F. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.2 JOIST INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: 16 inches

B. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar configurations.

C. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

D. Install supplementary framing, blocking, and bracing in joist framing indicated to support fixtures, equipment, services, and similar work requiring attachment to framing.

E. Install horizontal bridging in joist system, at mid-point of span. Fasten at each joist intersection. Bridging shall be one of the following:

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of 2 screws into each flange of the clip angle for framing members up to 6 inches deep.

2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

3.3 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

3.4 FIELD QUALITY CONTROL

A. Field and shop welds will be subject to testing and inspecting.

B. Testing agency will report test results promptly and in writing to Contractor and Architect.

C. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 4000

SECTION 05 5000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Stainless steel wall panels

B. Work Not Included:

1. Section 05 4000 Cold-Formed Metal Framing
2. Section 07 4113 Metal Roof Panels – Cast iron downspout boots

1.2 ACTION SUBMITTALS

A. Shop Drawings: Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

B. Stainless Steel:

1. Plates, Sheet, and Strips: ASTM A666, Type 304.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.

1. Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

END OF SECTION 05 5000

SECTION 06 1000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Miscellaneous rough carpentry including furring, blocking, and grounds.
2. Panel products for telecommunications backboards
3. Panel products.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 03 3000 - Cast-in-Place Concrete: Setting anchors in concrete.
3. Section 06 1753 - Shop-Fabricated Wood Trusses.
4. Section 07 2500 - Weather Barriers: Air barrier over sheathing.
5. Section 07 6200 - Sheet Metal Flashing and Trim: Sill flashings.

1.2 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

C. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

E. AWPA U1 - Use Category System: User Specification for Treated Wood

F. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc.

G. PS 2 - Performance Standard for Wood-Based Structural-Use Panels

H. PS 20 - American Softwood Lumber Standard

I. SPIB (GR) - Grading Rules

1.3 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

2.3 CONSTRUCTION PANELS

A. Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I.

2.4 ACCESSORIES

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

C. Sill Flashing: As specified in Section 07 6200

2.5 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Treatment:

1. Manufacturers:
   a. Arch Wood Protection, Inc: www.wolmanizedwood.com
   b. Koppers Performance Chemicals, Inc: www.koppersperformancechemicals.com
   c. Viance, LLC: www.treatedwood.com
2. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
   a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
   b. Treat lumber in contact with roofing, flashing, or waterproofing.
   c. Treat lumber in contact with masonry or concrete.
   d. Treat lumber less than 18 inches above grade.

PART 3 - PART 3 EXECUTION

3.1 PREPARATION

A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.

B. Coordinate installation of rough carpentry members specified in other sections.

3.2 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.3 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Provide the following specific non-structural framing and blocking:

1. Cabinets and shelf supports.
2. Wall brackets.
3. Grab bars.
4. Toilet room accessories.
5. Wall-mounted door stops.
6. Chalkboards and marker boards.
7. Joints of rigid wall coverings that occur between studs.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.5 CLEANING

A. Waste Disposal:

1. Comply with applicable regulations.
2. Do not burn scrap on project site.
3. Do not burn scraps that have been pressure treated.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 06 100

SECTION 061300 - HEAVY TIMBER CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Framing using timbers.

B. Related Requirements:

1. Section 06 10 00 "Rough Carpentry" for dimension lumber items associated with heavy timber framing.
2. Section 06 15 16 "Wood Roof Decking."

1.3 DEFINITIONS

A. Timbers: Lumber of 5 inches nominal or greater in least dimension.

B. Inspection agencies, and the abbreviations used to reference them, include the following:

1. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For preservative-treated wood products and timber connectors.

1. For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. For timber connectors. Include installation instructions.

B. Shop Drawings: For heavy timber framing. Show layout, dimensions of each member, and details of connections.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For timbers specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of materials to avoid extended on-site storage and to avoid delaying the Work.

B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings.

PART 2 - PRODUCTS

2.1 TIMBER

A. Comply with DOC PS 20 and with grading rules of lumber-grading agencies certified by ALSC's Board of Review as applicable.

1. Factory mark each item of timber with grade stamp of grading agency.
2. For exposed timber indicated to receive a stained or natural finish, apply grade stamps to surfaces that are not exposed to view, or omit grade stamps and provide certificates of grade compliance issued by grading agency.

B. Timber Species and Grade: Douglas fir; No. 1 or better, WWPA.

C. Structural Properties: Provide timbers that, for moisture content provided, complies with required structural properties.

1. Allowable Stress Ratings for 12-Inch Nominal Depth: Fb 850 psi and E 1,200,000 psi.

D. Moisture Content: Provide timber with 19 percent maximum moisture content at time of dressing or provide timber that is unseasoned at time of dressing but with 19 percent maximum moisture content at time of installation.

E. Dressing: Provide dressed timber (S4S) unless otherwise indicated.

F. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

G. Use process that includes water-repellent treatment.

H. Mark treated materials with treatment quality mark of an inspection agency approved by ALSC's Board of Review.

I. Application: Treat all heavy timber framing unless otherwise indicated.

2.2 TIMBER CONNECTORS

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

1. Cleveland Steel Specialty Co.
2. Halfen Anchoring Systems.
3. Simpson Strong-Tie Co., Inc.
4. USP Structural Connectors.
5. Wood Care Systems.

B. Fabricate beam seats, side plats, and anchors from steel as noted on drawings.

C. Materials: Unless otherwise indicated, fabricate from the following materials:

1. Structural-steel shapes, plates, and flat bars complying with ASTM A36/A36M.
2. Round steel bars complying with ASTM A575, Grade M 1020.
3. Hot-rolled steel sheet complying with ASTM A1011/A1011M, Structural Steel, Type SS, Grade 33.

D. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A123/A123M or ASTM A153/A153M.

2.3 FABRICATION

A. Predrill for fasteners and assembly of units.

B. Coat crosscuts with end sealer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Erect heavy timber framing true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.

1. Install horizontal and sloping members with crown edge up, and provide not less than 4 inches of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports with metal strap ties if not continuous.
2. Handle and temporarily support heavy timber framing to prevent surface damage, compression, and other effects that might interfere with indicated finish.

B. Framing Built into Masonry: Provide 1/2-inch clearance at tops, sides, and ends of members built into masonry, and bevel cut ends 3 inches; do not embed more than 4 inches unless otherwise indicated.

C. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

D. Fitting: Fit members by cutting and restoring exposed surfaces to match specified surfacing.

1. Predrill for fasteners using timber connectors as templates.
2. Coat crosscuts with end sealer.

E. Install timber connectors as indicated.

3.2 ADJUSTING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber framing if repairs are not approved by Architect.

END OF SECTION 061300

SECTION 061516 - WOOD ROOF DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-sawn wood roof decking and ceiling treatments.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for dimension lumber items associated with wood roof decking.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For preservative-treated wood products, include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of wood roof decking to avoid extended on-site storage and to avoid delaying the Work.

B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings. Stack wood roof decking with surfaces that are to be exposed in the final Work protected from exposure to sunlight.

PART 2 - PRODUCTS

2.1 WOOD ROOF DECKING, GENERAL

A. General: Comply with DOC PS 20 and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

2.2 SOLID-SAWN WOOD ROOF DECKING

A. Standard for Solid-Sawn Wood Roof Decking: Comply with AITC 112.

B. Roof Decking Species:

1. Douglas fir.

C. Roof Decking Nominal Size: 2 by 6.

D. Decking for Ceilings Nominal Size: 1 by 6.

E. Roof Decking Grade:

1. Dense Select Decking.

F. Grade Stamps: Factory mark each item with grade stamp of grading agency. Apply grade stamp to surfaces that are not exposed to view.

G. Moisture Content: Provide wood roof decking with 15 percent maximum moisture content at time of dressing.

H. Face Surface: Smooth.

I. Edge Pattern: Vee grooved.

2.3 ACCESSORY MATERIALS

A. Fasteners for Solid-Sawn Roof Decking: Provide fastener size and type complying with AITC 112 for thickness of deck used.

B. Nails: Common; complying with ASTM F1667, Type I, Style 10.

C. Fastener Material: Hot-dip galvanized steel.

D. Penetrating Sealer: Clear sanding sealer complying with Section 099300 "Staining and Transparent Finishing" and compatible with topcoats specified for use over it.

2.4 FABRICATION

A. Shop Fabrication: Where preservative-treated roof decking is indicated, complete cutting, trimming, surfacing, and sanding before treating.

B. Seal Coat: After fabricating and surfacing roof decking, apply a saturation coat of penetrating sealer in fabrication shop.

C. Apply indicated finish materials to comply with Section 099300 "Staining and Transparent Finishing" in fabrication shop if possible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and support framing in areas to receive wood roof decking for compliance with installation tolerances and other conditions affecting performance of wood roof decking.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install solid-sawn wood roof decking to comply with AITC 112.

1. Locate end joints for controlled random lay-up.

3.3 ADJUSTING

A. Repair damaged surfaces and finishes after completing erection. Replace damaged roof decking if repairs are not approved by Architect.

3.4 PROTECTION

A. Provide water-resistive barrier over roof decking as the Work progresses to protect roof decking until roofing is applied.

B. If, despite protection, inorganic boron (SBX)-treated roof decking becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061516

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

B. Factory mark panels to indicate compliance with applicable standard.

2.2 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat all plywood unless otherwise indicated .

2.3 WALL SHEATHING

A. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.

1. Nominal Thickness: Not less than 5/8 inch. .

2.4 ROOF SHEATHING

A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2 , Exposure 1 sheathing.

1. Span Rating: Not less than 24/0 48/24.
2. Nominal Thickness: Not less than 3/4 inch .

B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.

1. Span Rating: Not less than 24/0 .
2. Nominal Thickness: Not less than 5/8 inch .

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M .

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.

E. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.

1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C1002.
2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C954.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
2. ICC-ES evaluation report for fastener.

D. Coordinate wall roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:
   a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
   b. Screw to cold-formed metal framing.
   c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 061600

SECTION 06 1753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Shop-fabricated, engineered wood trusses.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 06 1000 - Rough Carpentry: Installation requirements for miscellaneous framing.
3. Section 06 1000 - Rough Carpentry: Material requirements for blocking, bridging, plates, and miscellaneous framing.

1.2 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

B. SPIB (GR) - Grading Rules

C. TPI 1 - National Design Standard for Metal-Plate-Connected Wood Truss Construction

D. TPI BCSI 1 - Building Component Safety Information Booklet: The Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses

E. TPI DSB-89 - Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Show truss configurations, sizes, spacing, size and type of plate connectors, cambers, framed openings, bearing and anchor details, and bridging and bracing.

1. Include identification of engineering software used for design.
2. Provide shop drawings stamped or sealed by design engineer.

1.4 QUALITY ASSURANCE

A. Designer Qualifications: Perform design by or under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State of Ohio.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle and erect trusses in accordance with TPI BCSI 1.

B. Store trusses in vertical position resting on bearing ends.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Truss Plate Connectors:

1. Alpine Engineered Products, Inc: www.alpeng.com.
2. MiTek Industries, Inc: www.mii.com.
3. Truswal Systems: www.truswal.com.

2.2 TRUSSES

A. Wood Trusses: Designed and fabricated in accordance with TPI 1 and TPI DSB-89 to achieve structural requirements indicated.

1. Species and Grade: Southern Pine, SPIB (GR) Grade.
2. Connectors: Steel plate.
3. Structural Design: Comply with 2017 Ohio Building Code for structural loading criteria.
4. Roof Deflection: 1/240, maximum.

2.3 MATERIALS

A. Lumber:

1. Moisture Content: Between 7 and 9 percent.
2. Reused lumber is not permitted.

B. Steel Connectors: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) Grade 33/230, with G90/Z275 coating; die stamped with integral teeth; thickness as indicated.

C. Truss Bridging: Type, size and spacing recommended by truss manufacturer.

2.4 ACCESSORIES

A. Wood Blocking, Bridging, Plates, and Miscellaneous Framing: As specified in Section 06 1000

B. Fasteners: Electrogalvanized steel, type to suit application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated on shop drawings.

B. Verify that supports and openings are ready to receive trusses.

3.2 PREPARATION

A. Coordinate placement of support items.

3.3 ERECTION

A. Install trusses in accordance with manufacturer's instructions and TPI DSB-89 and TPI BCSI 1; maintain a copy of each TPI document on site until installation is complete.

B. Set members level and plumb, in correct position.

C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure plumb, and in true alignment until completion of erection and installation of permanent bracing.

D. Do not field cut or alter structural members without approval of Architect.

E. Install permanent bridging and bracing.

F. Install headers and supports to frame openings required.

G. Frame openings between trusses with lumber in accordance with Section 06 1000

3.4 TOLERANCES

A. Framing Members: 1/2 inch maximum, from true position.

END OF SECTION 06 1753

SECTION 06 2000 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Finish carpentry items.
2. Hardware and attachment accessories.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.

1.2 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards

B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0

C. NEMA LD 3 - High-Pressure Decorative Laminates

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.

1. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

C. Samples: Submit samples of the following items:

1. Exterior Woodwork Items:
   a. Minimum 4-inch x 4-inch sample of each product specified.
   b. Sample of each fastener proposed for use.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect work from moisture damage.

PART 2 - PRODUCTS

2.1 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Exterior Woodwork Items:

1. Manufacturer:
   a. Basis of Design - James Hardie Building Products; Hardie board.
   b. Boral Building Products; TruExterior.
   c. Cement Board Fabricators; Silbonit Panels.
2. Window Casings, Moldings and Trim:
   a. Material: Pre-finished Fiber Cement Composite Board
   b. Size: As indicated on drawings
   c. Texture: Woodgrain
   d. Color: Factory-applied primer
3. Soffits:
   a. Material: Medium density pre-finished fiber cement composite board
   b. Panel Size: 24" x 96”
   c. Panel thickness: 1/4-inch
   d. Texture: Texture side to be exposed
   e. Color: Factory-applied primer
4. Fascias:
   a. Material: Medium density pre-finished fiber cement composite board
   b. Size: 3/4-inch x width as indicated on the drawings.
   c. Color: Factory-applied primer
5. Shingle Siding:
   a. Material: Medium density pre-finished fiber cement composite board
   b. Panel Size: 15.25" x 48” (6” exposure when applied)
   c. Panel thickness: 1/4-inch
   d. Color: Factory-applied primer
6. Porch Ceiling: polymer-composite paneling
   a. Manufacturer:
      1) Basis of Design - Boral, www.Boral/TruExterior.com
      2) MultiDeck
      3) Novik
   b. Composition: bio-based polymers and coal-combustion by-products (fly-ash)
   c. Panel Type: Tongue and groove beadboard
   d. Nominal Size: 5/8” x 12”

e. Exposed face: V-grooved at approximately 6” on center
f. Dimensional Stability: (Coefficient of Linear Expansion as determined by ASTM D 6341) < 1.40 E-05 in./in./°f
g. Recycled Content: Minimum 70%
h. Color: Factory-applied primer

2.2 PLASTIC MATERIALS

A. Solid Surface: NEMA LD 3, HGS; color as selected by Architect; textured, low gloss finish.

1. Basis of Design:
   a. Hyundai L&C Surfaces, Hanex Solid Surface: www.hyundailncusa.com
2. Acceptable Manufacturers:
   a. Wilsonart; www.wilsonart.com
   b. Avonite Surfaces: www.avonite.com
   c. Dupont; Corian: www.corian.com

B. Color:

1. Hanax Solid Surface HL-038 Amber

2.3 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Fasteners for exterior woodwork items shall be manufacturer’s standard corrosion resistant, non-staining fastener suitable for the finish material and substrate.

1. After installation of fasteners, fill impression with manufacturer’s recommended filler.

2.4 HARDWARE

A. Countertop support brackets, 24" x 24":

1. CounterBalance Workstation Bracket, www.counterbalanceshop.com
2. Workstation Bracket, Work Station Brackets, www.workstationbrackets.com
3. Standard Workstation Bracket, A & M Hardware, www.aandmhardware.com

2.5 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Install exterior siding and paneling in accordance with the manufacturer's installation requirements.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.3 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION 06 2000

SECTION 066510 - SOLID SURFACE FABRICATION

PART 4 - GENERAL

1. RELATED DOCUMENTS

a. Drawings and general provisions of the contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this Section.

2. SUMMARY

a. This Section includes the following horizontal and trim solid surface product types:

1) Countertops with sinks.
2) Office countertops
3) Cove backsplashes.

b. Related Sections include the following:

1) Division 5 Section "Metal Fabrications" for Blocking.

3. DEFINITION

a. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

4. SUBMITTALS

a. Product data:

1) For each type of product indicated.
2) Product data for the following:

a) Countertops with sinks and cove backsplash.
b) Countertops in office areas.

b. Shop drawings:

1) Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.

a) Show full-size details, edge details, thermoforming requirements, attachments, etc.
b) Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
c) Show locations and sizes of cutouts and holes for plumbing fixtures,

faucets, soap dispensers, waste receptacle and other items installed in solid surface.

c. Samples:

1) For each type of product indicated.

a) Submit minimum 6-inch by 6-inch sample in specified gloss.
b) Cut sample and seam together for representation of inconspicuous seam.
c) Indicate full range of color and pattern variation.

2) Approved samples may be retained as a standard for work upon approval of A/E.

d. Product data-1:

1) Indicate product description, fabrication information and compliance with specified performance requirements.

e. Product certificates:

1) For each type of product, signed by product manufacturer.

f. Fabricator/installer qualifications:

1) Provide copy of certification number.

g. Manufacturer certificates:

1) Signed by manufacturers certifying that they comply with requirements.

h. Maintenance data:

1) Submit manufacturer's care and maintenance data, including repair and cleaning instructions.

a) Maintenance kit for finishes shall be submitted.

2) Include in project closeout documents.

5. QUALITY ASSURANCE

a. Qualifications:

1) Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

b. Fabricator/installer qualifications:

1) Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

c. Applicable standards:

1) Standards of the following, as referenced herein:

a) American National Standards Institute (ANSI)
b) American Society for Testing and Materials (ASTM)
c) National Electrical Manufacturers Association (NEMA)
d) NSF International

2) Fire test response characteristics:

a) Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:

(1) Flame Spread Index: 25 or less.
(2) Smoke Developed Index: 450 or less.

d. Coordination drawings:

1) Shall be prepared indicating:

a) Plumbing work.
b) Electrical work.
c) Miscellaneous steel for the general work.
d) Indicate location of all walls (rated and non-rated), blocking locations and recessed wall items, etc.

2) Content:

a) Project-specific information, drawn accurately to scale.
b) Do not base coordination drawings on reproductions of the contract documents or standard printed data.
c) Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements
d) Provide alternate sketches to designer for resolution of such conflicts.

(1) Minor dimension changes and difficult installations will not be considered changes to the contract.

e. Drawings shall:

1) Be produced in 1/2-inch scale for all fabricated items.

f. Job mock-up:

1) Prior to fabrication of architectural millwork, erect sample unit to further verify selections made under sample submittals and to demonstrate the quality of materials and execution.

2) Mock-up shall be 24 inches in length and full width of counter top.
3) Build the mock-up to comply with the contract documents and install in a location as directed by the Architect.
4) Notify the Architect two weeks in advance of the date of when the mock-up will be delivered.
5) Should mock-up not be approved, re-fabricate and reinstall until approval is secured.

    a) Remove rejected units from project site.

6) After approval, the mock-up may become a part of the project.
7) This mock-up, once approved, shall serve as a standard for judging quality of all completed units of work.

6. DELIVERY, STORAGE AND HANDLING

a. Deliver no components to project site until areas are ready for installation.

b. Store components indoors prior to installation.

c. Handle materials to prevent damage to finished surfaces.

    1) Provide protective coverings to prevent physical damage or staining following installation for duration of project.

7. WARRANTY

a. Provide manufacturer's warranty against defects in materials.

    1) Warranty shall provide material and labor to repair or replace defective materials.
    2) Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

b. Optional Installed Warranty:

    1) To qualify for the optional Installed Warranty, fabrication and installation must be performed by a Certified Fabrication/Installation source who will provide a brand plate for the application.
    2) This warranty covers all fabrication and installation performed by the certified/approved source subject to the specific wording contained in the Installed Warranty Card.

c. Manufacturer's warranty period:

    1) Ten years from date of substantial completion.

8. MAINTENANCE

a. Provide maintenance requirements as specified by the manufacturer.

PART 5 - PRODUCTS

1. PERFORMANCE REQUIREMENTS

a. Manufacturers:

1) Subject to compliance with requirements, provide products by one of the following:

a) Corian surfaces from the DuPont company (basis of design).
b) Wilson Art- Solid Surface
c) Formica Solid Surface

2. MATERIALS

a. Solid polymer components.

1) Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.
2) Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.

b. Thickness:

1) ¾ inch

c. Edge treatment

1) As shown on drawings.

d. Backsplash:

1) Coved.

e. Sidesplash:

1) Applied.

f. Performance Characteristics:

1) Tensile Strength 6,000 psi ASTM D 638
2) Tensile Modulus 1.5 x 10-6 psi ASTM D 638
3) Tensile Elongation 0.4% min ASTM D 638
4) Flexural Strength 10,000 psi ASTM D 790
5) Flexural Modulus 1.2 x 10-6 psi ASTM D 790
6) Hardness 85
7) Thermal Expansion 1.80 x 10-5 in./in./F) ASTM D 696
8) Light Resistance (Xenon Arc) No effect NEMA LD 3-2000 Method 3.3
9) Wear and Cleanability Passes ANSI Z124.3 &

10) Stain Resistance: Sheets Passes ANSI Z124.3 & Z124.6
11) Boiling Water Resistance No visible change NEMA LD 3-2000 Method 3.5
12) High Temperature Resistance No change NEMA LD 3-2000 Method 3.6
13) Izod Impact 0.28 ft.-lbs./in. of notch ASTM D 256
14) Ball Impact No fracture-1/2 lb. ball: NEMA LD 3-2000
15) Resistance: Sheets 1/4" slab-36" drop Method 3.8
16) Specific Gravity 1.7
17) Water Absorption Long-term ASTM D 570 0.4% (3/4"), 0.6% (1/2"), 0.8% (1/4")
18) Flame Spread Index 25
19) Smoke Developed Index 25
20) Approximate weight per square foot: 1/2" 4.4 lbs.
21) Shapes meet or exceed the ANSI Z124.3 and ANSI Z124.6 standards for plastic sinks and lavatories. NEMA results based on the NEMA LD 3-2000

3. ACCESSORIES

a. Joint adhesive:

1) Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant UL-listed silicone sealant in colors matching components.

b. Sealant:

1) Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant UL-listed silicone sealant in colors matching components.

c. Conductive tape:

1) Manufacturer's standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.

d. Insulating felt tape:

1) Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat source.

4. FACTORY FABRICATION

a. Shop assembly

1) Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer’s printed instructions and technical bulletins.
2) Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.

a) Reinforce with strip of solid polymer material, 2" wide.

3) Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.

4) Rout and finish component edges with clean, sharp returns.

a) Rout cutouts, radii and contours to template.
b) Smooth edges.
c) Repair or reject defective and inaccurate work.

5. FINISHES

a. Select from the manufacturer's standard color chart.

b. Finish:

1) Provide surfaces with a uniform finish.

a) Matte; gloss range of 5-20.

PART 6 - EXECUTION

1. EXAMINATION

a. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.

b. Proceed with installation only after unsatisfactory conditions have been corrected.

2. INSTALLATION

a. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

1) Provide product in the largest pieces available.
2) Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.

a) Exposed joints/seams shall not be allowed.

3) Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
4) Cut and finish component edges with clean, sharp returns.
5) Anchor securely to base cabinets or other supports.
6) Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.
7) Carefully dress joints smooth, remove surface scratches and clean entire surface.
8) Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.

b. Coved backsplashes and sidesplashes

1) Provide coved backsplashes and sidesplashes at all walls and adjacent millwork in Toilet/Shower areas and Breakroom. Counter in VM-01 Parts Room and Office shall be without backsplash and scribed for proper fit.
2) Fabricate radius cove at intersection of counters with backsplashes to dimensions shown on the drawings.
3) Adhere to countertops using manufacturer's standard color-matched Joint Adhesive.

3. REPAIR

a. Repair or replace damaged work which cannot be repaired to Architects satisfaction.

4. CLEANING AND PROTECTION

a. Keep components clean during installation.

b. Remove adhesives, sealants and other stains.

END OF SECTION 066510

SECTION 07 0510 - VENTILATED RAINSCREEN

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Ventilated rainscreen (drainage membrane) behind cementitious cladding and adhered masonry veneer.

B. Related Requirements

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
   a. Section 06 2000 – Finish Carpentry
   b. Section 07 2500 – Metal Roofing Panels
   c. Section 07 6200 – Sheet Metal Flashing & Trim

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including installation instructions, detail drawings, test reports on physical and performance properties, and building code compliance reports.

B. Verification Samples: Submit clearly labeled samples of each material specified.

C. Warranty at Closeout: Submit manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion.

1.3 QUALITY ASSURANCE

A. Manufacturer: Minimum of 3 years' experience manufacturing similar products.

B. Installer: Minimum of 2 years' experience installing similar products and acceptable to the manufacturer.

C. Mock-Up: As required under Division 01-3000, provide materials and labor for exterior wall mock-up.

D. Pre-Installation Meeting: Conduct a pre-installation meeting a minimum of two weeks prior to commencing the Work of this Section.

1. Agenda shall include review of requirements and submittals for ventilated rainscreen, including surface preparation requirements specified under other sections, status of substrate work and preparation, compatibility of materials,

special details and flashings, installation procedures, testing and inspection procedures, protection, and repairs.

2. Attendance by related trades is required.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations.

1.5 WARRANTY

A. Manufacturer’s Warranty: Submit manufacturer’s standard limited warranty for defects in materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Ventilated Rainscreen

1. Delta-Dry www.dorken.com
2. Keene Building Envelope Products www.keenebuilding.com
3. Masonry Technology Inc. www.mtidry.com
4. Prosoco www.prosoco.com
5. Carlisle Coatings & Waterproofing www.carlisle-ccw.com
6. Grace Construction Products www.na.graceconstruction.com

B. Ventilated Rainscreen: Provide ventilated rainscreen with the following characteristics:

1. Color: Silver-gray.
2. Material: High-density polyethylene, stabilized (oxidation & UV)
3. Dimple Height: Approx. 2/5” (10.5 mm) ASTM D1777.
4. Compressive Strength: 93 kPa (1,946 psf) @ 8 % strain ASTM D6364/
5. Drainage Efficiency: Approx. 95% ASTM 2273.
6. Fungus Resistance: Does not support fungus growth ASTM C1338.
7. Fire Resistance: B2 DIN 4102.
8. Flame Spread: 210 CAN/ULC-S102.2.
9. Smoke Developed: 105-190 CAN/ULC-S102.2.
10. Water Penetration Resistance: 118 psi (813 kPa) Watertight AATCC 127.
11. Water Vapor Transmission: 22 ng/(Pa s m^2) ASTM E96, Method A.
12. Vapor Permeance: 0.14 perms grains/h/ft^2/in Hg ASTM E96, Method A.
13. Contact Surface of Rainscreen to Water-Resistive Barrier: Less than 20%, greater than 80% open.
14. Chemical Properties: Excellent chemical resistance, rot-proof.
15. Toxicity: Non-toxic, non-polluting.
16. Temperature Range: -22°F to +176°F (-30°C to +80°C).

17. Maximum UV (Sunlight) Exposure: Do not expose to UV light for longer than 30 days.

C. Accessory Products:

1. Butyl Rubber Tape at Penetrations
2. Fasteners: Stainless Steel nails and screws.
3. Fluid applied air barrier
4. Bug Screen
5. Metal flashing with drip edge

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Clean substrate of dirt and bond breaking substances prior to beginning installation.

3.2 INSTALLATION

A. Install products in strict accordance with manufacturer's instructions, approved submittals and the following:

1. Install ventilated rainscreen sheets horizontally with stud side facing the water-resistive barrier
2. Install sheets tight at side laps and end laps. Do not overlap or interlock.
3. Secure to substrate at edges and in the field of the sheet using fasteners and methods recommended by manufacturer.
4. Do not seal or block rainscreen at top or bottom of installation.

3.3 PROTECTION

A. Protect installed ventilated rainscreen from damage during application and remainder of construction period, according to manufacturer's written instructions.

B. Coordinate with installation of materials which cover the ventilated rainscreen, to ensure exposure period does not exceed that recommended by the manufacturer.

END OF SECTION 07 0510

SECTION 07 1900 - WATER REPELLENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Water repellents applied to exterior adhered masonry surfaces.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.

1.2 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.

1.3 FIELD CONDITIONS

A. Protect liquid materials from freezing.

B. Do not apply water repellent when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Silane, siloxane, silane-siloxane blend, or siliconate that reacts chemically with concrete and masonry; minimum 90 percent nonvolatile content.

B. Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.

1. Applications: Vertical surfaces and non-traffic horizontal surfaces.
2. Number of Coats: Two.

C. Manufacturer

1. Dayton Superior Corporation, www.daytonsuperior.com
2. Pecora Corporation : www.pecora.com , Weather Worker 100% J29A
3. PROSOCO, Inc : www.prosoco.com , Consolideck SL100 Water Repellent

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify joint sealants are installed and cured.

C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

3.2 PREPARATION

A. Prepare surfaces to be coated as recommended by water repellent manufacturer for best results.

3.3 APPLICATION

A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.

B. Apply two coats, minimum.

C. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

END OF SECTION 07 1900

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Glass-fiber blanket insulation.
2. Mineral-wool blanket insulation
3. Board insulation at perimeter foundation wall and underside of floor slabs.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:
1. Glass-fiber blanket insulation.
2. Mineral-wool blanket insulation. (Fire safing insulation)

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

A. Glass-Fiber Blanket Insulation, Unfaced : ASTM C665, Type I; passing ASTM E136 for combustion characteristics.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Certainteed; SAINT-GOBAIN.
   b. Johns Manville; a Berkshire Hathaway company.
   c. Owens Corning.
2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.2 MINERAL-WOOL BLANKET INSULATION

A. Mineral-Wool Blanket Insulation, Unfaced (Fire safing insulation) : ASTM C665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Johns Manville; a Berkshire Hathaway company.

b. Owens Corning.
c. ROCKWOOL.
2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.3 EXTRUDED POLYSTYRENE

A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Carlisle.
b. Johns Manville; a Berkshire Hathaway company.
c. Owens Corning.

2.4 ACCESSORIES
A. Insulation for Miscellaneous Voids:
1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.

PART 3 - EXECUTION

3.1 PREPARATION
A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL
A. Comply with insulation manufacturer's written instructions applicable to products and applications.
B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
C. Install insulation with manufacturer's R-value label exposed after insulation is installed.
D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION
A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For wood-framed construction, install blankets according to ASTM C1320 and as follows:
    a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.
B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 19

SECTION 07 2119 - FOAMED-IN-PLACE INSULATION

PART 1 - PART 1 GENERAL

1.1 SECTION INCLUDES

A. Foamed-in-place insulation.

1. At junctions of dissimilar wall and roof materials.

1.2 RELATED REQUIREMENTS

A. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.

1.3 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2015.

B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

E. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

F. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.

C. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

1.5 FIELD CONDITIONS

A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

B. Do not apply foam when temperature is within 5 degrees F of dew point.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Foamed-In-Place Insulation:

1. BASF Corporation ; WALLTITE US Series Closed Cell: www.spf.basf.com.
2. Gaco Western: www.gaco.com.
3. Icynene Inc ; Icynene Classic LD-C-50: www.icynene.com.
4. Johns Manville ; JM Corbond III Closed Cell Spray Polyurethane Foam: www.jm.com/sle.

2.2 MATERIALS

A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.

1. Aged Thermal Resistance: R-value (RSI-value) of 5 (deg F hr sq ft)/Btu (0.9 (K sqm)/W), minimum, when tested at 1 inch (25.4 mm) thickness in accordance with ASTM C518 after aging for 180 days at 41 degrees F (23 degrees C).
2. Water Vapor Permeance: Vapor retarder; 2 perm (115 ng/(Pa s sqm)), maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
3. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
4. Air Permeance: 0.004 cfm/sq ft (0.2 L/second sq meter), maximum, when tested at intended thickness in accordance with ASTM E2178 or ASTM E283 at 1.5 psf (75 Pa).
5. Closed Cell Content: At least 90 percent.
6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.

2.3 ACCESSORIES

A. Primer: As required by insulation manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify work within construction spaces or crevices is complete prior to insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

3.2 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Apply primer in accordance with manufacturer's instructions.

3.3 APPLICATION

A. Apply insulation in accordance with manufacturer's instructions.

3.4 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION 07 2119

SECTION 07 2500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Water-Resistive Barrier: Under exterior wall cladding, over sheathing or other substrate; not air tight or vapor retardant.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.

1.2 DEFINITIONS

A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.

B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.

C. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture resistant, to the degree specified, intended to be installed to shed water without sealed seams.

1.3 REFERENCE STANDARDS

A. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials

D. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials

E. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Manufacturer's Installation Instructions: Indicate preparation.

1.5 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 - PRODUCTS

2.1 WEATHER BARRIER ASSEMBLIES

A. Water-Resistive Barrier: Provide double layers on exterior walls behind exterior cladding and adhered masonry veneer.

2.2 WATER-RESISTIVE BARRIER MATERIALS (NEITHER AIR BARRIER NOR VAPOR RETARDER)

A. Weather-Resistive Barrier, Composite: Tear-resistant polyester sheet with UV-resistant acrylic coating.

1. Air Permeance: 0.178 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
2. Water Vapor Permeance: 200 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant procedure).
3. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for maximum of 210 days weather exposure.
4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.
5. Water Resistance: Comply with applicable water-resistive requirements of ICC-ES AC38.
6. Seam and Perimeter Tape: As recommended by sheet manufacturer.

2.3 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

3.2 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

3.3 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Water-Resistive Barriers: Install continuous barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.

C. Mechanically Fastened Sheets - On Exterior:

1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
2. Overlap seams as recommended by manufacturer but at least 6 inches.
3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
4. Install water-resistive barrier over jamb flashings.
5. Install two layers of weather barrier UNDER jamb flashings.
6. Install head flashings under weather barrier.
7. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.

D. Openings and Penetrations in Water Resistive Barriers:

1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches wide; do not seal sill flange.
3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

END OF SECTION 07 2500

SECTION 072800 - FLUID-APPLIED MEMBRANE AIR AND WATER BARRIERS

1. GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes vapor-permeable, fluid-applied air and water barriers.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for masonry ties and flashing installation.
2. Section 072000 "Insulation"

1.3 DEFINITIONS

A. Weather Barrier: A combination of materials and accessories that do the following:

1. Prevent the accumulation of water as a water-resistive barrier.
2. Minimize the air leakage into or out of the building envelope as a continuous air barrier.
3. Provide sufficient water vapor transmission to enable drying as a vapor-permeable membrane.

B. Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly in accordance with IBC Section 1403.2.

1. Primary Layer: Water-resistive barrier (fluid-applied) installed closest to building interior with all flashings and terminations integrated to this layer.

C. Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of building envelope in accordance with ASHRAE 90.1 Section 5.4.3.1.

D. Vapor-Permeable Membrane: The property of having a water-vapor permeance rating of 10 perms or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E96 in accordance with definition in International Building Code. Vapor-permeable material permits passage of moisture vapor through vapor diffusion.

E. Vapor Diffusion: A slow movement of individual water vapor molecules from regions of higher to lower water vapor concentration (higher to lower vapor pressure).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For weather barrier, include data on air and water-vapor permeance based on testing in accordance with referenced standards.

B. Sustainable Design Submittals:

1. Test Reports: Envelope testing and verification of the following:
   a. Water-Spray Test.
   b. Air Infiltration Test.
   c. Water Penetration Test.
2. Product Data: Including the following information:
   a. Provide Environmental Product Declarations (EPDs).

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer's Instructions: For installation of each product specified.

B. Sample Warranty: For manufacturer's warranty.

C. Reports: Field test and inspection reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is certified by weather barrier system manufacturer to install manufacturer's product.

B. Mockups: Build mockups to set quality standards for materials and execution.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Manufacturer's Field Service: Register Project with weather barrier manufacturer prior to installation of weather barrier and comply with weather barrier manufacturer's Project Registration and Observation process.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

C. Store in a dry environment between 50 and 80 deg F.

1.8 WARRANTY

A. Manufacturer's Product Warranty: Manufacturer agrees to repair or replace weather barrier product that fails in materials within specified warranty period.

1. Warranty Period: 10 years from date of product purchase.

2. PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain weather barrier assembly components, including weather barrier, weather barrier flashing and foam insulation from same manufacturer as weather barrier or manufacturer approved by weather barrier manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed weather barrier and accessories shall withstand specified wind pressures, liquid water penetration, and water vapor pressures, without failure due to defective manufacture of products.

B. High-Performance Installations:

1. For installation with one of the following building envelope performance or structural characteristics:
   a. Exceeding 65 mph equivalent structural load.
   b. Exceeding 15 mph equivalent wind-driven rainwater infiltration.
   c. Buildings with 60 ft. or more total height above grade plane, as defined by the IBC.
   d. Construction with gypsum or cement-based exterior sheathing.
   e. Non-wood based primary structure such as steel, light-gauge steel, masonry, or concrete.

2.3 WEATHER BARRIER

A. Basis-of-Design Product: DuPont de Nemours, Inc.; Tyvek Fluid Applied WB+ or comparable product by one of the following:

1. Prosoco .
2. W.R. Meadows

B. Fluid-Applied Membrane: ASTM E2357 passed, Air Barrier Association of America (ABAA) evaluated air barrier assembly, and assembly water resistance in accordance with ASTM E331; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized for nine-month exposure; and acceptable to authorities having jurisdiction.

1. Air Permeance, Product: Not more than 0.0002 cfm/sq. ft. at 1.57 lbf/sq. ft. when tested in accordance with ASTM E2178.
2. Air Permeance, Assembly: Not more than 0.0002 cfm/sq. ft. at 1.57 lbf/sq. ft. when tested in accordance with ASTM E2357 and evaluated by the ABAA.
3. Water Penetration Resistance, Product: Hydrostatic-head resistance greater than 394 inches in accordance with AATTC 127.
4. Water Penetration Resistance, Assembly: Assembly wall specimen described in ASTM E2357 to water resistance in accordance with ASTM E331 to 6.24 lbf/sq. ft. .
5. Water-Vapor Permeance: Not less than 10 perms in accordance with ASTM E96/E96M, Desiccant Method (Procedure A) or not less than 20 perms in accordance with ASTM E96/E96M, Water Method (Procedure B).
6. Allowable UV Exposure Time: Not less than nine months, when tested in accordance with ASTM G155 (accelerated weathering).
7. Flame Propagation Test: Confirm assembly compliance with NFPA 285.
8. Weather barrier system shall have a VOC content of 30 g/L or less.
9. Water-Resistive Barriers over Exterior Sheathing: Pass, in accordance with AC 212.
10. Percent Solids: Greater than 90.
11. 99-percent recovery at 300-percent elongation in accordance with ASTM D412.

2.4 WEATHER BARRIER FLASHING

A. Conformable Weather Barrier Flashing: Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure of 176 deg F for seven days.

1. Basis-of-Design Product: DuPont de Nemours, Inc.; FlexWrap NF or comparable product by one of the following:
   a. W.R. Meadows .
   b. Henry
2. Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.
3. Water Penetration: No leakage at 15 psf in accordance with ASTM E331.
4. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. at 25 deg F as Class A (without primer use).
5. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in., after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3 Test B.

B. Strip Flashing: Composite flashing material composed of spunbonded polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure of 176 deg F for seven days.

1. Basis-of-Design Product: DuPont de Nemours, Inc.; Tyvek StraightFlash or comparable product by one of the following:
   a. W.R. Meadows
   b. Henry
   c. Prior approved equal .
2. Water Penetration: No leakage at 15 psf in accordance with ASTM E331.

3. Low Temperature Adhesion: Exceeds minimum value of 1.5 lb./in. at 25 deg F as Class A without primer use.
4. Adhesion After Water Immersion: Exceeds minimum value of 1.5 lb./in., after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3 Test B.

C. Primer for Flashings: Synthetic rubber-based product. Spray applied. Strengthen the adhesive bond at low temperature applications between weather products, such as self-adhered flashing products, commercial building wraps, and common building sheathing materials.

1. Basis of Design Product: DuPont de Nemours, Inc.; DuPont Adhesive Primer or comparable product by one of the following.
   a. W.R. Meadows
   b. Henry
   c. Prior approved equal .
2. Peel Adhesion Test: Passes ASTM D3330, Test Method F, for the following:
   a. Peel Angles: 0, 25, 72, and 180 degrees.
   b. Substrates: Concrete masonry units (CMUs), exterior gypsum sheathing, oriented strand board (OSB), aluminum, and vinyl.
3. Chemical Compatibility per AAMA 713: Pass.
4. Flame Spread Index per ASTM E84: 5.
5. Smoke Development Index per ASTM E84: 0.

2.5 FLUID APPLIED FLASHING AND SEALANT

A. Fluid Applied Flashing: Trowel or brush applied, non-water soluble, single component, silyl terminated polyether technology (STPE), vapor permeable, flashing material.

1. Basis-of-Design Product: DuPont de Nemours, Inc.; Tyvek Fluid Applied Flashing and Joint Compound+ or comparable product by one of the following:
   a. W.R. Meadows
   b. Henry
   c. prior approved equal .
2. VOC Content: ASTM C1250, less than 2 percent by weight and less than 30 g/L.
3. Water Vapor Transmission: ASTM E96, Method B, greater than 20 perms at 25 mils thick.
4. Minimum Tensile Strength: ASTM D412, 245 psi.
5. Minimum Elongation at Break: ASTM D412, 400 percent.
6. Water-Resistive Seal: Pass, in accordance with AAMA 714.
7. Allowable UV Exposure Time: Not less than nine months, when tested in accordance with ASTM G155 (accelerated weathering).
8. Low-Temperature Crack Bridging: ASTM C1305, no cracking at 25 mil thickness.
9. Water Penetration Resistance: No leakage at 15 psf when tested in accordance with ASTM E331.
10. Percent Solids: Greater than 90.
11. 99-percent recovery at 300-percent elongation in accordance with ASTM D412.
12. Nail Sealability: Pass, in accordance with ASTM D1970.

B. Sealant: ASTM C920.

1. Extension-Recovery/Adhesion per ASTM C736: 100 percent recovery.
2. Accelerated Weathering/Low Temperature Flexibility per ASTM C793: Pass.
3. VOC Percentage by Weight per ASTM C1250: Less than 2 percent.
4. VOC per ASTM C1250: Less than 30 g/L.

3. EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that substrates have cured and aged for minimum time recommended in writing by weather barrier manufacturer.
3. Verify that substrates are visibly dry and frost-free.
   a. Fluid-applied weather barrier may be applied to damp surfaces.
   b. Surfaces are considered damp if there is no visible water on the surface, and no transfer of water to the skin when touched.
   c. Apply accessory products only to clean and dry surfaces.
4. Verify that substrates are free of efflorescence and mold.
5. Verify that masonry joints are flush and filled with mortar.
6. Verify that top-of-wall system has been capped or covered to prevent water getting behind the facade and into wall cavity.
7. Verify continuous path for moisture drainage.
   a. Verify that continuous path for drainage is not blocked or disrupted, which results in excess moisture buildup in wall cavity.
8. Verify that surfaces to receive weather barrier are above grade.

B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation.

1. Verify that rough sill framing for doors and windows slopes downward towards the exterior and is level across width of opening.

C. Verify air and surface temperatures are above 25 deg F with a maximum surface temperature of 140 deg F. Do not install once ambient temperature exceeds 95 deg F, unless surface is shaded.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate in accordance with manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

D. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

F. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

G. When spraying is method of application, taper ends of the joint treatment to assist maintaining a wall system free of pinholes and voids.

H. Treat all non-moving transition joints to beams, columns, and dissimilar materials by applying a 2-inch- wide by 60-mil- thick coat of fluid-applied flashing across the joint.

I. Apply 25-mil- thick coat of fluid-applied flashing, extending a minimum 2 inches on each surface, and treat the following conditions:

1. Joints up to 1/4 inch.
2. Joints 1/4- to 1/2-inch; reinforce with fiberglass-mesh tape.
3. Joints and transitions up to 1 inch; treat using strip flashing.

J. Bridge isolation joints expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement in accordance with manufacturer's written instructions and details.

K. When spraying is method of application, taper ends of fluid applied corner treatment to wall substrate.

L. Treat inside and outside corners by applying a 25-mil- thick coat of fluid applied weather barrier a minimum 2 inches on each adjoining surface. Apply fillet bead of fluid-applied sealant to inside corners to ensure continuity. Alternatively, treat corners using strip flashing. Press strip flashing into inside corners; ensure that it is fully adhered to substrate.

M. Seal penetrations using fluid-applied flashing or sealant. Extend fillet bead 1/2 inch onto both surfaces.

N. Treat embedded masonry anchors by applying a coat of fluid-applied weather barrier or fluid-applied flashing around base of the anchor.

3.3 ACCESSORIES INSTALLATION

A. Install accessory materials in accordance with air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

1. Coordinate installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install transition strip on roofing membrane or base flashing, for a minimum 3 inches coverage over each substrate.
3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow to dry.
4. Use recommended primer when applying self-adhered flashing products on concrete, masonry, and fiber faced exterior gypsum board substrates. Priming is generally not required for adhering self-adhered flashing products to wood. However, adverse weather conditions or colder temperatures may require a primer to promote adhesion. Priming is not required when applying fluid-applied products, except on cut edges of exterior gypsum sheathing.
5. Apply pressure along entire surface of strip flashing for good bond using a J-roller or firm hand pressure. Remove all wrinkles and bubbles by smoothing surface and repositioning as necessary.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. When applying self-adhered flashing products over a cured fluid-applied membrane, first apply a wet bed of fluid-applied product.

D. Seal fasteners of mechanically attached supports or furring strips in high-performance building envelope designs.

1. Apply double-sided butyl tape to back of support bracket at fastener location.
2. Embed support bracket into an additional wet bed of fluid applied product.
3. Adhere butyl-based flashing patch to wall at fastener location.
4. Use alternate method as approved by the manufacturer.

E. At end of each working day, seal top edge of strips and transition strips to substrate with manufacturer-approved product.

F. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Flashing Sill Area for Windows and Doors:

1. Use 6-inch- wide conformable flashing for 2- by 4-inch framing and 9-inch- wide conformable flashing for 2- by 6-inch framing. When rigid back dams are required or desired, one option to use is a 3/4-inch corner guard (back dam), cut to length

of sill, and nailed into place on interior edge of sill prior to installation of 9-inch-wide conformable flashing. Afterward, install 9-inch- wide conformable flashing over sill and corner guard back dam.

2. Install without stretching conformable flashing when installing along sills or jambs. Conformable flashing is intended to be stretched when covering corners or curved sections.

H. Apply fluid-applied flashing products from head of opening down. Use a corner trowel to smooth corners.

I. Repairs:

1. Coat small damaged areas with layer of fluid-applied product.
2. Reinforce large damaged areas with fiberglass mesh or replace damaged substrate before reapplying fluid-applied product.

3.4 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply air-barrier material to form a seal with strips and transition strips, and to achieve a continuous air barrier in accordance with air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.

1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.
4. Fluid applied products may be overcoated once a touch-free skin has formed. Exterior insulation and cladding may be installed once the membrane has cured sufficiently to resist damage during installation.

B. Apply air barrier material in accordance with air-barrier manufacturer's written instructions and recommendations.

1. Roller Application:
   a. Nap rolling: Use a roller cover with a 1/2- to 3/4-inch nap.
2. Spray Application:
   a. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
   b. Use spray guard.
   c. Back Rolling: Use a roller cover with a 1/2- to 3/4-inch nap. Apply fluid-applied product in a single coat at 25 mils thick. Control thickness by applying appropriate volume over a marked area and spot checking with a wet-mil gauge.

C. Integrate fluid-applied product with through-wall flashing and window and door flashing by overlapping flashing with fluid-applied product a minimum 2 inches.

D. Inspect surfaces to ensure that fluid-applied products are continuous and free of any voids or pinholes.

E. Do not cover air barrier until it has been tested and inspected by the testing agency.

F. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.5 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

1. Allow fluid-applied product to cure for 14 days prior to performance testing.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements.

1. Continuity of air-barrier system has been achieved throughout the building envelope without gaps, holes, or pinholes.
2. Air-barrier dry film thickness.
3. Continuous structural support of air-barrier system provided.
4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
5. Site conditions for application, temperature, and dryness of substrates are maintained.
6. Maximum exposure time of materials to UV deterioration not exceeded.
7. Surfaces primed, where applicable.
8. Laps in strips and transition strips comply with minimum requirements, are shingled in correct direction (or mastic applied on exposed edges), and are without fishmouths.
9. Termination mastic applied on cut edges.
10. Strips and transition strips firmly adhered to substrate.
11. Compatible materials used.
12. Transitions at changes in direction and structural support at gaps provided.
13. Connections between assemblies (air-barrier and sealants) comply with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
14. Each penetration sealed.

C. Field Quality Control Testing: Perform the following test on representative areas of structural sealant glazed curtain walls .

1. Allow fluid-applied product to cure for 14 days prior to performance testing.
2. Air Infiltration Whole Building: ASTM E779 at not more than 0.25 cfm/sf at 1.57 lb/sq. ft..
3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article in Part 2, but not less than 6.24 lbf/sq. ft. . No water penetration shall occur as defined in ASTM E1105.

D. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, in accordance with manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. . Remove and replace deficient air-barrier components for retesting as specified above.

E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

F. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, in accordance with manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials in accordance with air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072800

SECTION 07 4113 - METAL ROOF PANELS

PART 1 - GENERAL REQUIREMENTS

1.1 SUMMARY:

A. Section Includes:

1. The extent of each type of preformed metal roofing panel as indicated on the drawings and by the provisions of this section. The scope of work includes, but shall not be limited to: preformed metal roof panels, flashing required to weatherproof the system (ridge, hip, valley, cleat, eave, rake wall, rake edge, apron, inside corner, outside corner, gutter, downspout, drip sill, end wall, and other miscellaneous flashing), related accessories necessary for attachment of the roofing system, all butyl tape and sealant used in conjunction with the roofing system, and necessary attachment hardware as required to meet the performance standards and complete the roofing enclosure as indicated by Contract Documents.
2. Painting of cast iron downspout boots

B. Related Requirements:

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 06 1516 Wood Roof Decking
3. Section 06 1600 Sheathing
4. Section 07 9200 Sealant
5. Section 09 9113 Exterior Painting – Downspout boots

1.2 REFERENCES:

A. American Iron and Steel Institute (AISI), Specification for the Design of Cold-Formed Steel Structural Members.

B. American Institute of Steel Construction (AISC) Manual of Steel Construction (Current Edition).

C. American Society for Testing and Materials (ASTM):

1. ASTM A792: Specification for Sheet Steel, Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
2. ASTM E283-91: Test Method for Rate of Air Leakage over Solid Substrate.
3. ASTM E331-93: Test Method for Rate of Water Penetration over Solid Substrate.
4. ASTM E1680-95: Test Method for Rate of Air Leakage over Open Framed Structure.
5. ASTM E1646-95: Test Method for Rate of Water Penetration over Open Framed Structure.

6. ASTM E1592-95: Standard Test Method for Structural Performance of Sheet Metal and Siding Systems by Uniform Static Air Pressure Difference.

D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

1. Architectural Sheet Metal Manual.

E. Underwriter's Laboratory (UL) Roofing Materials and Systems Directory:

1. Roofing Materials and Systems Directory listings and classifications of Underwriter's Laboratory roofing construction assemblies.

1.3 SYSTEM DESCRIPTION:

A. Design Requirements:

1. Continuous, one-piece, preformed, prefinished single length roof panels.
2. Panels, clips, and other components required for specific project conditions.
3. Manufacturer is responsible for providing evidence acceptable to Architect that manufacturer's specified roof system is capable of meeting thermal, wind uplift for 115 MPH wind speed, and performance requirements specified.

B. Thermal Movement:

1. Complete metal roofing and flashing system shall be capable of withstanding expansion and contraction of components caused by changes In temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.
2. Interface between panel and expansion clip shall provide for applicable thermal movement in each direction along longitudinal direction.

C. Performance Requirements:

1. Underwriter's Laboratories, Inc. (UL) Wind Uplift Resistance Classification for Roof Assembly shall be Class 90, as installed, pursuant to Construction Number (selected from available assemblies in technical section of architectural binder) 431, 431A, 432, 433, 498, 498A, or 498B as defined by UL 580. Certified statements from manufacturer without proper UL classification will not be acceptable.
2. Complete metal roof system shall have maximum static pressure air infiltration of 0.046 cfm / square foot with 1.57 psf air pressure differential when tested in accordance with ASTM E283-91 or 0.014 cfm / square foot with 1.57 psf air pressure differential when tested in accordance with ASTM E1680-95.
3. Complete metal roof system shall have no uncontrolled water penetration (dynamic water pressure), other than condensation, when exposed to dynamic rain at 6.24 psf differential static pressure when tested for not less than fifteen (15) minutes in duration in accordance with ASTM E331-93 or ASTM E1646-95.
4. Entire roofing system (metal panels, flashing, expansion joints, and penetrations), are to be detailed to provide watertight roof under peak weather conditions.

1.4 SUBMITTALS

A. Shop Drawings Submittals:

1. Manufacturer of the metal roof system shall provide complete shop drawings in accordance with the requirements specified in Section 01 3000.
2. Shop drawings must be submitted and returned as acceptable prior to the beginning of product production.

B. Product Data Submittals:

1. Submit manufacturer's detailed product literature including the system profile sheet, system description including: material base-sheet gauge, seam height, panel on-center, finish, and sealant as required.
2. Submit manufacturer's installation guidelines of the specified product.
3. Submit a sample of each type of roof panel, complete with factory finish. In the case where custom color is specified, send a custom color chip for written approval along with a standard color product sample for review.

C. Quality Control Submittals:

1. Submit shop drawings signed by a registered licensed engineer certifying the design of the roof system meets the specified performance criteria.

1.5 QUALITY ASSURANCE:

A. Qualification of installers:

1. Competent and skilled sheet metal applicators familiar with Dimensional Metals' products, standard details and recommendations. Applicator shall have at least two (2) years of experience applying these types of materials with successful completion of projects with similar scope and is an approved installer with company-issued documentation accordingly.
2. Installers shall be thoroughly trained and experienced in the necessary crafts and who are completely familiar with and comply to the recommendations and details of the manufacturer and the ―Architectural Sheet Metal Manual‖ published by SMACNA.
3. Installers shall follow the manufacturers’ installation details without exception an installation detail revision. Detail revision authorization must be made in advance of product installation.

B. Qualification of the product manufacturer:

1. Manufacturer shall be a company specializing in Architectural Sheet Metal Products with at least ten (10) years of experience. Being listed as a prequalified manufacturer does not release manufacturer from providing complete, current and acceptable test data for each performance, thermal, and wind load requirement specified for specific profile proposed.
2. Manufacturer shall operate a permanent, full-time, manufacturing facility where the metal roof panels are produced on fixed based multi-station roll forming machines

that are included in the Underwriter's Laboratory field inspection services. These facilities must be currently under inspection at least four times per year by Underwriter's Laboratory personnel to verify compliance that the products fabricated are in accordance with the specifications of the products which were originally tested. Portable on-site roll-formers may not be used unless roof panels exceed 90’ in length.

C. Pre-Installation Meeting: Conduct a pre-installation meeting a minimum of two weeks prior to commencing the Work of this Section.

1. Agenda shall include review of requirements and submittals for product and system, including surface preparation requirements specified under other sections, status of substrate work and preparation, compatibility of materials, special details and flashings, installation procedures, testing and inspection procedures, protection, and repairs.
2. Attendance by related trades is required.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver roof system components to project site in manufacturer's unopened original containers.

B. Protect roof system components during shipment, storage, handling and erection from mechanical abuse, stains, discoloration and corrosion.

C. Provide strippable plastic film on all painted surfaces between contact areas to prevent abrasion during shipping, storage and handling.

D. Store materials off the ground, providing for drainage, under protective cover which allows for air circulation and protection from foreign material contamination, mechanical damage, cement, lime, or other corrosive materials

E. Handle materials to prevent damage to surfaces, edges and ends of roofing components.

F. Damaged material shall be rejected and removed from site.

G. Examine materials upon delivery to jobsite. Reject and remove physically damaged, stained or marred material from project site.

H. Metal roof components with strippable film must not be stored with exposure to direct sunlight.

I. Stack material to prevent damage and allow for adequate ventilation and drainage.

1.7 SITE CONDITIONS

A. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for preformed metal roofing system.

B. Protection:

1. Provide protection or avoid traffic on completed roof surfaces.
2. Do not overload roof with stored materials.
3. Support no roof-mounted equipment directly on roofing system.

C. Determine that work of other trades which penetrates roof or is to be made watertight by roof is coordinated by location, in place, and accepted prior to installation of roofing system.

1.8 WARRANTIES

A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Standard Manufacturer Warranty: Provide a written No Dollar Limit warranty, signed by the roofing manufacturer agreeing to promptly repair leaks resulting from defects in materials or workmanship for the following warranty period:

1. Warranty Period: 20 Years from date of Substantial Completion.

C. Weathertightness Warranty: Provide manufacturer's written weathertightness warranty for a minimum of 20 years against leaks in roof panel arising out of or caused by ordinary wear and tear under normal weather and atmospheric conditions. Warranty shall be signed by both the roofing system manufacturer and the roofing system contractor.

D. Finish Warranty: Furnish panel manufacturer's written warranty for twenty (20) years covering the finish of exposed coated metal surfaces including but not limited to roof panels, counter flashings, gutters, downspouts, gutter splash guards, and trim flashings against blistering, peeling, cracking, flaking, checking, chipping, rusting, and chalking and color change during the warranty period.

E. Roofing Contractor Warranty: The roofing contractor will guarantee, from the date of Substantial Completion, at his cost and expense make or cause to make such repairs to the roof resulting from faults or defects in material or workmanship as necessary to maintain the roof in a watertight condition.

1. Guarantee shall include, but is not limited to, roof panels, flashing, roof insulation, fasteners, valleys, gutters, downspouts, trim flashings, and roof expansion joints.
2. Warranty period: 2 years from the date of Substantial Completion.
3. Repairs required, either permanent or temporary, to the roofing or roof flashing under this guarantee shall be made within 3 days after notice of the need for repair. Should the contractor fail to make such repairs within the time period, the Owner may have the repairs made and the cost paid by the Contractor.

PART 2 - PRODUCT

2.1 PRODUCTS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Dimensional Metals, Inc. Interlock IL2016 or comparable product by one of the following:

B. Manufacturer

1. Firestone Building Products, www.firestonebpco.com
2. MBCI, www.mbci.com
3. Metal Panel Systems, www.metalpanelsystems.com

C. Being listed as a manufacturer does not release the manufacturer from providing a similar product that meets the performance criteria as listed in this specification. It is the responsibility of the manufacturers to provide evidence of meeting the specification parameters.

2.2 SHEET MATERIALS

A. Prefinished base sheet material shall be 24 Gauge (.024") Galvalume Aluminum-Zinc Alloy Coated Steel Grade C meeting ASTM A792.

B. Finish shall be 70% Kynar® 500 or Hylar® 5000 Fluorocarbon coating, applied on a continuous coil coating line, with top side dry film thickness of I.I +/-.01 mil dry film thickness and on the reverse side a wash coat and primer of .04 +/- .01 mil total dry film thickness.

C. Finish color shall be Hemlock Green as manufactured by Dimensional Metals, Inc. Unless otherwise noted all products shall be of the same finish and color.

D. Strippable film shall be applied to the topside of the painted coil to protect the finish during fabrication, shipping and field handling. This strippable film must be removed during installation.

2.3 PREFORMED METAL ROOFING SYSTEM

A. Preformed Metal Panels: Basis of Design

1. System Name: Inter-Lock
2. Model Number: IL2016
3. Seam Height: 1.75 inch
4. Seam On-center: 16 inches

B. Standing seams shall incorporate a continuous engineered interlocking connection with concealed anchor clips that prevents the entrance of water passage (select for engineered snap-together panels). Or, standing seams shall incorporate a continuous mechanically seamed connection with concealed anchor clips that prevents the entrance of water passage (select for mechanically seamed panels).

C. Standing seams shall contain factory injected non-curing sealant that runs continuously throughout the panel length as job conditions dictate.

D. Panel clips shall be as recommended by the manufacturer to meet the performance criteria of this specification.

E. All exposed adjacent flashing shall be of the same material and finish as the roof panels.

F. Fasteners:

1. Exposed screw fasteners shall be 300 series alloy stainless steel with integrally bonded neoprene washers or Zinc Aluminum Cast head covers with integral neoprene gaskets.
2. Exposed pop rivets shall be stainless steel, rivet and mandrel, self- plugging type #44 - 1/8" diameter 1/4" grip range minimum. Exposed pop rivets shall be painted to match the metal roof system.
3. Concealed fasteners for anchor clips shall be # 10-13- 1” or # 10-16 – 1” long pancake head #2 Phillips drive screw as required to meet the performance criteria in this specification.
4. Concealed fasteners for flashing attachment shall be # 10-13- 1” or # 10-16- 1” long truss head #2 Phillips drive screw as required to meet the performance criteria in this specification.
5. There shall be no exposed fasteners except to fasten flashing at fixing points, or for panel attachment as dictated by warranty requirements for longitudinal thermal expansion and contraction, or as indicated on the shop drawings.

G. Closures:

1. Hip and ridge closures shall be factory fabricated from similar material to the roof panels. Hip and ridge closures shall be field cut to fit properly between the panel seams.

H. Sealant:

1. Factory-applied seam sealant shall be non-curing butyl designed for metal to metal connection in concealed joints, if specified.
2. Field applied sealant and/or butyl tape shall be as recommended by the manufacturer of the metal roof system.

I. Underlayment:

1. Ice and Water Shed: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; nominal total thickness of 40 mils; with strippable release paper and polyethylene sheet top surface.
2. Install approved polypropylene sheet material in 10 square rolls equal to the product listed, applied in shingle-like application in continuous coverage from eave to ridge per roof area with approved mechanical attachment procedures.

J. Snow guards: Prefabricated, non-corrosive units designed to be installed without penetrating roof panels, and complete with pre-drilled holes, clamps and anchors.

1. Seam-mounted, bar-type snow guards: Aluminum or stainless steel rods or bars held in place by stainless steel clamps attached to verticle ribs of standing seam metal roof panels.
2. Color: match roof panels
3. Locations: as shown on drawings.

2.4 FABRICATION

A. Panels shall be fabricated in permanent fabrication facilities in continuous lengths as required and indicated in paragraph 1.6.B. No horizontal end lap joints will be accepted, unless panels exceed 90' in length or jobsite conditions dictate.

B. Panel design shall incorporate concealed clips and fasteners. Exposed fasteners in roofing panels will not be accepted.

C. Standing seam design shall prevent water infiltration by utilizing a capillary break to prevent siphoning.

D. Fabricate roofing and related sheet metal work in accordance with approved shop drawings and applicable standards set forth in the Sheet Metal and Air Conditioning Contractors National Association - Architectural Sheet Metal Manual (2003 edition).

E. All roofing and sheet metal flashing shall be fabricated in minimum 10'-0" lengths except as noted otherwise. All flashing shall have a minimum ¾” hemmed edges in exposed locations. Provide field fabricated miters for components that change direction on the project.

F. All gutter to be in continuous lengths up to 50 feet per the listed product in this paragraph. Expansion joints are to be utilized so as not to have lapped gutter joints.

1. DMI CG70 – 6” Continuous Gutter

G. Snow guards:

1. Prefabricated, non-corrosive units designed to be installed without penetrating roof panels, and complete with pre-drilled holes, clamps and anchors.
2. Seam-mounted, bar-type snow guards: Aluminum or stainless steel rods or bars held in place by stainless steel clamps attached to vertical ribs of standing seam metal roof panels.
3. Color: match roof panels
4. Locations: as shown on drawings.

H. Downspout boots: Cast iron

1. Manufacturer:
2. Basis of Design - Neenah Foundry Company: Product R4929 straight www.nenahfoundry.com
3. Barry Pattern and Foundry, www.barrycraft.com
4. J.R. Hoe, www.jrhoe.com

5. Downspout boots shall be shop finished prior to installation. See Section 09 9113 Exterior Painting.

I. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, and splash guards of the same material, thickness, finish, and color as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Examine alignment and placement of building roof structure before proceeding with installation of preformed metal roofing.

B. Examine SIPS roof deck before starting installation. Deck must be clear, clean and smooth, free of depressions, waves, curling at joints, or projections, dry and must remain dry and free of ice and snow, after roofing application commences. Notify SIPS supplier of any deviations prior to the start of installation.

C. Field check dimensions and check support alignment with taut string or wire. Support misalignment may cause additional stresses in the panels and contribute to oil canning.

D. Do not proceed with installation until conditions are satisfactory. Notify the architect in writing of unsatisfactory conditions.

E. Underlayment Installation:

1. Verify that Underlayment has been installed over solid substrate.
2. Ensure underlayment is installed horizontally, starting at the eave working to the ridge with a 6" minimum overlap as described in paragraph 2.03.I.
3. Ensure that all fasteners are totally flush with the substrate.

3.2 INSTALLATION:

A. General Requirements:

1. Install roofing and flashing in accordance with approved shop drawings and manufacturer's product data, within specified tolerances.
2. Isolate dissimilar metals, masonry and concrete from metal roof system with bituminous coating.
3. Anchorage shall allow for thermal expansion and contraction without stress or elongation of panels, clips or anchors.
4. Coordinate flashing and sheet metal work to provide watertight conditions at roof terminations. Fabricate and install in accordance with standards set forth in the SMACNA Manual using continuous cleats at all exposed edges.

B. Underlayment:

1. Install proper protection to finished substrate to prevent moisture infiltration to roofing assembly prior to placement of panels. Cover complete roof area to receive metal roof panels with a self-adhered ice and water underlayment membrane or a combination of and self-adhered ice and water underlayment at the eaves, valleys, rake walls, rake edges, and around all penetrations as described in paragraph 2.03.1.

C. Preformed Metal Panels:

1. Fasten anchor clips with fasteners as recommended by the manufacturer as required to meet the performance criteria specified.
2. Install starter and edge trim before installing roof panels.
3. Remove strippable plastic film prior to installation of roof panels.
4. Erect metal roofing with lines, planes, rises and angles sharp and true, and plane surfaces free from objectionable warp, dents, buckle or other physical defects.
5. Do not allow traffic on completed roof.
6. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
7. Remove and replace any panels or flashing components that are damaged beyond successful repair.

D. Flashing:

1. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for installation work where the manufacturer's approved shop drawings do not define a specific detail.
2. Conceal fasteners and expansion provisions wherever possible.
3. Hem all exposed edges of sheet metal flashing that are exposed with at least 3/4” fold under.
4. Insert metal flashing into reglets, anchor with wedges and seal all joints.
5. Set sheet metal items level, true to line and plumb.
6. Secure all metal flashing to wood nailers with screws as indicated on the approved shop drawings.
7. Use cleats to keep flashing end laps closed when face width exceeds eight (8) inches.

3.3 FIELD QUALITY CONTROL

A. Tolerances:

1. Applicable erection tolerances: Maximum variation from true planes or lies shall be 1/4" in 20'-0" or 3/8" in 40'-0".
2. Metal roof systems cannot correct any previously installed support or wood nailer problems that do not meet the above tolerances.

B. Manufacturer's Field Service:

1. Manufacturer's representative shall inspect all Watertight Warranted projects during the installation of the metal roof system.

2. Inspections shall be scheduled as required by the manufacturer of the roofing system.
3. Two mandatory visits are required:
   a. Inspection of proper panel and flashing installation.
   b. Final inspection upon completion of the metal roof installation.
4. Upon final inspection a report will be issued to the installer of any discrepancies and requirements for additional work. If additional work required the manufacturer will provide another final inspection to verify acceptance of completed work.

3.4 CLEANING

A. Clean exposed surfaces of work promptly after completion of installation. To prevent rust from staining the painted finish, immediately remove filings produced by drilling or cutting.

B. Clean roof in accordance with manufacturer's recommendations.

C. Touch up minor abrasions and scratches in finish with manufacturer’s supplied Kynar® touch up paint.

D. Remove all scrap and construction debris from the site.

3.5 PROTECTION

A. Protect finished sheet metal components within 8 feet of finished grade from damage until Owner acceptance.

B. Protect painted cast iron downspout boots from damage during installation of concrete sidewalks.

END OF SECTION 07 4113

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Manufactured reglets.
   2. Formed low-slope roof sheet metal fabrications.

B. Related Requirements:
   1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following
   1. Underlayment materials.
   2. Elastomeric sealant.
   3. Butyl sealant.
   4. Epoxy seam sealer.

B. Shop Drawings: For sheet metal flashing and trim.
   1. Include plans, elevations, sections, and attachment details.
   2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
   3. Include identification of material, thickness, weight, and finish for each item and location in Project.
   4. Include details for forming, including profiles, shapes, seams, and dimensions.
   5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
   6. Include details of termination points and assemblies.
   7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
   8. Include details of roof-penetration flashing.
   9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
   10. Include details of special conditions.
   11. Include details of connections to adjoining work.
   12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches .

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
   1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested , shop shall be listed as able to fabricate required details as tested and approved.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
   1. Build mockup of typical roof edge eave , including fascia fascia trim apron flashing , approximately 10 feet long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner 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. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
   1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
   2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
      b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:

1. Design Pressure generated by winds speed upto 135 MPH .

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F , ambient; 180 deg F , material surfaces .

2.2 SHEET METALS

A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
   a. Color: As selected by Architect from full range of industry colors and color densities .
   b. Color Range: 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. Exposed Coil-Coated Finish:
   a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions
3. Color: As selected by Architect from manufacturer's full range .
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. ATAS International, Inc.
      b. Henry Company.
      c. Owens Corning.
      d. SDP Advanced Polymer Products Inc.
   2. Source Limitations: Obtain underlayment from single source from single manufacturer.
   3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

2.4 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners , solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
   1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
      b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
      c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
   2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
   3. Fasteners for Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

F. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Fry Reglet Corporation.
      b. Heckmann Building Products, Inc.
      c. Hohmann & Barnard, Inc.
   2. Source Limitations: Obtain reglets from single source from single manufacturer.
   3. Material: Stainless steel, 0.0188 inch thick .
   4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
   5. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
   6. Accessories:
      a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
      b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
   7. Finish: With manufacturer's standard color coating .

2.5 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
   1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
   2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
   3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
   4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
   5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:
   1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings

and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters:

1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
2. Fabricate in minimum 96-inch- long sections.
3. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard, but with thickness not less than twice the gutter thickness .
4. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
5. Gutter Profile: Match existingsize and profile in accordance with cited sheet metal standard.
6. Expansion Joints: Butt type with cover plate .
7. Gutters with Girth up to 15 Inches: Fabricate from the following materials:
   a. Aluminum: 0.040 inch thick.

B. Downspouts: Fabricate rectangular downspouts to match exisitng, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors . Shop fabricate elbows.

1. Fabricated Hanger Style: Fig. 1-35A in accordance with SMACNA's "Architectural Sheet Metal Manual."
2. Fabricate from the following materials:
   a. Aluminum: 0.024 inch thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing and Fascia Cap: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long sections. Furnish with 6-inch- wide, joint cover plates. Shop fabricate interior and exterior corners.
   1. Joint Style: Butted with expansion space and 6-inch- wide, concealed backup plate .
   2. Fabricate from the following materials:
      a. Aluminum: .032 inch thick.
B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.
   1. Coping Profile: [Fig. 3-4A] [Fig. 3-4B] [Fig. 3-4C] [Fig. 3-4D] [Fig. 3-4E] [Fig. 3-4F] [Fig. 3-4G] in accordance with SMACNA's "Architectural Sheet Metal Manual."
   2. Joint Style: Butted with expansion space and 6-inch- wide, concealed backup plate .
   3. Fabricate from the following materials:
      a. Aluminum: 0.032 inch thick.
      b. Galvanized Steel: 0.040 inch thick.
      c. Aluminum-Zinc Alloy-Coated Steel: thick.
C. Roof-to-Wall Transition Expansion-Joint Cover: Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.
   2. Stainless Steel: 0.0250 inch thick.
   3. Aluminum-Zinc Alloy-Coated Steel: 0.034 inch thick.
D. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
   1. Aluminum: 0.040 inch thick.
   2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
E. Counterflashing: Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.
   2. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.
F. Flashing Receivers: Fabricate from the following materials:
   1. Aluminum: 0.032 inch thick.
   2. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.
G. Roof-Penetration Flashing: Fabricate from the following materials:
   1. Stainless Steel: 0.0188 inch thick.
   2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:
   1. Galvanized Steel: 0.028 inch thick.
   2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
   1. Verify compliance with requirements for installation tolerances of substrates.
   2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
   3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering, High-Temperature Sheet Underlayment:
   1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
   2. Prime substrate if recommended by underlayment manufacturer.
   3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
   4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
   5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
   6. Roll laps and edges with roller.
   7. Cover underlayment within 14 days.
B. Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.
   1. Install in shingle fashion to shed water.
   2. Lapp joints not less than 4 inches.

3.3 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
   1. Install fasteners , solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
   3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
   4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
   5. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
   6. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
   7. Do not field cut sheet metal flashing and trim by torch.
   8. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
   1. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
   1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
   2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
   3. Use lapped expansion joints only where indicated on Drawings.
D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance .
E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
F. Seal joints as required for watertight construction.
   1. Use sealant-filled joints unless otherwise indicated.
      a. Form joints to completely conceal sealant.
      b. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
      c. Adjust setting proportionately for installation at higher ambient temperatures.
         1) Do not install sealant-type joints at temperatures below 40 deg F.
   2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.4 INSTALLATION OF ROOF-DRAINAGE SYSTEM

A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
B. Hanging Gutters:
   1. Join sections with joints sealed with sealant.
   2. Provide for thermal expansion.
   3. Attach gutters at eave or fascia to firmly anchor them in position.
   4. Provide end closures and seal watertight with sealant.
   5. Slope to downspouts 1/8" per foot.
   6. Fasten gutter spacers to front and back of gutter.
   7. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
   8. Anchor gutter with gutter brackets spaced not more than 24 inches apart to roof deck unless otherwise indicated, and loosely lock to front gutter bead.

9. Install gutter with expansion joints at locations not exceeding, 30 feet apart. Install expansion-joint caps.
10. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.

C. Downspouts:
1. Join sections with 1-1/2-inch telescoping joints.
2. Provide hangers with fasteners designed to hold downspouts securely to walls.
3. Locate hangers at top and bottom and at approximately 60 inches o.c.
4. Connect downspouts to underground drainage system.

D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated on Drawings. Lap joints minimum of 4 inches in direction of water flow.

3.5 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements , sheet metal manufacturer's written installation instructions, and cited sheet metal standard.
1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:
1. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches over base flashing.
3. Lap counterflashing joints minimum of 4 inches.
4. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.6 INSTALLATION OF WALL FLASHINGS

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.7 INSTALLATION OF MISCELLANEOUS FLASHING

A. Equipment Support Flashing:

1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
2. Weld or seal flashing with elastomeric sealant to equipment support member.

B. Overhead-Piping Safety Pans:
1. Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings.
2. Pipe and install drain line to plumbing waste or drainage system.

3.8 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.9 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
B. Clean and neutralize flux materials. Clean off excess solder.
C. Clean off excess sealants.

3.10 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
C. Maintain sheet metal flashing and trim in clean condition during construction.
D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

PART 4 - END OF SECTION 07 62 00

SECTION 07 9200 - JOINT SEALANTS

1. GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Non-sag, gunnable joint sealants.
2. Joint backings and accessories.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 08 8000 - Glazing: Glazing sealants and accessories.
3. Section 09 3000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.
4. Section 09 9113 – Exterior Painting – Anti-graffiti coating

1.2 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants

C. ASTM C1193 - Standard Guide for Use of Joint Sealants

D. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants

E. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
2. List of backing materials approved for use with the specific product.
3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
4. Substrates the product should not be used on.

C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

1.4 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Refer to the provisions of the contract, Division 01 and other Specification Sections that define the starting date and length of the warranty and correction periods, or that discuss either additional warranty requirements, or extended equipment warranties beyond the standard period.

C. Warranty: Provide five year warranty for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

2. PRODUCTS

2.1 MANUFACTURERS

A. Non-sag sealants:

1. BASF Construction Chemicals - Building Systems, www.buildingsystems.basf.com
2. Pecora Corporation, www.pecora.com
3. Tremco Global Sealants, www.tremcosealants.com
4. Sika Corporation, www.usa-sika.com

2.2 JOINT SEALANT APPLICATIONS

A. Scope:

1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
   a. Wall expansion and control joints.
   b. Joints between door, window, and other frames and adjacent construction.
   c. Joints between different exposed materials.
   d. Openings below ledge angles in masonry.
   e. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
   a. Joints between door, window, and other frames and adjacent construction.
   b. Other joints indicated below.
3. Do not seal the following types of joints.
   a. Intentional weepholes in masonry.
   b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.

c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
d. Joints where installation of sealant is specified in another section.
e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.

C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.

1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
2. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.

D. Interior Wet Areas: Bathrooms and restrooms; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.

E. Glue-laminated Construction:

1. Joints between glue-laminated beams and columns: Premium Acrylic/Latex

2.3 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 6116

2.4 NONSAG JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 50 percent, minimum.
2. Non-Staining to Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.

B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.

1. Color: White.

C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 25 percent, minimum.

D. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.

E. Premium Acrylic/Latex: Color to match glue-laminated beams and columns.

1. Conceal Textured Caulk – Sashco
2. Energy Seal – Perma-Chink
3. Check Mate 2 – Schroeder Log Home Supply

2.5 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
3. Open Cell: 40 to 50 percent larger in diameter than joint width.
4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

3. EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

E. Coordinate installation of joint sealant with the installation of the anti-graffiti coating.

3.3 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Non-sag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION 07 9200

SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Non-fire-rated hollow metal doors and frames.
2. Thermally insulated hollow metal doors with frames.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 08 7100 - Door Hardware.
3. Section 09 9113 - Exterior Painting: Field painting.
4. Section 09 9123 - Interior Painting: Field painting.

1.2 ABBREVIATIONS AND ACRONYMS

A. ANSI - American National Standards Institute.

B. ASCE - American Society of Civil Engineers.

C. HMMA - Hollow Metal Manufacturers Association.

D. NAAMM - National Association of Architectural Metal Manufacturers.

E. SDI - Steel Door Institute.

F. UL - Underwriters Laboratories.

1.3 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design

B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames

C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100)

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength

I. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames

J. ICC A117.1 - Accessible and Usable Buildings and Facilities

K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames

L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Hollow Metal Doors and Frames:

1. Ceco Door
2. Curries
3. Republic Doors
4. Steelcraft

2.2 DESIGN CRITERIA

A. Requirements for Hollow Metal Doors and Frames:

1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
2. Accessibility: Comply with ICC A117.1 and ADA Standards.

3. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
4. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
   a. Based on NAAMM HMMA Custom Guidelines: Provide at least A25/ZF75 (galvannealed) for interior applications, and at least A60/ZF180 (galvannealed) or G60/Z180 (galvanized) for corrosive locations.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 HOLLOW METAL DOORS

A. Door Finish: Factory finished.

B. Exterior Doors: Thermally insulated.

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
   a. Level 2 - Heavy-duty.
   b. Model 1 - Full Flush.
   c. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
   d. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
2. Door Thermal Resistance: R-Value of 6.0 minimum, for installed thickness of polystyrene.
3. Door Thickness: 1-3/4 inch, nominal.
4. Door Face Sheets: Flush.

C. Interior Doors, Non-Fire Rated:

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
   a. Level 2 – Heavy-duty.
   b. Model 1 - Full Flush.
   c. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
2. Door Thickness: 1-3/4 inch, nominal.
3. Door Face Sheets: Flush.

2.4 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Exterior Door Frames: Full profile/continuously welded type.

1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
3. Frame Finish: Factory primed and field finished.
4. Weatherstripping: Separate, see Section 08 7100

C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.

1. Terminated Stops: Provide at interior doors; closed end stop terminated 6-inch, maximum, above floor at 45 degree angle.
2. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.

2.5 ACCESSORIES

A. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.

B. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

2.6 FABRICATION

A. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

B. Hollow-Metal Doors:

1. Top and bottom caps to be 20 ga. (0.0375”) galvannealed steel channel welded to door
2. Edge seams – welded and dressed smooth prior to applying factory primer.
3. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
3. Jamb Anchors: Provide number and spacing of anchors as follows:
   a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
      1) Two anchors per jamb up to 60 inches high.
      2) Three anchors per jamb from 60 to 90 inches high.
      3) Four anchors per jamb from 90 to 120 inches high.

4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.

4. Door Silencers: Drill stops to receive door silencers.

a. Single-Door Frames: Three door silencers.

D. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware according to the Door Hardware Schedule and templates furnished as specified in Section 08 7100 Door Hardware.

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
3. Provide loose stops and moldings on inside of hollow-metal work.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.7 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10 , door manufacturer's standard.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.2 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Coordinate frame anchor placement with wall construction.

C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

D. Install door hardware as specified in Section 08 7100

E. Touch up damaged factory finishes.

3.3 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.4 SCHEDULE

A. Refer to Door and Frame Schedule on drawings.

END OF SECTION 08 1113

SECTION 08 1116 - ALUMINUM DOORS AND FRAMES

PART 5 - GENERAL

5.1 SUMMARY

A. Work of this section includes the following:

1. Glazed aluminum doors.
2. Aluminum frames.
3. Glazing.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 08 7100 - Door Hardware: Hardware for aluminum doors.
3. Section 08 8000 - Glazing: Glazing materials for aluminum doors and frames.

5.2 REFERENCE STANDARDS

A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document)

B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum

C. AAMA 701/702 - Combined Voluntary Specifications for Pile Weatherstrip and Replaceable Fenestration Weatherseals

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

5.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's descriptive literature for each type of door; include information on fabrication methods.

C. Shop Drawings: Include elevations of each opening type.

D. Selection Samples: Complete set of color and finish options, using actual materials, for Architect's selection.

E. Manufacturer's Qualification Statement.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

5.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than five years of documented experience.

5.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver aluminum components in manufacturer's standard protective packaging, palleted, crated, or banded together.

B. Inspect delivered components for damage and replace. Repaired components will not be accepted.

C. Store components in clean, dry, indoor area, under cover in manufacturer's packaging until installation.

D. Protect materials and finish from damage during handling and installation.

5.6 FIELD CONDITIONS

A. Do not begin installation of interior aluminum components until space has been enclosed and ambient thermal conditions are being maintained at levels consistent with final project requirements.

5.7 WARRANTY

A. Refer to the provisions of the contract, Division 01 and other Specification Sections that define the starting date and length of the warranty and correction periods, or that discuss either additional warranty requirements, or extended equipment warranties beyond the standard period.

B. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

C. Provide five year warranty on aluminum doors and frames.

PART 6 - PRODUCTS

6.1 MANUFACTURERS

A. Glazed Aluminum Doors:

1. EFCO Corporation; Series 406, Thermal Storefront Framing: www.efcocorp.com/sle

2. YKK AP America Inc; www.ykkap.com.
3. Kawneer Company, Inc.; Tri-fab 451T: www.kawneer.com

B. Aluminum Frames:

1. EFCO Corporation; Series 406, Thermal Storefront Framing: www.efcocorp.com/sle
2. YKK AP America Inc; www.ykkap.com.
3. Kawneer Company, Inc.; Tri-fab 451T: www.kawneer.com

6.2 DOORS AND FRAMES

A. Glazed Aluminum Doors: Extruded aluminum tube frame, full glazed, without middle rail; factory glazed.

1. Thickness: 1-3/4 inches, nominal.
2. Stile Width: 5 inches, nominal.
3. Finish: Class I – Dark Bronze anodized.
4. Texture: Smooth.
5. Glazing, Exterior Doors: Sealed insulating units, 1 inch thick, made of clear 1/4 inch (6 mm) thick fully tempered glass.

B. Aluminum Frames for Doors, Sidelights, and/or Transoms: Extruded aluminum, front-set (exterior) style, non-thermally broken hollow or C-shaped sections; no steel components.

1. Frame Depth: 4-1/4 inches.
2. Finish: Same as doors.
3. Weatherstripping: Replaceable pile type; at jambs and head.
4. Sidelight/Transom Glazing: Sealed insulating glass units, 1 inch overall thickness, with two panes of clear 1/4 inch thick fully tempered glass.

C. Dimensions and Shapes: As indicated on drawings; dimensions shown are nominal.

1. Provide the following clearances:
   a. Hinge and Lock Stiles: 1/8 inch.
   b. Between Meeting Stiles: 1/4 inch.
   c. At Top Rail and Bottom Rail: 1/8 inch.

6.3 COMPONENTS

A. Tubular Doors: Extruded aluminum tubing, 1/8 inch minimum thickness, with heavy-duty plated steel through bolts in rails, glazing stops, and glazing gaskets.

B. Frames: Extruded aluminum shapes, not less than 0.062 inch thick, reinforced at hinge and strike locations.

1. Corner Brackets: Extruded aluminum, fastened with stainless steel screws.
2. Trim: Extruded aluminum, not less than 0.062 inch thick, removable snap-in type without exposed fasteners.

C. Door Hardware: Refer to Section 08 7100 for additional requirements.

6.4 FINISHES

A. Class I Color Anodized Finish: Electrolytically deposited colored anodic coating; AAMA 611 AA-M12C22A44, minimum dry film thickness 0.7 mils (0.018 mm).

6.5 ACCESSORIES

A. Replaceable Weatherstripping: AAMA 701/702 wool pile.

B. Fasteners: Aluminum, non-magnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.

C. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, non-magnetic stainless steel or steel hot-dip galvanized in compliance with ASTM A123/A123M.

D. Bituminous Coating: Cold-applied asphaltic mastic, compounded for 30-mil (0.76 mm) thickness per coat.

PART 7 - EXECUTION

7.1 EXAMINATION

A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.

7.2 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings.

B. Set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with manufacturer's recommendations and within specified tolerances.

C. Where aluminum surfaces contact metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact by painting dissimilar metal with heavy coating of bituminous paint.

D. Hang doors and adjust hardware to achieve specified clearances and proper door operation.

7.3 CLEANING

A. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609 & 610.

B. Do not use abrasive, caustic, or acid cleaning agents.

7.4 PROTECTION

A. Protect products of this section from damage caused by subsequent construction until Date of Substantial Completion.

B. Replace damaged or defective components that cannot be repaired to a condition indistinguishable from undamaged components.

END OF SECTION 08 1116

SECTION 08 3100 - ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Ceiling mounted concealed ladder units.
2. Wall mounted access door and frame units.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.

1.2 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of each access door and/or panel unit.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 CEILING MOUNTED CONCEALED LADDER UNITS

A. Manufacturers:

1. Fakro America LLC, http://www.fakrousa.com/
   a. Modal: LML LUX metal folding ladders with safety railing
2. Precision Ladders LLC, http://www.precisionladders.com
   a. Model: Super Simplex Disappearing Stairway metal folding ladder with safety railing
3. Werner Co., www.wernerco.com
   a. Model: AE2210 metal folding ladder with safety railing

2.2 WALL-MOUNTED UNITS

A. Manufacturers:

1. Babcock-Davis; www.babcockdavis.com Model: BHS
2. ACUDOR Products Inc: www.acudor.com. Model: SD-6000
3. Cendrex, Inc: www.cendrex.com. Model: PHS

B. Fabrication: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.

1. Style: Exposed frame with door surface flush with frame surface.
2. Door Style: Single thickness with rolled or turned in edges.
3. Heavy Duty Frames: 10 gage, minimum thickness.
4. Heavy Duty Single Steel Sheet Door Panels: 10 gage, minimum thickness.
5. Steel Finish: Primed.
6. Door/Panel Size: 18” x 18”
7. Latch/Lock: Rim cylinder to match building master key

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION 08 3100

SECTION 08 4313 - ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Aluminum-framed storefront, with vision glass.
2. Aluminum windows.

B. Related Requirements

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.
3. Section 08 8000 - Glazing: Glass and glazing accessories.

1.2 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site

B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document)

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)

1.3 SUBMITTALS

A. See Division 1 specification sections for submittal procedures.

B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

C. Samples: Submit two samples 8 inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.

D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.5 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.6 WARRANTY

A. See Division 1 specification sections for additional warranty requirements.

B. Refer to the provisions of the contract, Division 01 and other Specification Sections that define the starting date and length of the warranty and correction periods, or that discuss either additional warranty requirements, or extended equipment warranties beyond the standard period.

C. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 - PRODUCTS

2.1 FRAMING FOR INSULATING GLAZING

A. Front-Set (exterior) Style, Thermally-Broken:

1. EFCO Corporation; Series 406, Thermal Storefront Framing: www.efcocorp.com/sle
2. YKK AP America Inc.; www.ykkap.com.
3. Kawneer Company, Inc.; Tri-fab 451T: www.kawneer.com

2.2 STOREFRONT AND WINDOWS

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.

1. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
2. Glazing Rabbet: For 1 inch insulating glazing.
3. Finish: Class I color anodized.
   a. Factory finish all surfaces that will be exposed in completed assemblies.
4. Finish Color: Dark Bronze anodized.

5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
11. Sill Flashing: Minimum 24GA aluminum anodized to match storefront.

2.3 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.

1. Glazing Stops: Flush.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Fasteners: Stainless steel.

C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

D. Aluminum Sill Flashing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.2 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.5 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 08 4313

SECTION 08 7100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Automatic operators.

C. Related Sections:

1. Division 08 Section “Door Hardware Schedule”.
2. Division 08 Section “Hollow Metal Doors and Frames”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. UL/ULC and CSA C22.2 – Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
8. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.2 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams.

Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:
   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.
   h. Warranty information for each product.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

D. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.3 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

E. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

F. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

G. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.6 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Twenty five years for manual surface door closer bodies.

1.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

C. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

2.2 HANGING DEVICES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Acceptable Manufacturers:
   a. McKinney Products (MK).
   b. Pemko Manufacturing (PE).
   c. Stanley Hardware (ST).

2.3 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
5. Acceptable Manufacturers:
   a. Hiawatha, Inc. (HI).
   b. Rockwood Manufacturing (RO).
   c. Trimco (TC).

2.4 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified patented cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer’s United States patents. Cylinders are to be factory keyed.

1. Acceptable Manufacturers:
   a. Medeco (MC) - X4 Series.
   b. Sargent Manufacturing (SA) - XC Series.
   c. Stanley Best (BE) - MX8 Series.

E. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified patented cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer’s United States patents.

1. Acceptable Manufacturers:
   a. Per ODOT requirements, match I/C core manufacturer.

F. Keying System: Each type of lock and cylinders to be factory keyed.

1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

G. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

H. Construction Keying: Provide construction master keyed cylinders.

I. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

J. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Acceptable Manufacturers:
   a. Lund Equipment (LU).
   b. MMF Industries (MM).
   c. Telkee (TK).

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Acceptable Manufacturers:
   a. Corbin Russwin Hardware (RU) – ML2000 Series.
   b. Sargent Manufacturing (SA) – 8200 Series.
   c. Stanley Best (BE) – 40H Series.

2.6 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Acceptable Manufacturers:
   a. Corbin Russwin Hardware (RU) - DL4100 Series.
   b. Sargent Manufacturing (SA) - 4870 Series.
   c. Stanley Best (BE) - 48H Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.8 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper

installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Acceptable Manufacturers:
   a. LCN Closers (LC) - 4040 Series.
   b. Sargent Manufacturing (SA) - 351 Series.
   c. Norton Door Controls (NO) - 7500 Series.

2.9 ELECTROHYDRAULIC DOOR OPERATORS

A. General: Provide low energy operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.

B. Standard: Certified ANSI/BHMA A156.19.

C. Performance Requirements:

1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.

D. Configuration: Surface mounted or in-ground as required. Door operators to control single swinging and pair of swinging doors.

E. Certification: Furnish Operators with GreenCircle Certification.

F. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19. When not in automatic mode, door operator to function as manual door closer with fully adjustable opening and closing forces, with or without electrical power.

G. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.

H. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.

I. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.

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

1. LCN Closers (LC) - 4640 Series.
2. Norton Door Controls (NO) - 6000 Series.
3. Stanley Security Solutions (ST) – D-4990 Series.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
   a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Acceptable Manufacturers:
   a. Hiawatha, Inc. (HI).
   b. Rockwood Manufacturing (RO).
   c. Trimco (TC).

2.11 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:
   a. Hiawatha, Inc. (HI).
   b. Rockwood Manufacturing (RO).

c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Acceptable Manufacturers:
2. Glynn Johnson (GJ).
3. Rixson Door Controls (RF).
4. Sargent Manufacturing (SA).

2.12 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

D. Acceptable Manufacturers:

1. National Guard Products (NG).
2. Pemko Manufacturing (PE).
3. Reese Enterprises, Inc. (RE).

2.13 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

D. Antimicrobial Finishes: Where specified, finishes on locksets, latchsets, exit devices and push/pull trim to incorporate an FDA recognized. Silver Ion, antimicrobial coating (MicroShield™) listed for use on equipment as a suppressant to the growth and spread of a broad range of bacteria, algae, fungus, mold and mildew.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 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.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect 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 and functionality.

1. PE - Pemko
2. AD - Adams Rite
3. RU - CorbinRusswin
4. MC - Medeco
5. RO - Rockwood
6. RF - Rixson
7. NO - Norton

END OF SECTION 08 7100

SECTION 08 8000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Adjust list below to suit Project.
2. Single and dual pane units for interior and exterior storefront systems
3. Single pane glass for entry doors.

B. Related Sections:

1. Section 08 1116 Aluminum Doors and Frames
2. Section 08 4313 Aluminum-framed Storefront

C. Work Not Included:

1. Section 07 9200 Joint Sealant

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions.

C. Thermal Movements: Provide glazing that allows for thermal movements.

1.3 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.4 QUALITY ASSURANCE

A. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

B. Glazing Publications: Comply with recommendations of the following unless more stringent requirements are indicated.

1. GANA Publications: "Glazing Manual”

1.5 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Refer to the provisions of the contract, Division 01 and other Specification Sections that define the starting date and length of the warranty and correction periods, or that discuss either additional warranty requirements, or extended equipment warranties beyond the standard period.

C. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

A. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
2. For uncoated glass, comply with requirements for Condition A.
3. Provide Kind FT (fully tempered) float glass in place of annealed float glass where indicated on the drawings.

B. Low-e Coated Clear Glass:

1. Glass shall have a low-e coating sputter applied to the number 2 surface
2. Basis of Design: PPG Solarban 60
3. Comparable Products:
   a. Guardian Glass
   b. Viracon

C. Textured Glass: Interior pane of insulated units for window Type W1 to be:

1. Basis of Design - Bendheim Glass Co. - Low-Iron Solar Textured Architectural
2. Comparable Products:
   a. Pilkington
   b. Oldcastle

2.2 INSULATING-GLASS UNITS

A. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units.

1. Sealing System: Dual seal.
2. Spacer Specifications: Manufacturer's standard spacer material and construction.

2.3 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:

1. Neoprene, ASTM C 864.
2. EPDM, ASTM C 864.
3. Silicone, ASTM C 1115.
4. Thermoplastic polyolefin rubber, ASTM C 1115.
5. Any material indicated above.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

1. Neoprene.
2. EPDM.
3. Silicone.
4. Thermoplastic polyolefin rubber.
5. Any material indicated above.

2.4 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: Clear

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Single-Component Neutral-Curing Silicone Glazing Sealants
   a. Type and Grade: S (single component) and NS (non-sag).
   b. Class: 25.
   c. Use Related to Exposure: NT (nontraffic).
   d. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
   e. Applications: for joints between glass panels, and between glass panel and veneer plaster wall construction

2.5 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze 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 standard, to comply with system performance requirements.

B. All exposed edges of glass panels are to be polished.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of 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: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

PART 3 - EXECUTION

3.1 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.

1. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
2. Protect glass edges from damage during handling and installation. Remove glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance from Project site and legally dispose of off Project site.
3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by sealant compatibility and adhesion testing.
4. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
5. Provide spacers for glass lites where the length plus width is larger than 50 inches unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances.

B. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

1. 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.
2. 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 by gasket manufacturer.
3. Install gaskets so they protrude past face of glazing stops.

3.2 CLEANING AND PROTECTION

A. Protect glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

3.3 INSULATING GLASS TYPES

A. Glass Type 1: Low-e-coated, clear/clear insulating glass unit. (Window Types W1, W2, W3, Storefront Glass)

1. Overall Unit Thickness: 1 inch
2. Thickness of Each Glass Lite: 6.0 mm.
3. Air Space: 1/2 inch
4. Outdoor Lite: Class 1 (clear) float glass with Low-e coating.
   a. Kind FT (fully tempered) where indicated on the drawings.
5. Interspace Content: Air.(Argon)
6. Indoor Lite: Class 1 (clear) float glass.
   a. Kind FT (fully tempered) where indicated on the drawings.
7. Low-E Coating: Sputtered on #2 surface.
8. Visible Light Transmittance: 68 percent minimum.
9. Outdoor Visible Light Reflectance: 11%
10. Indoor Visible Light Reflectance: 12%
11. Solar Heat Gain Coefficient: 0.38
12. Shading Coefficient: 0.43
13. Winter Nighttime U-Value: 0.293 Btu/hr x sf x degree F maximum.
14. Summer Daytime U-Value: 0.275 Btu/hr x sf x degree F maximum.
15. Light to Solar Gain Ratio: 1.80

B. Glass Type 2: Low-e-coated, clear/textured insulating glass unit. (Window Type W4)

1. Overall Unit Thickness: 1 inch
2. Thickness of Each Glass Lite: 6.0 mm.
3. Air Space: 1/2 inch
4. Outdoor Lite: Class 1 (clear) float glass with Low-e coating.
   a. Kind FT (fully tempered) where indicated on the drawings.
5. Interspace Content: Air (Argon).
6. Indoor Lite: Textured glass.
7. Low-E Coating: Sputtered on #2 surface.
8. Visible Light Transmittance: 68 percent minimum.
9. Outdoor Visible Light Reflectance: 11%
10. Indoor Visible Light Reflectance: 12%
11. Solar Heat Gain Coefficient: 0.37
12. Shading Coefficient: 0.43
13. Winter Nighttime U-Value: 0.245 Btu/hr x sf x degree F maximum.
14. Summer Daytime U-Value: 0.220 Btu/hr x sf x degree F maximum.
15. Light to Solar Gain Ratio: 1.82

3.4 MONOLITHIC GLASS TYPES

A. Glass Type 3: Entrance doors

1. Indoor Lite: Class 1 (clear) float glass.
   a. Thickness: 6.0 mm.
   b. Kind FT (fully tempered) where indicated on the drawings.

END OF SECTION 08 8000

SECTION 09 2116 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Metal stud wall framing.
2. Metal channel ceiling framing.
3. Cementitious backing board.
4. Gypsum wallboard.
5. Joint treatment and accessories.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
3. Section 09 3000 - Tiling: Tile backing board.

1.2 REFERENCE STANDARDS

A. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units

B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board

C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members

D. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

E. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board

F. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

G. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

H. ASTM C1396/C1396M - Standard Specification for Gypsum Board

I. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels

J. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

K. GA-216 - Application and Finishing of Gypsum Board

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.2 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:

1. Clark Dietrich Building Systems LLC: www.clarkdietrich.com
2. Marino-Ware: www.marinoware.com.
3. MBA Metal Framing: www.mbastuds.com

B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.

1. Studs: 16 gage "C" shaped with flat or formed webs with knurled faces.
2. Runners: 14 gage U shaped, sized to match studs.
3. Ceiling Channels: 14 gage C-shaped.

C. Load Bearing Framing System Components: See Section 05 4000 Cold-Formed Metal Framing.

D. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

2.3 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:

1. CertainTeed Corporation: www.certainteed.com
2. Continental Building Products: www.continental-bp.com

3. Georgia-Pacific Gypsum: www.gpgypsum.com
4. National Gypsum: www.nationalgypsum.com
5. USG Corporation: www.usg.com

B. Gypsum Wallboard - Impact Resistant Wallboard:

1. Application: All vertical surfaces and ceilings.
2. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
3. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
4. Hard Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
6. Type: Fire resistance rated Type X, UL or WH listed.
7. Thickness: 5/8 inch.
8. Edges: Tapered.

2.4 ACCESSORIES

A. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.

1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
2. Ready-mixed vinyl-based joint compound.

B. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

C. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

D. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

E. Sound attenuation batts: ASTMC665 Type I, unfaced.

2.5 TRIM ACCESSORIES

A. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet

B. Interior Trim: ASTM C 1047.

1. Cornerbead: Use at outside corners; 1-1/4 x 1-1/4”
2. Expansion (Control) Joint: Use where indicated or 30’ OC max

3. Vinyl J-Trim
   a. Clark-Dietrich – Rip-Bead Muddable J-Bead
   b. Marino-Ware – L-Tear Strip
   c. Plastic Components – Trim Tab

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.2 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.

   1. Level ceiling system to a tolerance of 1/1200.
   2. Laterally brace entire suspension system.

C. Studs: Space studs at 16 inches on center.

   1. Extend partition framing to structure where indicated and to ceiling in other locations.
   2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
   3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.

3.3 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

3.4 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:

   1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

1. Feather coats of joint compound so that camber is maximum 1/32 inch.

D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.5 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION 09 2116

SECTION 09 3000 - TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Tile for wall applications.
2. Cementitious backer board as tile substrate.
3. Non-ceramic trim.
4. Anti-fracture Membrane

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 07 9200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
3. Section 09 2116 - Gypsum Board Assemblies: Tile backer board.

1.2 REFERENCE STANDARDS

A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium)

B. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar

C. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar

D. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement.

E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive.

F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.

G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy.

H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout.

I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout.

J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework.

K. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units.

L. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone.

M. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.

N. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units.

O. ANSI A137.1 - American National Standard Specifications for Ceramic Tile.

P. ANSI A137.2 - American National Standard Specifications for Glass Tile.

Q. ASTM C373 - Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products, Ceramic Tiles, and Glass Tiles.

R. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a pre-installation meeting one week before starting work of this section; require attendance by all affected installers.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Samples: Mount tile and apply grout on two plywood panels, minimum 26 by 40 inches in size illustrating pattern, color variations, and grout joint size variations.

D. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

1.5 QUALITY ASSURANCE

A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.7 FIELD CONDITIONS

A. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 - PRODUCTS

2.1 TILE

A. Tile - Basis of Design: Subject to compliance with requirements, provide tile products as manufactured by Dal-Tile (www.daltile.com) or comparable product by one of the following:

1. American Olean Corporation: www.americanolean.com
2. Crossville, Inc. Tile; www.crossvilleinc.com

B. WT-1, WT-3 Porcelain Tile: ANSI A137.1, standard grade.

1. Dal-Tile Corporation: "Ayers Rock"
2. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
3. Size: 6 1/2 by 6 1/2 inch, 13 by 13 inch, 12 by 24 inch and 20 by 20 inch, nominal, as noted on the drawing
4. Thickness: 3/8 inch.
5. Surface Finish: Matte glazed.
6. Edges: Rectified, Square.
7. Color(s): Rustic Remnant AY05
8. Grout Color: TEC Summer Wheat

C. WT-2 Mosaic Tile: ANSI A137.2, standard grade.

1. Dal-Tile Corporation: Coastal Keystones
2. Miniature Mosaic Tiles:
   a. Size and Shape: 1-inch by 1-inch mosaic, nominal, tiles on 12 by 12 inch, nominal, paper-face mounted.
   b. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
3. Edges: Pressed
4. Color: Treasure Island CK90
5. Grout Color: TEC Summer Wheat

D. WT-4 Mosaic Tile: ANSI A137.2, standard grade.

1. Dal-Tile Corporation: Modern Linear Beige MT-61
2. Size and Shape: 12 inch x 24 inch
3. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
4. Edges: Rectified, Square.
5. Grout Color: TEC 988 Pearl

2.2 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: Satin natural anodized extruded aluminum, style, and dimensions to suit application, for setting using tile mortar or adhesive.

1. Applications:
   a. Open edges of wall tile (top edge of cove base).
   b. Bullnose outside wall corners.

2.3 GROUT AND SETTING MATERIALS

A. Basis of Design: Subject to compliance with requirements, provide grout and setting products as manufactured by TEC Specialty Products Inc or comparable product by one of the following:

1. Bonsal, W. R., Company.
2. Custom Building Products
3. LATICRETE International Inc.
4. MAPEI Corporation.

B. Retain setting and grouting materials below as required for installation methods selected; delete others.

C. Modified Dry-Set Cement Mortar ANSI A118.15.

D. Epoxy Tile Grout: ANSI A118.3, color as scheduled.

1. Chemical resistant and water-cleanable epoxy grout

2.4 MISCELLANEOUS MATERIALS

A. Basis of Design: Subject to compliance with requirements, provide grout and setting products as manufactured by Laticrete International-Hydro Ban or comparable product by one of the following:

1. Bonsal, W. R., Company.
2. Custom Building Products
3. MAPEI Corporation.

B. Waterproofing Membrane: Material complying with ANSI A118.10

1. Type: Fluid-applied.
2. Thickness: 20 mils, maximum.
3. Crack Resistance: No failure at 1/16 inch gap, minimum.
4. Products:
   a. Custom Building Products; Fracture Free Crack Prevention Membrane
   b. LATICRETE International, Inc; LATICRETE Blue 92 Anti-Fracture Membrane
   c. Merkrete, by Parex USA, Inc; Merkrete Fracture Guard
   d. Proflex Products, Inc; Maxxim Sim-40

2.5 ACCESSORY MATERIALS

A. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.3 INSTALLATION - GENERAL

A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings. Pattern based on Daltile Hopscotch pattern. Provide matching pattern if tile product provided other than Daltile.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install non-ceramic trim in accordance with manufacturer's instructions.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep control and expansion joints free of mortar, grout, and adhesive.

I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.4 INSTALLATION - WALL TILE

A. On walls with SIPS substrate, install in accordance with TCNA (HB) Method W244, thin-set over cementitious backer units, with waterproofing membrane.

B. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

C. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.5 CLEANING

A. Clean tile and grout surfaces.

END OF SECTION 09 3000

SECTION 09 6513.13 - RESILIENT BASE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Resilient wall base

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

1.3 PROJECT CONDITIONS

A. Maintain 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 time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After post-installation period, maintain 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 covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install resilient products after other finishing operations, including painting, have been completed.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish 1 box of each type, color, and pattern of floor tile installed.
2. Resilient Wall Base: Furnish not less than 10 lf of each type and color of base installed.

PART 2 - PRODUCTS

2.1 RESILIENT WALL BASE

A. Resilient Wall Base: ASTM F 1861 Type TS (rubber, vulcanized thermoset); Group I (solid);

1. Manufacturers: Subject to compliance with requirements, provide one of the following:
   a. Tarkett – Johnsonite Basis of Design
   b. Burke Flooring Products
   c. Munson Rubber Co.
   d. Roppe Corp.
2. Properties:
   a. Minimum Thickness: 0.125 inch.
   b. Height: 4 inches.
   c. Lengths: Coils in manufacturer's standard length.
   d. Outside Corners: Job formed.
   e. Inside Corners: Job formed.
   f. Surface: Smooth.
   g. Type: Straight and coved
3. Products:
   a. Traditional Vinyl

2.2 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.

B. 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.

C. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

1. Do not install resilient products until they are same temperature as space where they are to be installed.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts,

carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CLEANING AND PROTECTION

A. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

END OF SECTION 09 6513.13

SECTION 09 9113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Surface preparation.
2. Field application of paints, stains, and varnishes.
3. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
4. Do Not Paint or Finish the Following Items:
   a. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   b. Items indicated to receive other finishes.
   c. Items indicated to remain unfinished.
   d. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   e. Floors, unless specifically indicated.
   f. Glass.
   g. Concealed pipes, ducts, and conduits.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 09 9123 - Interior Painting.

1.2 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications

B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47).

3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

C. Samples:

1. Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified. Where sheen is specified, submit samples in only that sheen.
2. Submit maximum 12”x12” of anti-graffiti coating on each proposed substrate to receive coating to be used as a test panel to test anti-graffiti properties.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.5 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for exterior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer, no exceptions.

B. Paints:

1. Basis of Design:
   a. Sherwin-Williams Company
2. Acceptable Manufacturers:
   a. PPG Architectural Coatings
   b. Benjamin Moore

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.

1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Supply each paint material in quantity required to complete entire project's work from a single production run.
3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Colors: To be selected from manufacturer's full range of available colors.

1. Selection to be made by Architect after award of contract.
2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.

2.3 PREPARATORY COATS

A. Primer: Exterior acrylic based primer recommended in writing by manufacturer for use with finish coat and on substrate indicated.

1. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.

B. Ferrous Metal - Previously primed and unprimed surfaces

1. Primer
   a. Vehicle: Acrylic
   b. Volume Solids: 38% +/- 2%
   c. VOC: <50 g/l
2. Basis of Design:
   a. Sherwin-Williams – Pro Industrial Pro-Cryl Universal Primer,B66-1300 Series

C. Anti-graffiti Coating – Primer as recommended by anti-graffiti coating manufacturer.

2.4 EXTERIOR FINISH COATS

A. Ferrous Metal, Semi-Gloss

1. Pre-catalyzed Waterbased Epoxy
    a. Vehicle: Acrylic Epoxy
    b. Volume Solids: 34% +/- 2%
    c. VOC: <50g/L
2. Basis of Design:
    a. Sherwin-Williams – Zero VOC Acrylic B66-650 Series

B. Anti-graffiti coating, clear

1. Vehicle: Acrylic copolymer
2. VOC: <100g/L
3. Sheen: Low-gloss
4. Color: Tint to match Minwax Ipswich Pine
5. Basis of Design:
    a. Monopole Inc., Monochem Permashield NS
6. Acceptable Products:
    a. Sherwin Williams, 2K Water-based Urethane Anti-Graffiti Coating
    b. Rainguard International, VandlGuard

C. Fiber-cement Siding and Trim

1. Exterior Latex, Satin
    a. Vehicle: Acrylic Latex
    b. Volume Solids: 36% +/- 2%
    c. VOC: <50g/L
2. Basis of Design:
    a. Sherwin-Williams – Zero VOC Acrylic B66-650 Series

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Fiber Cement Siding: Remove dirt, dust and other foreign matter with a stiff fiber brush. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

G. Glue-Laminated Beams: Prior to application of anti-graffiti coating, wash surfaces with solvent, remove grease and dirt in accordance with coating manufacturer.

H. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.3 APPLICATION

A. Glu-Laminated structure: Apply anti-graffiti coating to wood structure after assembly but prior to installing walls, storefront, SIPS roofing panels, etc.

B. Cast Iron Downspout Boots: Primer and finish coats shall be shop applied on all exterior surfaces in a conditioned space . After paint has dried, wrap downspout boots in protective covering. Covering shall be removed prior to acceptance by the Owner.

C. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.5 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

3.6 EXTERIOR PAINTING SCHEDULE

A. Ferrous Metal, Pre-primed:

1. Gloss Level 5, Semi-Gloss:
   a. Prime Coat: Touch-up where damaged
   b. Intermediate Coat: Acrylic epoxy, 1.4 DFT
   c. Topcoat: Acrylic epoxy, 1.4 DFT

B. Ferrous Metal, Galvanized

1. Gloss Level 5, Semi-Gloss
   a. Prime Coat: Primer, Acrylic, 1.9-3.8 DFT
   b. Intermediate Coat: Acrylic epoxy, 1.4 DFT
   c. Topcoat: Acrylic epoxy, 1.4 DFT

C. Ferrous Metal, Unprimed

1. Gloss Level 5, Semi-Gloss
   a. Prime Coat: Primer, Acrylic, 1.9-3.8 DFT
   b. Intermediate Coat: Acrylic epoxy, 1.4 DFT
   c. Topcoat: Acrylic epoxy, 1.4 DFT

D. Anti-graffiti Coating, laminated wood structure and wood trim

1. Clear
   a. Primer (as recommended by manufacturer): coverage rate at 60-110 sf/gal.
   b. Intermediate Coat(s) as recommended by manufacturer: 300-400 sf per gallon
   c. Top Coat: 300-400 sf per gallon

E. Fiber-cement Siding and Trim, Pre-primed

1. Top Coat: Fill nail holes and touch-up factory-applied primer
2. Intermediate Coat: Exterior Latex, 1.4 mil DFT
3. Top Coat: Exterior Latex, 1.4 mil DFT

END OF SECTION 09 9113

SECTION 09 9123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Surface preparation.
2. Field application of paints, stains, and varnishes.
3. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
4. Do Not Paint or Finish the Following Items:
   a. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   b. Items indicated to receive other finishes.
   c. Items indicated to remain unfinished.
   d. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   e. Floors, unless specifically indicated.
   f. Glass.
   g. Concealed pipes, ducts, and conduits.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 09 9113 - Exterior Painting.

1.2 REFERENCE STANDARDS

A. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials.

B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

C. SSPC-SP 1 - Solvent Cleaning

D. SSPC-SP 6 - Commercial Blast Cleaning

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47).
3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.

1. Where sheen is specified, submit samples in only that sheen.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.5 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:

1. Basis of Design
   a. Sherwin-Williams Company
2. Acceptable Manufacturers:
   a. PPG Architectural Finishes
   b. Benjamin Moore

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.

1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Supply each paint material in quantity required to complete entire project's work from a single production run.
3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 6116

C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

2.3 PREPARATORY COATS

A. Interior Primer: Interior primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.

1. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.

B. Gypsum Board

1. Primer, Sealer, Latex
   a. Vehicle: Styrated Vinyl Acrylic
   b. Volume Solids: 35 +/- 2%
   c. VOC: <50 g/L
2. Basis of Design:
   a. Sherwin-Williams – PrepRite ProBlock B51-600 Series

C. Ferrous Metal - Unprimed surfaces

1. Primer, Rust-inhibitive, Water-based Interior
   a. Vehicle: Acrylic
   b. Volume Solids: 39 +/- 2%
   c. VOC: 90 g/L
2. Basis of Design:
   a. Sherwin-Williams – Pro Industrial Pro-Cryl Universal Primer

2.4 INTERIOR FINISH COATS

A. Gypsum Board, Walls

1. Latex, Interior
   a. Vehicle: Vinyl Acrylic
   b. Volume Solids: 44 +/- 2%

c. VOC: 0g/L
d. Sheen: Egg-shell or flat as indicated in finish schedule.
2. Basis of Design
a. Sherwin-Williams – ProMar 200 Zero VOC Primer B20 Series

B. Ferrous Metal

1. Enamel, Interior
a. Vehicle: Urethane modified alkyd resin
b. Volume Solids: 34 +/- 2%
c. VOC: 50g/L
2. Basis of Design
a. Sherwin-Williams – Pro Industrial Waterbased Alkyd Urethane Enamel – B53 Series

C. Anti-graffiti coating, clear

1. Vehicle: Two-component hydrophobic polyurethane
2. Volume Solids: 51% + 2%
3. VOC: <100g/L
4. Basis of Design:
a. Sherwin Williams 2K Water-based Urethane Anti-Graffiti Coating
5. Acceptable Products:
a. CSL Silicones, Inc. Si-COAT 531 AG
b. Rainguard International
c. Vandlguard One

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Gypsum Wallboard: 12 percent.
2. Plaster and Stucco: 12 percent.
3. Masonry, Concrete, and Concrete Masonry Units : 12 percent.
4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

F. Ferrous Metal:

1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

G. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

3.3 APPLICATION

A. Apply to wood structure after assembly but prior to installing walls, storefront, SIPS roofing panels, etc.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

3.5 INTERIOR PAINT SCHEDULE

A. Gypsum Board

1. Eggshell, Semi-gloss
   a. High Build Primer: Vinyl Acrylic, 0.8 DFT to 15.0 DFT
   b. Intermediate Coat: Vinyl Acrylic, 1.5 to 2.0 DFT
   c. Finish Coat: Vinyl Acrylic, 1.5 to 2.0 DFT
2. Flat
   a. High Build Primer: Vinyl Acrylic, 0.8 DFT to 15.0 DFT
   b. Intermediate Coat: Vinyl Acrylic, 1.5 to 2.0 DFT
   c. Finish Coat: Vinyl Acrylic, 1.5 to 2.0 DFT

B. Ferrous Metal

1. Semi-Gloss
   a. Primer: Acrylic, Water-based 2.0 to 4.0 DFT
      1) Touch-up areas where factory applied primer has been damaged.
   b. Intermediate Coat: Modified Alkyd Enamel, 1.4 to 1.7 DFT
   c. Finish Coat: Modified Alkyd Enamel, 1.4 to 1.7 DFT

C. Anti-graffiti Coating, laminated wood structure and wood trim

1. Clear
   a. Top Coat: 2.0-4.0 DFT

END OF SECTION 09 9123

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Primers
2. Wood stains.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.
2. Include preparation requirements and application instructions.
3. Indicate VOC content.

B. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: 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. Stains and Transparent Finishes: 5 percent, but not less than 1 gal. of each material and color applied.

1.4 MOCKUPS

A. Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under Sample submittals and to set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.
   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
   b. Other Items: Architect will designate items or areas required.
2. Final approval of stain color selections will be based on mockups.
   a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

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 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.

1.6 FIELD CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply finishes 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 MANUFACTURERS

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

1. Benjamin Moore & Co.
2. PPG Paints.
3. Pratt & Lambert.
4. Sherwin-Williams Company (The).

2.2 MATERIALS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each coating 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.

B. Stain Colors: As selected by Architect from manufacturer's full range .

2.3 PRIMERS

2.4 WOOD STAINS

A. Stain, Exterior, Solvent Based, Solid Hide: Solvent-based, oil or oil/alkyd, pigmented stain for new, or previously stained, wood surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Diamond Vogel Paints.
   b. Sherwin-Williams Company (The).
   c. Benjamin Moore & Co.

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 Interior Wood Substrates: 13 percent, when measured with an electronic moisture meter.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with finish application only after unsatisfactory conditions have been corrected.

1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.

1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

B. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.

1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.

2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

C. Exterior Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Prime edges, ends, faces, undersides, and backsides of wood.
   a. For solid hide stained wood, stain edges and ends after priming.
3. Countersink steel nails, if used, and fill with putty or plastic wood filler tinted to final color. Sand smooth when dried.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions.

1. Use applicators and techniques suited for finish and substrate indicated.
2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

C. Paint/Stain surfaces of ship lapped siding prior to installing, (when siding expands and contracts, unfinish surface is exposed.) Contractor to re-paint siding at no extra change to owner if after expansion and contraction , unpainted surface are seen.

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 finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

END OF SECTION 099300

SECTION 10 1400 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Room and door signs.
2. Adhesive film signage at glass

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.

1.2 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.

1. Submit for approval by Owner through Architect prior to fabrication.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. Store tape adhesive at normal room temperature.

1.5 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Flat Signs:

1. Best Sign Systems, Inc: www.bestsigns.com.
2. Cosco Industries (ADA signs); ADA Series 1: www.coscoarchitecturalsigns.com.
3. Cosco Industries (non-ADA signs); Changeable Message Signs: www.coscoarchitecturalsigns.com.
4. Seton Identification Products: www.seton.com/aec.

2.2 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Room and Door Signs: Provide signs as noted on drawings plus one to post occupancy to be located as directed by the Authority Having Jurisdiction

1. Sign Type: Flat signs with engraved panel media.
2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.

2.3 SIGN TYPES

A. Flat Signs: Signage media without frame.

1. Edges: Square.
2. Corners: Square.
3. Wall Mounting of One-Sided Signs: Tape adhesive.

B. Color and Font: Unless otherwise indicated:

1. Character Font: Helvetica, Arial, or other sans serif font.
2. Character Case: Upper case only.
3. Character Color: Contrasting color.

2.4 ADHSIVE FILM SIGNAGE

A. Material: Clear, weather-resistant, pressure-sensitive, vinyl film with permanent adhesive.

B. Thickness: 0.08 inch

C. Image to be printed on film.

D. Size: As indicated on the drawings.

E. Signage Text:

1. No Smoking
2. No Pets

2.5 TACTILE SIGNAGE MEDIA

A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:

1. Total Thickness: 1/16 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

D. Protect from damage until Substantial Completion; repair or replace damaged items.

END OF SECTION 10 1400

SECTION 10 2113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Phenolic toilet compartments.
2. Urinal screens.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 10 2800 - Toilet Accessories.

1.2 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

B. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on panel construction, hardware, and accessories.

C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

D. Samples: Submit two samples of partition panels, 8" by 8" inch in size illustrating panel finish, color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Phenolic Toilet Compartments:

1. Basis of Design: Bradley Corp. Mills Metals Division – Series 700
2. Acceptable Products
   a. Bobrick Washroom Equipment, Inc.; Duraline 1080 Series
   b. Partition Systems International of South Carolina; Phenolic Toilet Partitions

2.2 PHENOLIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid phenolic core panels with integral melamine finish, floor-to-ceiling.

B. Doors:

1. Thickness: 3/4 inch.
2. Width: 24 inch.
3. Width for Handicapped Use: 36 inch.
4. Height: 58 inch.

C. Panels:

1. Thickness: 1/2 inch.
2. Height: 58 inch.
3. Depth: As indicated on drawings.

D. Pilasters:

1. Thickness: 3/4 inch.
2. Width: As required to fit space; minimum 3 inch.

E. Screens: Without doors; to match compartments; mounted to wall with continuous panel brackets with vertical support/bracing same as compartments.

F. Color: Equal to Bradley Mills Stock Color 7022 Natural Canvas.

2.3 ACCESSORIES

A. Pilaster Shoes: Formed chromed steel with polished finish, 3 inch high, concealing floor fastenings.

B. Pilaster Brackets: Satin stainless steel.

C. Wall Brackets: Continuous type, satin stainless steel.

D. Hardware: Satin stainless steel, institutional series:

1. Continuous, full height hinges, gravity type, self-closing, adjustable for door close positioning.
2. Door Latch: Slide type with exterior emergency access feature.
3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
4. Coat hook with rubber bumper; one per compartment, mounted on door.

E. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct location of built-in framing, anchorage, and bracing.

3.2 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.3 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

END OF SECTION 10 2113.19

SECTION 10 2800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes:

1. Commercial toilet accessories.
2. Electric hand/hair dryers.
3. Child diaper changing stations.
5. Utility room accessories.

B. Owner Furnished Material

1. Soap dispensers
2. Toilet paper dispensers
3. Roll towel dispensers

C. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.

1.2 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM C1036 - Standard Specification for Flat Glass

C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass

D. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Samples: Submit two samples of each accessory, illustrating color and finish.

D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Commercial Toilet Accessories:

1. American Specialties, Inc; www.americanspecialties.com
2. Bradley Corporation; www.bradleycorp.com
3. Bobrick Washroom Equip. Inc.; www.bobrick.com

B. Electric Hand Dryers - Basis of Design: Subject to compliance with requirements, provide Airblade V as manufactured by Dyson, Inc.; www.dyson.com or comparable product by one of the following:

1. American Specialties, Inc; www.americanspecialties.com
2. Bradley Corporation; www.bradleycorp.com
3. Bobrick Washroom Equip. Inc.; www.bobrick.com
4. Excel Dryer Inc.; www.exceldryer.com

C. Diaper Changing Stations:

1. American Specialties, Inc; Model 9012: www.americanspecialties.com
2. Bobrick Washroom Equip. Inc.; KB200-00: www.bobrick.com
3. Diaper Deck & Company; Diaper Deck: www.diaperdeck.com

D. All items of each type to be made by the same manufacturer.

2.2 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

B. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required to provide ahigh-quality mirror glass that is free from inconsistencies that distort the reflection.

2.3 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

2.4 COMMERCIAL TOILET ACCESSORIES

A. Electric Dryers: Traditional fan-in-case type, with downward nozzle.

1. Cover: Nickel.

B. Mirrors: Stainless steel framed, 1/4 inch thick tempered safety glass; ASTM C1048.

1. Size: 24" wide, 36" high.
2. Frame: 0.04 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
4. Basis of Design: Bobrick B-221

C. Seat Cover Dispenser: Stainless Steel, No. 4 (satin), surface-mounted, reloading by concealed opening at base, tumbler lock.

1. Minimum capacity: 250 seat covers.
2. Basis of Design: Bobrick B-221.

D. Grab Bars: Stainless steel, nonslip grasping surface finish.

1. Standard Duty Grab Bars:
   a. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
   b. Length and Configuration: As indicated on drawings.
   c. Finish: Smooth, No. 4 finish (satin) on ends and slip resistant texture in grip area.
   d. Basis of Design: Bobrick B-6806.

E. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.

1. Basis of Design: Bobrick B-270.

F. Child Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.

1. Material: Polyethylene.
2. Mounting: Surface.
3. Minimum Rated Load: 250 pounds.

2.5 MAINTENANCE/CUSTODIAL ACCESSORIES

A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.

1. Drying rod: Stainless steel, 1/4 inch diameter.

2. Hooks: 3, 0.06 inch stainless steel rag hooks at shelf front.
3. Mop/broom holders: 4 spring-loaded rubber cam holders at shelf front.
4. Length: 36 inches.

B. Hat and Coat Hook

1. Hooks: Satin stainless steel finish, 2”x2” flange, 1”W x 6-1/2”H hook, with concealed wall plate. Basis of Design, Bobrick B-6827

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.

3.2 INSTALLATION

A. Coordinate locations of wood blocking in walls for wall mounted accessories prior to the installation of gypsum wall board or cementitious backer board.

B. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.

C. Install plumb and level, securely and rigidly anchored to substrate.

D. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.3 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION 10 2800

SECTION 105626 - STATIONARY SHELVING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal Storage Shelving:

1. Steel four-post shelving.

1.2 REFERENCES

A. ASTM International (ASTM):

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A. Submit under provisions of Section 013000 - Administrative Requirements.

B. Product Data:

1. Manufacturer's data sheets on each product to be used.

C. Storage and handling requirements and recommendations.

D. Typical installation methods.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

B. Protect from damage due to weather, excessive temperature, and construction operations.

1.5 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.6 WARRANTY

A. Manufacturer's standard limited warranty unless indicated otherwise.

1. Manufacturer will repair or replace components that fail in materials or workmanship within warranty period.

2. Failures include, but are not limited to: Deterioration of metals, metal finishes, and other materials beyond normal wear.

a. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:

1. H-2886 Industrial Shelving - ULine

B. Acceptable Manufacturers:

1. Global Industrial

2. Industrial Shelving Solutions

2.2 STATIC SHELVING

A. Steel Four Post Shelving:

1. Construction

a. Adjustable Shelves: Rest on shelf supports hung on uprights.

b. Characteristics

1) Type: Self-supporting unit.

2) Configuration: Open.

3) Width: 48 inches

4) Height: 87 inches

5) Shelf Depth: 24 inches

6) Flat Shelves: Number of Shelves: 6 shelves.

7) Shelf Capacity: 550 lbs.

c. Uprights: L-shape, cold-rolled steel angle posts.

1) Thickness: 14 ga. (.0781-inch)

2) Perforations: 1-1/2 inches on centers.

d. Adjustable Steel Shelves: Cold-rolled steel, 20 ga. (0.0375 inch) thick.

1) Height: 3/4 inches minimum.

2) Flanged to support shelf reinforcements.

3) Tabs with 1/4 inch heads shoulder rivets at each end of shelf for insertion in the keyhole slots in the uprights.

e. Bracing: Cold-rolled steel, 11 ga. (0.1250) inch thick side and back sway bracing.

f. Finish: Factory applied powder coating

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly constructed and prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

3.4 CLEANING AND PROTECTION

A. Clean products in accordance with the manufacturer's recommendations.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 105626

SECTION 10 7500 - FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Aluminum Flagpoles.

B. Related Requirements

1. Section 03 3000 - Cast-in-Place Concrete: Concrete base and foundation construction.
2. Section 26 5000 – LED Light Fixtures – pole mounted light fixture
3. Section 31 2323 - Fill: Sand to fill foundation tube sleeve.

1.2 REFERENCE STANDARDS

A. AASHTO M 36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

D. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube

E. NAAMM FP 1001 - Guide Specifications for Design Loads of Metal Flagpoles

F. NFPA 70 - National Electrical Code

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pole, accessories, and configurations.

C. Shop Drawings: Indicate detailed dimensions, base details, anchor requirements, and imposed loads.

1.4 QUALITY ASSURANCE

A. Designer Qualifications: Design flagpole foundation under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed the State of Ohio.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.5 COORDINATION

A. Coordinate location and installation of flagpole lights with electrical contractor.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect flagpole and accessories from damage or moisture.

PART 2 - PRODUCTS

2.1 FLAGPOLES

A. Manufacturers:

1. Basis of Design
   a. Morgan-Francis
2. Acceptable Manufacturers
   a. Concord American Flagpole
   b. Flag and Banner
   c. Flagpoles Inc.
   d. Pole-Tech

B. Flagpoles: Designed in accordance with NAAMM FP 1001.

1. Material: Aluminum.
2. Design: Cone tapered.
3. Mounting: Ground mounted type.
4. Exposed Height: 60 ft; measured from nominal ground elevation.
5. Outside Butt Diameter: 10 inches.
6. Outside Tip Diameter: 4 inches.
7. Nominal Wall Thickness: 0.250 inches.
8. Halyard: Interior cable type, winch operation with removable crank.

C. Performance Requirements:

1. Wind Pressure Loading on Flagpole with Flag: Resistant without permanent deformation to 105 miles/hr wind speed, in accordance with NAAMM FP 1001; the factor of safety used is 2.5. Verify the number of flags that will be flown on the flagpole.

2.2 POLE MATERIALS

A. Aluminum: ASTM B241/B241M, 6063 alloy, T6 temper.

2.3 ACCESSORIES

A. Finial Ball: Stainless steel, 10 inch diameter.

B. Truck Assembly: Cast aluminum; revolving, stainless steel ball bearings, non-fouling.

C. Flag: American, 12 ft by 8 ft maximum size, nylon fabric, brass grommets, hemmed edges.

D. Furnish factory installed hinged panels for access to halyard assembly and electrical connections for electrical lights. Panels shall have concealed and a tamper-resistant locking device. Field installed access panels will not be accepted.

2.4 MOUNTING COMPONENTS

A. Foundation Tube Sleeve: AASHTO M 36, corrugated 16 gage, 0.0598 inch steel, galvanized, minimum depth of 6’-0”.

2.5 FINISHING

A. Aluminum: Dark Bronze Anodized.

B. Finial: Gold anodized finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

A. Install flagpole, foundation, base assembly, and fittings in accordance with manufacturer's instructions.

B. Electrically ground flagpole installation.

3.3 TOLERANCES

A. Maximum variation from plumb: 1 inch.

3.4 ADJUSTING

A. Adjust operating devices so that halyard and flag function smoothly.

END OF SECTION 10 7500

SECTION 12 3900 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes:

1. Picnic Tables
2. Benches
3. Trash Receptacles
4. Smoking Receptacles

B. Related Requirements:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
2. Division 03 Section "Cast-in-Place Concrete" for installing anchor bolts cast in concrete footings.
3. Division 31 Section "Earth Moving" for excavation for installing concrete footings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For site furnishings.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For site furnishings to include in maintenance manuals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Trash Receptacle Liners: One additional full-size unit for each receptacle.

PART 2 - PRODUCTS

2.1 PICNIC TABLES

A. Sitting -Picnic Table Basis-of-design product:

1. Carousel Tables, Ash Wood Square Top, 4 seat and 3 seat ADA, Dining height, Backed Seats, or equal.
2. 2. Manufacturer: Landscape Forms 7800 E. Michigan Ave.Kalamazoo, MI 49048phone: 800 430-6209local: (614) 558-2800fax: 412-781-7840email: kendrab@landscapeforms.comwebsite: www.landscapeforms.com
3. Manufacturer: Forms+Surfaces, 30 Pine Street Pittsburgh, PA 15223 phone: 800-451-0410 fax: 412-781-7840 email: sales@forms-surfaces.com website: www.forms-surfaces.com

B. Tables and seating

1. Materials:
   a. Table - Top, Domestically Sourced Thermally Modified Ash.
   b. Seats: Grid steel seats.
   c. Frames: 2” steel tubing with invisible welds.
   d. Fasteners: recessed stainless steel.
2. Finishes
   a. All metal Polyester Powder Coat.
   b. Ash wood, unfinished.
   c. Bench frame (inner surfaces): polyester powdercoat
      1) Standard Texture from Forms+Surfaces Powdercoat Chart. - MOSS
3. Dimensions
   a. Tables: Square 86"x 86" x 33” high.
   b. Provide one ADA-compliant 3 seat, open on one side.
4. Mounting: Surface mount into slab. Provide stainless steel threaded anchors and stainless steel mounting hardware.

2.2 BENCHES

A. Bench Basis-of-design product: provide backed and/or backless benches based on the product named: or equal

1. Basis of Design: Bowery Bench
2. Manufacturer: Canterbury Designs6195MaywoodAve. Huntington Park, CA 90255phone: 800-935-7111website: www.canterbury-designs.com

B. Benches

1. Materials:
   a. Seat: Steel straps.
   b. Bench frame: Wrought Steel.
2. Finishes
   a. Bench: Polyester Powder Coat
   b. Armrests: Polyester Powder Coat to match frame.
3. Dimensions
   a. Backed bench, six foot, surface mount
   b. Overall dimensions: 72" long x 22.7" deep x 31.1" high.
   c. Seat dimensions: 16" deep x 18" high.
4. Mounting: Surface mount on slab. Provide stainless steel threaded anchors and stainless steel mounting hardware.

2.3 TRASH RECEPTACLES

A. Products: Provide the following:

1. Plaza steel strap trash receptacle – 36 gallon by The Park and Facilities Catalog, (www.theparkcatalog.com). Color – Green. Item # 398-8002.
2. 36-Gallon main street trash receptacle with open dome lid by OCC Outdoos, (www.occoutdoors.com). Color – Green (RAL 6005). Dome top colors – Green. Surface mount. Item # Rec-SL-36-DDT.
3. Outdoor metal slatted trash receptacle with rain shield lid – 36 gallon by Global Industries, (www.globalindustries.com). Color – Green. Item # T9F260804BK.

2.4 SMOKING RECEPTACLES

A. Products: Provide the following:

1. Grenadler Ash Urn freestanding smoking receptacle. Manufactured by Landscape Forms, or equal.
2. 10” x 10” x 35”. Color – Black.
3. Surface mount on slab. Stainless steel hardware and expansion hardware.

2.5 GENERAL FINISH REQUIREMENTS

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions. Complete field assembly of site furnishings.

B. Install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored.

END OF SECTION 12 3900

SECTION 12 4813 - ENTRANCE FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Roll-up rail mats.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for floor mats and frames.

B. Shop Drawings:

1. Items penetrating floor mats and frames, including door control devices.
2. Divisions between mat sections.
3. Perimeter floor moldings .
4. Custom Graphics: Scale drawing indicating colors.

C. Samples: For the following products, in manufacturer's standard sizes:

1. Floor Mat: Assembled sections of floor mat.
2. Tread Rail: Sample of each type and color.
3. Frame Members: Sample of each type and color.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For floor mats and frames to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC/ANSI A117.1-2009.

2.2 ROLL-UP RAIL MATS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Construction Specialties, PediTred G4 with HD – MonoTuft HD Carpet Tread inserts or a comparable product by one of the following:

1. American Floor Products Company, Inc.
2. Balco, Inc.
3. The Mad Matter

B. Floor Mats: Extruded aluminum ASTM B 221, alloy 6105-T5 with 3/4” deep tread rails joined by TPE hinge and cushion. Hinge shall be perforated for drainage

1. Depth: nominal 11/16-inch
2. Tread Spacing: 1.5” O.C
3. Tread Inserts: 33-oz./sq. yd. weight, level-cut, nylon-pile, fusion-bonded carpet to a rigid two-ply backing. Carpet fibers shall be a minimum of 100, 12 mil monofilament fibers per square inch.
4. Colors, Textures, and Patterns of Inserts: As selected by Architect
5. Rail Color: Dark bronze anodized
6. Wheel Load: 1000 lbs.
7. Mat Size: As indicated on the drawings

C. Graphics: Custom inlaid or woven-in graphic logo, and characters, as indicated.

2.3 FRAMES

A. Recessed Frames: Manufacturer's standard extrusion.

1. Extruded Aluminum: ASTM B 221, Alloy 6061-T6
   a. Color: Dark bronze .

2.4 FABRICATION

A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

B. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's standard protective coating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate tops of mat surfaces with bottoms of doors that swing across mats to provide clearance between door and mat.

B. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.

3.2 PROTECTION

A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 12 4813

SECTION 22 0191 - COORDINATION BETWEEN TRADES

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 DESCRIPTION

A. General: This is a General Contracting delivery model where a General contractor (GC) will be responsible for complete project. GC may use his own crew or hire sub contractor of trades and specialties to complete the project to meet all the meeting plans, specifications, applicable codes , standards and all equipment manufacturers requirements as per plans and specifications sustainable operation of the project facilities. meeting all Codes, standards and equipment manufacturers recommendations and requirements. The completed project shall be operating with sustainable maintenance and operation as per best practices. GC is responsible to coordinate the services of all sub-contractors and complete the project. GC shall review all shop drawings to coordinate as well as resolve any issues (including necessary scheduling time delays. etc.) before forwarding them to Architect and Engineer (A/E) for approval.

B. Motors one-half horsepower or smaller shall be single phase unless noted otherwise; larger motors shall be 208 Volts three phase, unless otherwise noted.

C. Equipment drawing 1000 watts or more must have a power factor of 85% or greater at rated load conditions. Equipment with an operating power factor less than 85% shall be corrected to at least 90% under rated load operating conditions Power factor correction devices shall be the responsibility of the Contractor furnishing the equipment. Equipment shall exceed minimum regulatory requirements including EPA, DOE and other standards.

D. All electrical wiring and conduits shall be provided by electrical contractor. The control wiring i(under 40 volts) can be run in these conduits by controls contractor. all conduits shall be horizontal and vertical and shall run parallel to walls. The required power and controls to Plumbing equipment and their proper operation is the responsibility of plumbing sub contractor, coordinate.

E. It is the responsibility of each sub Contractor furnishing motors to advise the Electrical Contractor of the exact function of the systems to assure proper type of starter (including necessary time delays, etc.) with correct number of auxiliary contacts required for the proper operation of the system, coordinate.

F. All electrical devices furnished as a part of Division 22 equipment, and installation requirements of all electrical work for Division 22 Contractors shall conform to the applicable sections of Division 26.

G. Final operation of equipment provided under Division 22 shall be the responsibility of the Division 22 Contractor.

H. All conduits for division 22, 23 and 26 and other parts outside the equipment for electrical power or controls shall be provided and installed by Electrical Contractor. VFD's unless supplied by the equipment manufacturer shall be provided and installed by Electrical Contractor as per specification 262320.

1.3 ELECTRICAL ITEMS

A. Electrical hot water heaters, Electric Water Coolers/Fountains and other plumbing equipment with required auxiliaries that need electrical power shall be wired by Electrical Contractor.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 22 0191

SECTION 22 0500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. In Drywall, Masonry, or Concrete Wall Construction:

1. Option for above ceiling only: omit block(s) where required for penetrations, and shall provide squarefinished opening. Do not omit blocks under bearing points or in firerated or smokerated walls. Do not omit blocks in walls which serve as sound barriers.
2. Provide openings through metal building walls and roofs, and seal watertight.

B. In precast concrete work, in lieu of sleeves, cut holes after erection of concrete.

C. Sleeve where pipes pass exposed through walls, and where any piping passes through smoke-rated or fire-rated separations, equipment room walls, or above-grade floors.

D. If sleeves are not installed in construction, due to fault of the Contractor, holes through masonry or concrete construction shall be core drilled at the expense of the Contractor.

E. Sleeves are not required in floor slabs on grade or in core-drilled openings not requiring water-proofing or firestopping. EXCEPTION: Sleeves are required at core drilling through hollow core pre-cast slabs and through concrete block walls, to facilitate containment of required firestopping material.

F. Sleeving with absolutely watertight seal is required for piping passing through exterior walls above grade, and underground foundation walls and other below-grade penetrations into building.

1.2 WARRANTY

A. See Division 1 specification section for warranty requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Any specified Material or Equipment Manufacturer furnished by the Contractor other than the Design Base Manufacturer shall be, in the opinion of the A/E, equivalent in quality, design, features, performance, arrangement, and appearance to that of the Design Base equipment or material, including any special features or requirements.

B. Recognizing that since no two Manufacturers are “identical,” whenever the Contractor elects to furnish specified equipment or material manufactured by other than the Design

Base Manufacturer, the Contractor shall be responsible for the cost and coordination of all modifications required to accommodate the elected equipment or material.

C. Where deemed necessary by the A/E, the Contractor shall, at no additional cost to the Owner, prepare new layouts for these other brands of equipment which may have different dimensional or service requirements from the Design Base Manufacturer Standard. Submit these layouts to the A/E for review.

2.2 EQUIPMENT SUITABILITY

A. All equipment provided shall perform as intended. All items listed shall function properly, and as the Manufacturer intended. Install equipment according to the Manufacturer's recommendations. Properly attach equipment to the floor, wall, or structure. Each item of equipment shall be compatible with all other accessories or hook-ups, including piping, controls, wiring, and other equipment that are not furnished by the equipment Manufacturer, but that are required as an accessory or modification to achieve its intended function.

2.3 MISCELLANEOUS ACCESSORIES

A. Provide any additional adapters, fittings, trim, structural steel angles, channels, Unistrut, brackets, etc., as necessary to securely mount and install all items of equipment specified or shown on the Drawings. All steel installed outside or exposed to moisture shall be hot-dipped galvanized.

B. These accessories are required even though they may not be shown or detailed on the Drawings.

C. Installation shall be compatible with the building construction on which the item is to be located.

D. Verify the type of construction prior to ordering the equipment item, so that all required accessories are included.

2.4 QUANTITIES

A. Equipment may be referred to in these Specifications, or on the Drawings, as either singular or plural; the Contractor shall verify the exact number of items required to complete its Work.

2.5 STANDARD SLEEVES

A. Pipe sleeve material:

1. Up to 8 in. diameter: Machine-cut Schedule 40 black steel pipe.
2. Bare copper piping: Copper sleeves.
3. OPTION: In walls: Schedule 40 plastic pipe may be used for pipe sleeves, except where adjacent ceiling space is used for return air plenum.

B. Sizing: Sleeves shall be large enough for insulation to be continuous, or for watertight or fire-rated sleeve seals to be installed. Size to allow 1/2 in. minimum clearance all around pipe or pipe insulation.

2.6 WATERTIGHT SLEEVE SEALS

A. Oakum Caulking: With lead-pour or elastomeric sealant. Elastomeric sealant shall be 2component, polysulfide or polyurethane.

B. OPTION: Compression Seals: Stainless steel bolts and nuts. Provide correct size seal, and coordinate with sleeve size.

C. Provide sleeves with waterstop anchor flange at midpoint where penetrating structure at or below grade.

2.7 FIRE-RATED SLEEVE SEALS

A. ASTM E119 and E814 Silicone RTV foam, UL-approved.

B. Plastic drain, waste, and vent stacks, and lines penetrating fire-rated floors, ceilings, and walls shall be fire-blocked and waterproofed using ProSet Systems, Inc., Series 45 or 55 couplings and Series 90 Code Red Firestop devices. All other plastic drain openings, such as closet stubs, and floor drains, shall be fire-blocked and waterproofed using ProSet Systems C, and EZ Flex flexible couplings.

2.8 PAINTING OF PLUMBING SYSTEMS

A. Refer to Division 9 for painting specifics.

B. Plumbing systems in “Finished Spaces” shall be painted, color to match adjacent finishes. Mechanical Rooms, Plumbing Chases, and Janitor’s Closets shall NOT be considered “Finished Spaces”.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate location of sleeves, core drilled holes and other holes required with General Trades Contractor, equipment and other Trades.

B. Coordinate locations and sizes of all required openings with General Trades Contractor, equipment, and other Trades.

3.2 CUTTING

A. Cut sleeves through walls flush with each surface.

B. Cut sleeves 1/8" above finished floors and 3" above floors in utility rooms and equipment rooms. Bottom of sleeve to be cut flush with bottom surface.

C. Refer to Division 1 for specific requirements regarding approved cutting methods.

3.3 INSTALLATION OF SLEEVES AND RELATED WORK

A. General Trades Contractor shall install and build-in all sleeves in new walls.

B. Piping is not to bear on sleeves. Sleeves must be installed plumb and true to line, grade and position.

C. Close space around ducts and pipes passing through walls and floors. Seal space up to a 1/2" gap with sealant or caulking. Close off space greater than 1/2" gap with sheet metal and seal airtight. Pack all fire or sound rated separation sleeves with glass fiber, high temperature mineral wool, aluminum-silica fiber, fire retardant rope, calcium silicate, or other noncombustible material to maintain fire rating of structure and finished with fire-rated sleeve seals. Fill space around all sleeves leading into exposed areas with material compatible with adjacent construction and finish.

D. Unused sleeves shall be plugged and fire-packed.

E. Install sheet metal escutcheons around ducts passing through walls exposed.

F. Use sleeves where round duct openings are required through exposed walls, smoke or fire partitions, or equipment room walls. Close off all spaces around rectangular ducts through these walls. Close off all spaces around fans, dampers, louvers or grilles which require rectangular openings.

G. All pipe sleeves and escutcheons shall have ample clearance for pipe and covering, and shall have chrome plated wall and floor escutcheons over the pipe in finished areas. Provide chrome plated or prime coated escutcheons in other rooms.

H. Give the General Trades Contractor locations and sizes of all openings required for the installation of equipment or sleeves before construction of masonry or concrete walls is started. If it becomes necessary to cut into new work because of the failure of this Contractor to notify the General Trades Contractor, then the General Trades Contractor shall do any necessary cutting and patching required later at this Contractor's expense.

3.4 WATERTIGHT SEALS

A. Pipe sleeves penetrating outside wall or slabs on grade, to have welded intermediate flange imbedded in masonry. Space around pipe to be clamped, packed and caulked with lead and oakum to make an absolutely watertight seal within sleeve; General Trades Contractor shall caulk around outside of sleeve.

B. Option: Install compression seals.

END OF SECTION 22 0500

SECTION 22 0500.10 - GENERAL REQUIREMENTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Provide all materials, labor, tools, and equipment to complete and leave ready for operation all plumbing systems as called for in these Specifications and shown on the Drawings and any and all details essential to complete the work. Follow Ohio Plumbing Code for all interior piping.

C. By submitting a bid, the Contractor certifies that:

1. The Contractor has visited the site and is satisfied that he understands all the Conditions that may have an effect on his bid price, with the sole exception of those items, if any, which he specifically is taking exception to in writing in his bid.
2. The Contractor fully understands the make-up, construction, and operation of all systems and equipment he is bidding on and that he has included in his price for all materials, supplies, accessories, and services necessary to make these systems complete and operational. The contractor understands that equipment start up shall be done under supervision of factory trained qualified person who has worked on such model for minimum of three years.

1.2 STANDARDS OF QUALITY

A. Provide quality work conforming to the accepted practice and standards of the trade. Further definition of quality is given by reference to various laws, codes, standards, and regulations.

B. All laws and codes having jurisdiction over this project are deemed to be included in their entirety as a part of these Specifications. Also, any other laws, codes, standards, or regulations referenced herein are deemed to be included in their entirety.

C. If a conflict occurs between the Drawings, the Specifications, and/or the applicable Codes, immediately call it to the attention of the Architect/Engineer, stringent of the two apply A/E will determine which interpretation shall take precedence.

D. Listed below are titles and abbreviations used in the Specification. All may not necessarily apply to this work.

1. ANSI - American National Standards Institute
2. ASME- American Society of Mechanical Engineers
3. ASPE - American Society of Plumbing Engineers Inc.
4. ASSE - American Society of Sanitary Engineers
5. ASTM - American Society for Testing and Materials

6. AWWA - American Water Works Association
7. CISPT - Cast Iron Soil Pipe Institute
8. COC - City of Columbus
9. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry, Inc.
10. NEC - National Electrical Code
11. NEMA - National Electrical Manufacturers Association
12. NFPA - National Fire Protection Association
13. OAC - Ohio Administrative Code
14. ODH -Ohio Department of Health
15. ODOE - Ohio Department of Energy
16. ODOT - Ohio Department of Transportation
17. Ohio EPA- Environmental Protection Agency, Ohio.
18. PDI – Plumbing and Drainage Institute
19. UL - Underwriters' Laboratories
20. OSHA –Occupational Safety and Health Administration
21. EPA- Environmental Protection Agency.

E. The following codes apply to this work:

1. Local
   a. Local County Jurisdiction
   b. IECC - International Energy Conservation CodeState of Ohio
   c. Ohio Building Code
   d. Ohio Plumbing Code
   e. Pressure Piping Code (OAC 4101:8)
   f. Fire Code (OAC 1301:7 and 4101:21 thru 10)
2. National
   a. National Fire Protection Association (NFPA) Codes as listed in subsequent Sections.
   b. ANSI Welding Code B31.1.0.
   c. All applicable OSHA Requirements

1.3 CONTRACT DRAWINGS

A. Drawings are schematic and show approximate locations and the extent of work. Exact locations and extent must be coordinated with other Contractors and verified in the field. Coordination of the final fabrication drawings and final coordination of the installation in the field is the Contractor's responsibility. Contractor is to take the design to the next level of detail knowing exactly what equipment and materials he is going to provide and build the project based on that equipment and other approved shop drawings.

1.4 ABBREVIATIONS AND SYMBOLS

A. Some of the abbreviations and symbols are shown on Drawings. Contractor should refer also to the symbols lists shown in the American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) Fundamentals Handbook and American Society of Plumbing Engineers (ASPE) Handbook for further abbreviations.

1.5 DEFINITIONS

A. Applicable definitions as listed by Ohio Building Codes apply to this work.

1.6 PERMITS, FEES AND NOTICES

A. Unless otherwise excluded in the Contract Documents, secure and pay for all fees, licenses and inspections necessary for the proper execution and completion of work.

B. Give notice and comply with all laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance of the work.

1.7 EXAMINATION OF SITE

A. Certain existing conditions may affect the manner of work or sequence of the work tasks. Review existing services and structures prior to bidding the work. Review operating schedules for existing systems and services. Coordinate the scheduling of the work with existing conditions and operations

B. The Contractor is required to visit the site of the proposed project, become familiar with other trades design drawings for coordination. After the Contract is signed, no allowance will be made for a lack of knowledge or omission of the project conditions.

C. Verify and reconcile the work required by the Contract Documents with conditions at the Site, prior to bidding the project.

1.8 UTILITIES

A. Locate any existing utilities prior to construction. Make minor relocation if required by site conditions to permit installation of work. Advise the Architect/Engineer immediately of major conflicts to permit modifications of the Contract Documents.

B. Record locations of all concealed utilities on the Record Drawings.

C. Procedure for making connections to existing utilities shall be planned at least two weeks in advance of the work and the work shall be executed in a manner to provide reasonably continuous service throughout the construction period. Connections shall be made only at times approved by the General Contractor. For interruption of service in major utility systems, the Contractor must submit to the General Contractor a step-by-step sequence of operations planned to accomplish the work. Outline must show tentative dates and times of day for shut-off and restoration of services.

D. Contractors shall make requests for Utility Services through the Utility Company. The current pressure for gas is 2 PSI or less than 14 inches at regulator for the equipment. The contractor shall verify pressure and provide the secondary regulators for necessary pressure reduction to match the equipment need.

1.9 CONTRACTOR DESIGN/DETAILING

A. The Contractor is required to include the design of component parts, sub systems and installation details as required by the Specifications, as indicated on the Drawings and as required for a complete and operating installation. This design coordination and shop drawings work shall be done after all equipment manufacturers and material types have been selected from the ones allowed by the Specifications. If required by the Specifications, submit design calculations for review. Obtain the services of qualified personnel to perform this design and detailing. The Contractor's design and detailing does not relieve the Contractor from complying with the Contract Documents

PART 2 - PRODUCTS

2.1 DESIGN BASE MANUFACTURERS

A. The Contract Documents are based on the requirements and layout of the equipment of the Design Base Manufacturers. Design coordination of equipment with the building and with other trades has been made for the specific models and manufacturers of equipment. Where several manufacturers are listed, the first named is the Design Base Manufacturer, unless specifically noted otherwise. Products of the other listed manufacturers which are comparable in performance and quality to the Design Base Manufacturers may be submitted for review and approval

B. Prepare new layouts for all other non-base manufacturer equipment and adjust and coordinate these layouts with equipment dimensions or service requirements which may be different from those of the Design Base Manufacturer. Verify that this equipment will fit and function in the indicated application. Submit these layouts as part of the shop drawing review.

C. Whenever the Contractor furnishes equipment or material other than the Design Based Manufacturer specified, the Contractor is responsible for the cost and coordination of all modifications required, not only to his work, but also for the modifications to the design by a registered engineer if necessary and work of all other related trades affected. Where changes to the work of other trades are required, this Contractor must include the additional cost of all such work in his bid

2.2 QUANTITIES

A. Equipment may be referred to either in these Specifications or on the Drawings as singular or plural; Contractor is responsible for verifying the exact number of items required to complete his work.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate work weekly and notify the General Contractor at least two full working days prior to commencing work in a particular area.

B. Coordinate and schedule all work, in a careful manner with all necessary consideration for the General Contractor and the public, avoiding interference with the use of, and passage to and from, adjacent areas and facilities designated to remain in use during the work. Coordinate work with the other Contractors.

C. Maintain in operating condition all active utilities.

3.2 CUTTING AND PATCHING

A. Unless otherwise required in General or Special Conditions, the Contractor shall perform all cutting and patching required for his own work. Work must be accomplished in a neat and workmanlike manner, acceptable to the General Contractor.

B. If necessary to cut into work of other Trades, it shall be done by the other Trades Contractor at this Contractor's expense. Patching shall be similarly executed.

C. Cutting of structural support beams, joists, plates, or other structural members is strictly prohibited without the specific written consent of the General Contractor. Use rotary drill/ core drilling where cutting holes 'through concrete, brick, plaster, or tile is necessary. Obtain approval of the General Contractor before proceeding with work.

D. All cutting and patching shall be done promptly and all repairs shall be made as necessary to leave the entire work in good condition, including all cutting, fitting, drilling of masonry, concrete, metal, wood, plaster, and other materials as specified or required for proper assembly, fabrication, installation, and completion of all work listed in the Contract.

E. Patching shall match adjacent materials and shall be accomplished only by tradesmen skilled in the respective craft required. Materials and equipment used in the patching work shall comply with requirements of those Sections of the Specifications relating to material to be used in new construction. If sleeves are installed in fire wall, it shall meet NFPA requirements.

3.3 PAINTING AND RELATED WORK

A. Painting and repairs in patched area, required by Sections of Division 22, is the responsibility of the respective Division 22 Contractor. It shall be done by a qualified tradesman skilled in the craft and shall meet the requirements of Division 9. Each Contractor is responsible for repainting of finished areas disturbed by his own cutting and patching. Finishes shall match existing surrounding surfaces

B. Factory finished equipment which has rusted or has been damaged shall be cleaned, spot primed with zinc chromate, and finished to the original quality and color by the Contractor.

C. Support steel shall be cleaned, rust removed, primed, and painted.

D. All plywood mounting boards shall be primed and finished in accordance with Division 9.

3.4 CLEANING

A. Upon completion of work, all material and equipment furnished in this Contract shall be thoroughly cleaned of dirt, grease, rust, and oil. Prepare for finish painting, where painting is specified.

B. Clean galvanized piping in exposed areas with diluted acetic acid.

C. Clean copper piping in exposed areas with fine emery cloth and solvent.

D. Clean all gauges, thermometers, traps, dirt legs, strainers and fittings.

E. Contractors must remove mud and spillage from public and Owners streets without delay. Failure to clean streets promptly could result in streets being cleaned by the General Contractor or other public agency at the Contractor's expense.

3.5 TESTS

A. The Contract Documents, laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction may require portions of the work to be inspected, tested or approved. These services shall be performed by approved agencies at the Contractor's expense.

B. The General Contractor must be notified of all scheduled tests and adjustments at least 48 hours before they are scheduled. If the Contractor performs any test or adjustment without proper notification, the Contractor may be required to perform the test or adjustment a second time, at the Contractor's cost. All test schedules are to be coordinated with the General Contractor to minimize inconvenience and interruption of work.

C. The Contractor shall bear all costs of such inspections, tests or approvals.

D. Required certifications of inspection, testing, or approval shall be secured by the Contractor and included in the Service Manual.

E. Concealed lines shall be tested before being concealed. If a leak appears during the final test, the Contractor shall repair the line and any damage resulting from the leak.

F. After work has been completed, but before pipe covering has been applied, the Contractor shall test each system as required by other Sections of this Specification. At the test pressures, the circulation shall be free and the piping proven free of leaks.

3.6 REQUIREMENTS FOR COMPLETION

A. DESCRIPTION

1. The following is a partial list of items which must be submitted as required prior to Substantial Completion. Refer to General Conditions and Division 1 sections concerning closeout. The list includes, but is not limited to:
   a. All Division 22 Contractors:
      1) Receipt for Operating Instructions and Service Manual.
      2) Certificate of Equipment Demonstration.
      3) Receipt for keys.
      4) Warranties.
      5) All required test reports as specified in other Sections.
      6) Record Drawings.
   b. Plumbing Contractor Only.
      1) Certificate of Plumbing Inspection.
      2) Certificate of Sterilization.

B. In addition to the written submittals, the following items must also be submitted prior to Substantial Completion:

1. Loose or spare parts as specified in other Sections.
2. Spare parts as specified in this Section.
3. Dates Equipment arrived at job site.
4. Installation completion date.
5. Dates of maintenance at start-up and periodic inspections.
6. Dates of lubrication, specific brand names, manufacturer and types of lubricant.
7. Any keys or specialty tools, wrenches etc.
8. Sterilization of potable water new piping verified by owner or A/E.

C. SPARE PARTS

1. Furnish one complete set of the following spare parts:
   a. Spare sets of belts, filters, gaskets, etc.

D. OPERATING TEST

1. At completion, the Contractor shall operate the systems for a period of at least five days, not necessarily consecutive, to demonstrate fulfillment of the requirements of the Contract. During this time, adjust equipment so that it will perform as the manufacturer intended, and so that systems will function as designed. Complete balancing before operating test is started.
2. Each system shall be operated in every mode of operation and the position of devices shall be checked for proper performance and switching.
3. The contractor shall train at minimum in two sessions, one week apart and video record the training. Schedule with Owner or its representative.

E. PERSONNEL INSTRUCTION/ TRAINING

1. After all system operational tests have been completed, schedule an instruction/Training period with the Owner’s Representative. Instruct the Owner

and Owner-designated personnel in the operation and maintenance of all systems and equipment.

2. To familiarize the Owner with equipment and procedures, allow time as necessary for this instruction / training. Schedule time convenient for the Owner.
3. The instruction is to include the following:
   a. Location of items of equipment and explanation of their use.
   b. Reference to service manual for record and clarity.
   c. Coordination of written and verbal instructions so that each is understood by personnel.
   d. Explanation of control system.
   e. Complete review of items in the manuals.
   f. Maintenance procedures to be followed by the Owner.

F. SAFETY REQUIREMENTS

G. Contractor shall be required to comply with all requirements for ACGIH /OSHA Safety Data Sheets (SDS's) (previously called MSDS sheets) lockout and tag out procedures, section 013543 "Environmental Procedures, confined space entry requirements, work permits, construction site fire protection, fall protection for all contractor and subcontractor employees, hazardous materials abatement procedures, prohibition of mercury-containing materials, etc.

END OF SECTION 22 0500.10

SECTION 22 0505 - PLUMBING EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 DESCRIPTION

A. The bedding and backfill requirements listed in this Section represent a minimum requirement. If Local or State requirements are in excess of listed requirements, such requirements shall supersede.

B. ALL EXCAVATION AND BACKFILL WORK SHALL COMPLY WITH REQUIREMENTS OF THE LATEST STANDARDS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).

C. Provide excavation and backfilling for Plumbing Work. Backfill to finish grade or to levels suitable for finish grading.

D. Refer to Section 22 05 .00 for cutting and patching responsibilities.

E. Coordinate routing of underground lines with the A/E to minimize disruption and damage to trees, shrubs, walks, drives, and other landscape features.

F. Excavation, backfill, surface repair and traffic control within the public right-of-way shall be in accordance with governing agency rules and regulations. Pay any fee associated with alteration of the roadway.

G. Remove unusable or surplus excavated material from the site. Deposit any usable excavated material where directed by the A/E.

H. Locate and touch existing underground utilities, if any, in the areas of Work. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, notify the A/E immediately for instructions before proceeding. Cooperate with all trades, Utility Companies and the Owner in keeping services and the facilities in operation.

I. Excavation damage to, or interruption of service of, any underground utility shall be a liability of the Contractor, whether or not plotted on the Drawings. Promptly repair or replace all damage to any existing utility to the full satisfaction of the Utility Company, the Utility Owner and the A/E.

J. All existing utility service piping, conduits, wiring, etc., which are uncovered, whether within or beyond the property lines, shall be suitably supported, protected and maintained in operation, and shall be protected against settlement when excavations are refilled.

K. Coordinate timing of excavations where required by the Authority Having Jurisdiction or where otherwise specified herein.

L. Provide pipe bedding for all sanitary sewer lines located outside of building.

M. Provide pipe bedding for all sanitary sewer lines located below the floor slab.

N. Obtain approval from the A/E for bearing conditions.

O. Whenever, in the opinion of the A/E, the soil is unsuitable for supporting piping, provisions for proper foundations will be made and the Contract price will be adjusted accordingly.

P. Contact the A/E to obtain copies of Soils reports, if available. Bidders are strongly urged to visit the site and investigate existing soil conditions themselves.

Q. Contractor shall provide seed grass cover to reestablish landscape to existing conditions where disturbed by its Work. This includes replacement of existing plants, shrubs, and related items.

R. Repair and restore plants, shrubs, trees, sodden areas, paving, streets, curbs, and walks to match existing in the area where excavations are made.

S. Maintain seeded lawns not less than 11 months after Contract Completion and add any backfill as required due to settling, etc. to bring up level with adjacent grade. If seeded in non-growing season and not given full 11 months of maintenance, or if not considered acceptable at that time, continue the following growing season until an acceptable lawn is established, as determined by the A/E.

T. Rock excavation is not anticipated. Contractor will be entitled to additional compensation for excavating any rock that is not indicated on the Contract Drawings or in available Soils Reports. Refer to available soil boring data.

1. If rock or boulders are encountered, immediately stop all excavation. Notify the A/E, and submit a cost per cubic yard, over and above Base Bid, for excavation and backfill of rock areas. Rock excavation is defined as the excavation of any buried boulders and rock, in excess of 1/2 cu. yd. in volume, which requires the systematic drilling with jackhammer or use of other special equipment.
2. All other excavation, including soft shale and similar sedimentary soil formations, shall be regarded as “earth” excavation, and shall be included in the Contractor’s Bid.
3. Do not proceed with rock excavation without prior written authorization of the A/E.
4. The use of explosives is expressly prohibited.

U. Provide concrete encasement required for underground piping. Where required, concrete encasement shall extend 6 in. around piping or sleeve, for 1 ft. each side of footings or foundations, and up to footing bearing elevation. Backfill around piping encasement after concrete has properly hardened.

1. All concrete shall be 3,000 PSI minimum and placed in accordance with applicable ACI Standards. Refer to Section 03 30 .0.

PART 2 - PRODUCTS

2.1 BACKFILL

A. Typical backfill conditions:

1. Piping where bedding is not specified or required by Code: Previously excavated material.
2. Piping below slab-on-grade floors and pavement: Crushed stone (ODOT Item 304), pea gravel, or coarse sand from 4 in. below piping to slab.
3. Other piping outside building: Pea gravel from 4 in. below piping to 12 in. minimum above pipe, then previously excavated material.
4. Piping under drives and parking lots: Pea gravel from 4 in. below piping to 12 in. minimum above pipe, then previously excavated material. If pipe is less than 2 ft. below grade to top of pipe, provide 6 in. concrete encasement.
5. Concrete pads and bases: Granular material conforming to Division 03 requirements.
6. Piping under footings and foundations: Provide concrete encasement.
7. Underground oil interceptor: Pea gravel.

B. Materials:

1. Crushed stone: (ODOT Item 304).
2. Pea gravel: 1/8 in. minimum to 3/4 in. maximum diameter.
3. Sand: Clean, dry, coarse or medium.
4. Washed gravel: 3/4 in. size.
5. Concrete encasement: Material conforming to Division 03 requirements.

C. Materials Prohibited from Being Used for Backfill:

1. Material containing large rocks (over 2 in.), building materials, masonry debris, cinders, rubbish, wood, or other material subject to decay.
2. Any material which may cause damage to piping.
3. Frozen earth.

2.2 Paving

A. Asphalt Paving:

1. Aggregate base: ODOT Item 304, 8 in. total, compacted in (2) 4 in. layers.
2. Base course: ODOT Item 402, 13/4 in. thickness.
3. Surface course: ODOT Item 404, 11/4 in. thickness.
4. Tack coat: ODOT Item 407.
5. Prime coat: ODOT Item 408.

B. Sealer: ODOT Item 409.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavations shall be open cut from the surface. No undercuts permitted, except where specifically directed by the Associate Architect.

B. Hold trench width to a minimum.

C. Do not excavate utility trenches parallel to building or column footings closer than 5 ft. except with prior written approval of the Associate Architect. When parallel trenches are required deeper than the building footings, the horizontal distance from the footing shall be equal to, or greater than, 1-1/2 times the vertical distance below the footing, but in no case shall the horizontal distance be less than 5 ft., except with the approval of the Associate Architect.

D. Bedded piping: Mechanical excavation shall extend 4 in. to 6 in. below final elevation of pipe. In trenches cut through rock, mechanical excavation shall extend 6 in. below and around final elevation of pipe.

E. Unbedded piping: Mechanical excavation shall be held to 4 in. above final elevation. The remainder shall be trenched by manual excavation, so that piping is fully supported on undisturbed soil. Shoring of piping in trench will not be permitted.

F. Remove from site, excess materials unsuitable for fill.

G. Coordinate timing of excavations in advance with other Contractors, the Associate Architect, and the Owner.

3.2 PROTECTION

A. Maintain in place adequate barricades, guards, planking, plating, signage, warning lights, etc., at and around excavations.

B. Contact the Ohio Utilities Protection Service (1-800-362-2764) well in advance of the start of any excavation, to determine if any of the utility companies or departments have underground utilities in or near the project area.

C. Contact Local Water and Sewer Departments, Gas Company, Electric Company, Telephone Company, etc. regarding the possibility of encountering existing utilities. The integrity of all existing utilities shall be maintained.

D. 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 at the Contractor's expense, to the full satisfaction of the Utility Owner.

E. Provide and maintain bracing, shoring, sheet piling or sheathing as required to safely support walls of the excavation. Barricade and maintain in a safe condition until backfilling is completed.

F. Provide and operate pumping equipment to keep excavation free of water at all times.

G. Protect excavations from frost by covering and/or heating.

H. Install a continuous 4 in. wide vinyl plastic tape, with embossing, identifying buried service, 18 in. above pipe elevation and on pipe centerline, during backfilling operation on new outside piping.

3.3 BACKFILLING

A. Backfill only when exact locations of lines and equipment have been recorded, and all tests and inspections have been completed.

B. Do not place fill material on frozen ground, or use fill in a frozen condition.

C. Deposit fill in layers of thickness required by the nature of the soil, or as directed, but not exceeding 6 in. compacted thickness, to a point 24 in. above pipe, and 12 in. thickness above this point. Compact each layer to a uniform solid mass. Place fill in horizontal layers, beginning with lowest areas and building up until entire area to be filled is at a uniform elevation. Compaction shall be a minimum of 90 lbs./cu.ft. laboratory dry weight.

D. Bedded piping: Pipes shall be bedded in pea gravel, minimum 4 in. below pipe, 6 in. above pipe, according to Ohio Specifications CM 310.02, Grading "A".

E. Unbedded Piping: If excavation should go deeper than required, fill with bank run gravel and tamp firmly to achieve final elevation. Wherever material is encountered in the bottom of the excavation that is not capable of supporting piping properly, remove such material to depth required. Backfill with crushed stone, and tamp firmly to achieve final elevation.

F. Control moisture content of compacted fill to insure maximum density either by adding water and working soil prior to compacting.

G. Use machine tampers around perimeter of foundation walls or areas inaccessible to large equipment and rollers. Do not use rolling equipment in areas adjacent to foundations.

H. Concrete encasement shall extend 6 in. around piping and for 1 ft. each side of footings or foundations, and shall extend up to footing bearing elevation.

I. Concrete encasement shall be by the Division 22 Contractor. Division 22 Contractor shall clean around pipe before encasement. Division 22 Contractor backfills around piping encasement after concrete has properly hardened.

J. Provide clay bulkheads, minimum 3 ft. long, across the trench at 100 ft. intervals, to impede the natural movement of ground water. Top of bulkheads to extend 6 in. above top of pipe.

K. Where excavations have not been properly filled or where settlement occurs, they shall be refilled, compacted, smoothed off, and finished to a final condition acceptable to the Owner and Associate Architect.

3.4 EXCAVATION SAFETY

A. Excavation and trench wall supporting, shoring, sloping, cribbing, stepping of excavations, and other steps required for safety shall be in strict accordance with OSHA and Local requirements.

B. Stability of Excavations: Slope sides of excavations to comply with requirements of OSHA and Code Authority having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or instability of material exposed.

C. Maintain sides and slope of excavations in a safe condition until completion of backfilling.

D. Shoring and Bracing: Provide materials for shoring and bracing such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

E. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

F. Protection of Persons and Property: Barricade open excavations occurring as part of this Work, and post with warning lights. Erect warning lights as required by OSHA and Local Code Authority. Consult with Associate Architect regarding additional requirements.

G. Refer to the "Manual of Accident Prevention in Construction", published by the Associated General Contractors of America, and safety regulations of the appropriate State Agency.

END OF SECTION 22 0505

SECTION 22 0508 - PLUMBING ELECTRICAL COORDINATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Unless noted otherwise, the Electrical Contractor shall provide all line voltage wiring required to power Plumbing equipment.

B. Unless noted otherwise, the Plumbing Contractor shall provide all low voltage wiring for control, monitor, or interlock Plumbing equipment.

C. Plumbing Contractor shall supervise all final power connections to Plumbing and temperature control equipment and devices.

PART 2 - PRODUCTS

2.1 DISCONNECT SWITCHES

A. Plumbing contractor shall provide factory-installed disconnects only where specifically listed in division 22 specification sections. Electrical contractor shall provide all other disconnects.

2.2 MOTOR STARTERS

A. Plumbing contractor shall provide factory-installed starters only where specifically listed in division 22 specification sections. Electrical contractor shall provide all other starters.

2.3 CONTROL WIRING

A. Plumbing Contractor shall provide all control wiring.

PART 3 - EXECUTION

3.1 PREPARATION

A. Consult Drawings which may affect the location of equipment, conduit or wiring, and make minor adjustments in locations as necessary to secure coordination.

END OF SECTION 22 0508

SECTION 22 0509 - GENERAL PLUMBING PIPING REQUIREMENTS

PART 1 - GENERAL

1.1 Description

A. The following instructions apply to all piping systems, except where otherwise noted:

1. Piping Drawings are schematic. Carefully coordinate final locations.
2. Provide unions or flanges at each final connection and at each piece of equipment. Arrange piping, and locate unions and flanges, to permit easy removal of parts and equipment for inspection and cleaning. Welded connections to equipment are prohibited.
3. Where connection size is smaller than piping, make reduction at final connection only. Do not reduce size of pipe drop. Arrange all piping in accordance with the best standards of the Trade, with vertical lines plumb, and horizontal runs parallel or perpendicular to the building walls.
4. Provide valves and specialties as required to provide a complete and operational system. Install valves on each piece of equipment.

B. If other means of draining are not provided, install drain valves at all low points to permit complete draining of each of the following systems:

1. Domestic water system.

C. Contractor shall provide information on chases, sleeves, and openings required for its Work to other trades. Contractor shall assume cost and responsibility for all cutting and patching resulting from improper coordination of its Work.

PART 2 - PRODUCTS

2.1 UNIONS

A. In copper pipe: Bronze 150 lb. ground joint, solder end (do not use wrought copper unions).

B. In steel pipe: Black malleable iron, 250 lb. bronze ground ball joint.

C. Dielectric: Material shall be compatible for the type of service.

2.2 DRAIN VALVES

A. Drain Valves: Milwaukee BA100H or BA150H. 3/4 in. bronze hose-end ball valve, with cap and chain (where concealed).

B. Other Acceptable Manufacturers: Walworth or Nibco.

2.3 JOINTS

A. Flanged: Cast iron or cast bronze, 125 lb.

B. Gaskets: Nonmetallic. 1/8 in. minimum thickness, fibrous type with double coat of graphite, asbestos-free, ASME B16.21, except use Type 304 stainless steel with carbon steel guide on high temperature piping systems. Use dielectric gaskets where joining dissimilar piping material.

C. Bolts and Other Hardware:

1. Bolts for steel, cast iron, brass, and bronze, for 250 lb. SWP, and for 450 deg. F. or below: Carbon steel, with American Standard regular, square heads and American Standard heavy-hexagon, semi-finished nuts.
2. Where equipment is installed outside, all hardware and bolts shall be stainless steel.
3. ASME B18.21, Teehead, high tensile steel bolts and nuts may be used in mechanical joint pipelines.

D. Threaded piping: Use NPT tapered threads. (ASME B1.20.1.)

E. Filler materials:

1. Solder: Shall meet ASTM B32. Alloy Sn94 and Sn95 shall be used.
2. Brazing: Shall meet AWS A5.8.
3. Welding: Shall comply with AWS D10.12.

2.4 NIPPLES

A. Same weight and material as pipe with which they are used, except shoulder nipples shall be extra-heavy. Short nipples are not allowed.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate installation height of faucets, hose bibbs, and wall hydrants with Associate Architect.

B. Coordinate piping with beams, joists, walls, HVAC ductwork, equipment and electrical equipment.

C. Coordinate location of rough-in and final connections to equipment with General Trades Contractor.

3.2 INSTALLATION

A. Install all valves in accessible locations. Coordinate installation of access panels.

B. Open valves fully before soldering.

C. Where water lines drop in outside walls, install piping so that the wall insulation is between the pipe and the outside wall. Avoid this condition where at all possible.

D. Install ball valves in lines to equipment and fixtures not provided with stops.

E. Unless otherwise noted, install shock absorbers at the end of each main or branch.

F. Install backflow preventers where indicated or required by code.

G. Provide rigid support for water meter as required to securely hold meter stable.

H. Installation of water meter shall meet Water Utility Company standards.

I. Where piping is installed above ceilings, below ceiling insulation, this Contractor to assure that ceiling insulation has no insulation voids above piping.

J. Install piping in such a manner as to allow complete drainage of the water piping system. Drain toward the source, wherever possible.

K. Provide 3/4" valved inlet immediately downstream of water meter for purpose of adding sterilizing solution into interior domestic water piping system.

3.3 TESTS

A. Perform tests as required by the State and Local Building Code and as specified below:

1. Take precautions to remove all air before performing hydrostatic tests.
2. Test piping at 125 PSIG for (6) hours with no pressure drop. All tests should be made before piping is insulated or concealed. Tests shall be witnessed by the Associate Architect's Representative.
3. If a leak occurs, defective piece or joint shall be replaced. No caulking will be permitted. Tests shall then be repeated.

3.4 STERILIZATION OF WATER LINES

A. After water piping is complete and fixtures have been installed, flush piping clean and sterilize all new hot and cold water piping, including water service line, and water heaters. The sterilization shall be done under the immediate on-the-job supervision of a Water Testing Laboratory regularly engaged in the service. All fees for testing and use of testing equipment shall be paid by this Contractor.

B. With all outlets closed, fill system to working pressure and close valve on supply main.

C. Open all fixtures slightly and pump a sterilization solution into test tap as follows: 400 minimum to 1000 maximum parts per million chlorine solution made from a sanitation grade of hyperchlorite, 70% available chlorine. Hyperchlorites may be either Pittchlor, H.T.H. or Perclorn.

D. Each outlet, hot and cold, shall be tested during fill to prove the presence of chlorine at that outlet. Chlorine shall be present at all outlets.

E. Water piping system shall remain filled for a period of 24 hours and each outlet shall be again tested and shall have at least 100 parts per million of chlorine remaining.

F. Upon completion of sterilizing, all outlets shall be opened wide and the main supply valves opened, flushing system free of chlorine. Outlets shall be again checked and flushed until free of chlorine. Flush main valves and entire building domestic water system. Coordinate with Owner.

G. After final flushing, all electric water cooler inlet strainers and all aerators shall be removed, cleaned and replaced.

H. Chlorination of the system may be performed at same time the pressure test is conducted.

I. Provide Associate Engineer with a "Certificate of Completion of Chlorination" after chlorination is completed.

END OF SECTION 22 0509

SECTION 22 0510 - PLUMBING PIPING EXPANSION NOISE VIBRATION ISOLATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide thermal expansion control for all piping.

B. Isolate all piping for both noise and vibration transmission.

C. To prevent damage to building, equipment, joists, hangers and piping, provide expansion loops, guides, anchors and offsets in piping systems as necessary to accurately control pipe movement due to equipment operation or thermal gradients.

D. Provide flexible connectors on all piping to equipment 5 HP and larger, and where shown for equipment of lower horsepower.

E. Provide expansion joints and accompanying anchors and guides where expansion cannot be provided for with loops and offsets (not shown).

F. Anchor points are not indicated on Drawings. Install anchor points as needed to properly control piping movement. Typically piping shall be anchored at tees, elbows and bends. Piping shall also be anchored in each direction.

PART 2 - PRODUCTS

2.1 EXPANSION JOINTS

A. 2 in. and smaller: Stainless steel bellows and elements; cast iron equalizing rings, tie-rods, and copper sweat ends, internally guided expansion compensator, 250 PSIG working pressure.

B. Acceptable Manufacturers: Metraflex HPMF or equal by Hyspan Precision Products, Inc., Flexicraft, Flexonics Products, Minnesota Flexible Corp., Uniroyal General Rubber, or Twin City Hose, Inc..

2.2 PIPE ALIGNMENT GUIDES

A. Painted steel cylinder guide assembly with welded mounting brackets, 2piece pipe clamp “Spider” assembly.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Line expansion:

1. U-Bends: In all piping subject to expansion and contraction, install U-Bends or loops in piping, in accordance with ASHRAE Equipment Handbook, Chapter 33.
2. Expansion Joints: Where unable to provide U-bends, or where specifically shown or specified, provide expansion joints. Install according to the Manufacturer's instructions.

B. Branch connections:

1. Branch connections to mains shall be made with a minimum of two 90 degree elbows, and must incorporate at least one change of direction in the horizontal plane, and one change of direction in the vertical plane, before connecting to equipment or fixtures, or before dropping in or rising in a wall. Exceptions: All refrigerant piping shall be installed per ASHRAE Standards, and Manufacturer's recommendations.
2. Bullhead connections in any piping service are expressly prohibited.

C. Guides: All loops and expansion joints shall be supplemented with adequate guides as close to loops and joints as possible and additionally at recommended intervals from joints, to preserve alignment and pitch. Guides shall be rigidly secured to the structure and shall permit axial movement only. Follow Manufacturer's instructions on locations where applicable.

D. Anchors: Pipe anchors shall be installed where required to secure the pipe and totally eliminate movement. They shall be attached securely to the structure.

END OF SECTION 22 0510

SECTION 22 0511 - PLUMBING ROUGH IN AND CONNECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Special Conditions, and Division 01, General Requirement 220509 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. Provide supply, waste, vent, gas, compressed air and other plumbing service rough-ins. Refer to approved equipment drawings for exact rough-in sizes and locations. Coordinate rough-in with all items of equipment. Coordinate rough-in locations with the Owner.

B. Make final connections to equipment furnished by the Owner, unless otherwise noted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Furnish and install only those brands of material and equipment mentioned specifically in these Specifications or on the Drawings, or if accepted as substitutes.

B. Provide piping, fittings, valves, and specialties as required and as specified under other Sections of these Specifications.

C. Provide stop valves on supply connections to equipment not otherwise furnished with integral stops.

D. Provide waste traps and drain strainers on waste connections to equipment as required and specified. Provide ADA protective pipe/fitting coverings on all exposed finish piping serving sinks and lavatories

E. Provide finish cleanout and access covers as required and specified.

F. All products and piping installed under floor, in trench or above ceiling shall be checked by quality control person and pressure tested before covering any piping or its components.

PART 3 - EXECUTION

3.1 PLUMBING INSTALLATION

A. Thoroughly clean plumbing piping and equipment provided as a part of this work. Remove shipping stickers, cement, mortar, plaster, paint splatters, oil and grease spots, and other foreign matter.

B. Plan and coordinate arrangement, mounting, and support of plumbing equipment before installing.

C. Provide final cleaning of plumbing equipment and area of work after completion of plumbing finish work and making final connections.

END OF SECTION 22 0511

SECTION 22 0517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.
3. Grout.

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

A. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

B. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

C. Galvanized-Steel-Sheet Sleeves: 0.0239-inchminimum thickness; round tube closed with welded longitudinal joint.

D. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.2 SLEEVE-SEAL SYSTEMS

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

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.

3. Proco Products, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.
   a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.

2. Install sleeves that are large enough to provide 1/4-inchannular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 07 9200 "Joint Sealants."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:
   a. Piping Smaller Than: Galvanized-steel wall sleevesGalvanized-steel wall sleeves, schedule 40 minimum..
   b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.
2. Exterior Concrete Walls below Grade:
   a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.
      1) Select sleeve size to allow for 1-inchannular clear space between piping and sleeve for installing sleeve-seal system.
   b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.
      1) Select sleeve size to allow for 1-inchannular clear space between piping and sleeve for installing sleeve-seal system.
3. Concrete Slabs-on-Grade:
   a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves with sleeve-seal system.
      1) Select sleeve size to allow for 1-inchannular clear space between piping and sleeve for installing sleeve-seal system.
   b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves with sleeve-seal system.
      1) Select sleeve size to allow for 1-inchannular clear space between piping and sleeve for installing sleeve-seal system.
4. Concrete Slabs above Grade:
   a. Piping Smaller Than NPS 6: Molded-PE or -PP sleeves.
   b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.
5. Interior Partitions:
   a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
   b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 22 0517

SECTION 22 0523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide valves to facilitate maintenance and isolation of piping systems.

PART 2 - PRODUCTS

2.1 BALANCING VALVES (2 in. and Smaller)

A. 200 PSIG, ASTM B62 bronze body/brass ball, threaded or solder joint ends, differential pressure read-out ports, 1/4 in. drain port, memory stop feature to allow valve to be closed for service and reopened to setpoint without disturbing balance position, and calibrated nameplates to ensure specific valve settings.

B. Acceptable Manufacturers: ITT Bell & Gossett CB Series, Nibco Fig. 1710, or Taco ACUF Series.

2.2 BALL VALVES (3 in. and Smaller)

A. 150 lb. SWP, bronze body, threaded or solder joint ends, TFE seat and seals, stainless steel ball, blow-out-proof stem, extended handle with vapor seal, adjustable memory stop, and protective sleeve.

1. Acceptable Manufacturers: Milwaukee Model BA100 or BA150, Watts No. B6000 or B6001, Apollo 70100 or 70200, Hammond 8501 or 8511, Nibco 580-70 or 585-70, or Kitz 68 or 69.

B. With Lockable Handles: 150 lb. SWP, bronze body, threaded ends, TFE seat and seals, stainless steel ball, extended handle with vapor seal, adjustable memory stop, and protective sleeve.

1. Acceptable Manufacturers: Milwaukee Model BA100 LD, Apollo No. 7010027, or Nibco 58070LH.

2.3 CHECK VALVES

A. 2 in. and Smaller: 125 lb. SWP, ASTM B62 bronze body, swing check, threaded or solder joint tubing ends, with renewable bronze disc and integral seat.

1. Acceptable Manufacturers: Milwaukee Fig. 509, 1509, Apollo 161 Series, Nibco T-413, or Watts LFWCV.

B. 21/2 in. and Larger (swing): 125 lb. SWP, iron body, bronze trim, with flanged ends.

1. Acceptable Manufacturers: Milwaukee Fig. F-2974, Apollo 910F, or Nibco F-918.

2.4 DRAIN VALVES

A. 3/4 in. bronze hose-end ball valve, with cap and chain.

B. Acceptable Manufacturers: Milwaukee Fig. BA-100H or BA-150H (threaded or soldered ends), Apollo 70-100 HC Series, or Nibco T-585-70-HC.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install valves and specialties at locations where indicated on the Drawings or where required for maintenance and service.

B. Install 3/4 in. drain valves in piping at low points to provide complete drainage of all systems.

C. Install valve at inlet and outlet to water heater.

D. Install valves in accessible locations for operation, removal or servicing. Coordinate with structure, mechanical and electrical equipment.

E. Open up valves fully before soldering to piping.

F. Locate all valves in accessible location or coordinate access panel locations with architect and GC to ensure proper access is provided to all valves.

G. Install valves with handwheel at or above center of pipe.

H. During soldering or brazing, remove valve internals, protect the remaining element of sweat end valves against heat damage.

I. Extend drain from temperature pressure relief valve to 6" above floor, or to floor drain.

3.2 PROHIBITIONS

A. Do not install any valves where the fluid operating pressure exceeds 80% of its pressure rating.

B. Do not install solder joint valves on systems where the fluid temperature may soften the solder.

C. Do not use union fittings on soldered copper connections.

3.3 TESTS

END OF SECTION 22 0523

SECTION 22 0523.12 - BALL VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.
3. CPVC ball valves.
4. PVC ball valves.

1.2 DEFINITIONS

A. CWP: Cold working pressure.

B. RPTFE: Reinforced polytetrafluoroethylene.

C. WOG: Water, oil, gas.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and soldered ends.
3. Set ball valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Standards:

1. Domestic water valves intended to convey or dispense water for human consumption must comply with the SDWA, requirements of authorities having jurisdiction, and NSF 61 and NSF 372, or must be certified to be in compliance with NSF 61 and NSF 372 (by an ANSI-accredited third-party certification body) that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.5 for flanges on steel valves.
4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
5. ASME B16.18 for cast copper solder-joint connections.
6. ASME B16.22 for wrought copper and copper alloy solder-joint connections.
7. ASME B16.34 for flanged and threaded end connections
8. ASME B31.9 for building services piping valves.

C. Provide bronze valves made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

D. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream piping unless otherwise indicated.

F. Valve Actuator Type:

1. Gear Actuator: For quarter-turn valves NPS 4 and larger.
2. Hand Lever: For quarter-turn valves smaller than NPS 4 .

G. Valves in Insulated Piping:

1. Provide 2-inch extended neck stems.
2. Extended operating handles with nonthermal-conductive covering material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

2.3 BRASS BALL VALVES

A. Brass Ball Valves, Two Piece with Full Port and Brass Trim, Threaded or Soldered Ends:

1. Manufacturers: Subject to compliance with requirements, provide one of the following:
   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   b. Bray Commercial.
   c. FNW; Ferguson Enterprises, Inc.
   d. Milwaukee Valve Company.
   e. Viega LLC.
   f. WATTS; A Watts Water Technologies Company.
2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Two piece.
5. Body Material: Forged brass.
6. Ends: Threaded or soldered.
7. Seats: PTFE.
8. Stem: Brass.
9. Ball: Chrome-plated brass.
10. Port: Full.

B. Brass Ball Valves, Two Piece with Full Port and Stainless Steel Trim, Threaded or Soldered Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   b. FNW; Ferguson Enterprises, Inc.
   c. Milwaukee Valve Company.
   d. Viega LLC.
   e. WATTS; A Watts Water Technologies Company.
2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Two piece.
5. Body Material: Forged brass.
6. Ends: Threaded or soldered.
7. Seats: PTFE.
8. Stem: Stainless steel.
9. Ball: Stainless steel, vented.
10. Port: Full.

2.4 BRONZE BALL VALVES

A. Bronze Ball Valves, Two Piece with Full Port, and Bronze or Brass Trim, Threaded or Soldered Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.

b. Milwaukee Valve Company.
c. NIBCO INC.
d. Viega LLC.
e. WATTS; A Watts Water Technologies Company.
f. Zurn Industries, LLC.

2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Two piece.
5. Body Material: Bronze.
6. Ends: Threaded or soldered.
7. Seats: PTFE.
8. Stem: Bronze or brass.
9. Ball: Chrome-plated brass.
10. Port: Full.

B. Bronze Ball Valves, Two Piece with Full Port and Stainless Steel Trim, Threaded or Soldered Ends:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   b. Milwaukee Valve Company.
   c. NIBCO INC.
   d. Viega LLC.
   e. WATTS; A Watts Water Technologies Company.
2. Standard: MSS SP-110; MSS SP-145.
3. CWP Rating: 600 psig.
4. Body Design: Two piece.
5. Body Material: Bronze.
6. Ends: Threaded or soldered.
7. Seats: PTFE.
8. Stem: Stainless steel.
9. Ball: Stainless steel, vented.
10. Port: Full.

2.5 CPVC BALL VALVES

A. CPVC Union Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Valve, Inc.
   b. Hayward Flow Control; Hayward Industries, Inc.
   c. Jomar Valve.
2. Standard: MSS SP-122.
3. Pressure Rating and Temperature: 150 psig at 73 deg F .
4. Body Material: CPVC.
5. Body Design: Union type.
6. End Connections for Valves NPS 2 and Smaller: Detachable, socket or threaded.

7. End Connections for Valves NPS 2-1/2 to NPS 4: Detachable, socket or threaded .
8. Ball: CPVC; full port.
9. Seals: PTFE or EPDM-rubber O-rings.
10. Handle: Tee shaped.

2.6 PVC BALL VALVES

A. PVC Union Ball Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. American Valve, Inc.
   b. Hayward Flow Control; Hayward Industries, Inc.
   c. Jomar Valve.
2. Standard: MSS SP-122.
3. Pressure Rating and Temperature: 150 psig at 73 deg F .
4. Body Material: PVC.
5. Body Design: Union type.
6. End Connections for Valves NPS 2 and Smaller: Detachable, socket or threaded.
7. End Connections for Valves NPS 2-1/2 to NPS 4: Detachable union with socket or threaded .
8. Ball: PVC; full port.
9. Seals: PTFE or EPDM-rubber O-rings.
10. Handle: Tee shaped.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves. Remove defective valves from site.

3.2 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow space for service, maintenance, and equipment removal without system shutdown.

B. Provide support to piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access.

D. For valves in horizontal piping, install valves with stem at or above center of pipe.

E. Install valves in position to allow full valve actuation movement.

F. Valve Tags: Comply with requirements in Section 22 0553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

G. Adhere to manufacturer's written installation instructions. When soldering or brazing valves, do not heat valves above maximum permitted temperature. Do not use solder with melting point temperature above valve manufacturer's recommended maximum.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves exhibiting leakage.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, provide the same types of valves with higher CWP ratings.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option or press-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

3.5 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Brass ball valves, two piece with full port, and brass stainless steel trim. Provide with solder -joint ends.
2. Bronze ball valves, two piece with full port, and bronze or brass stainless steel trim. Provide with solder -joint ends.
3. Bronze ball valves, two piece with regular port, and bronze stainless steel trim.

B. Pipe NPS 2-1/2 and Larger:

1. Steel and Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.

C. CPVC Pipe NPS 4 and Smaller: Union ball valve.

D. PVC Pipe NPS 4 and Smaller: Union ball valve.

END OF SECTION 22 0523.12

SECTION 22 0529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Metal framing systems.
3. Thermal hanger-shield inserts.
4. Fastener systems.
5. Pipe stands.
6. Pipe-positioning systems.
7. Equipment supports.

B. Related Requirements:

1. Section 05 5000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 22 0510 – “PLUMBING PIPING EXPANSION NOISE VIBRATION ISOLATION” for vibration isolation devices.

1.3 ACTION SUBMITTALS

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

1. Metal framing systems.
2. Pipe stands.
3. Equipment supports.

1.4 INFORMATIONAL SUBMITTALS

1.5 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

B. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design trapeze pipe hangers and equipment supports.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7 .

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
3. Design seismic-restraint hangers and supports for piping and equipment.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electro-galvanized.
3. Nonmetallic Coatings: Plastic coated or epoxy powder coated.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel .

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
   a. Flex-Strut Inc.
   b. G-Strut.
   c. Unistrut; Atkore International.
2. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
4. Channels: Continuous slotted carbon-steel channel with inturned lips.
5. Channel Width: Selected for applicable load criteria.

6. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
7. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel .
8. Metallic Coating: Hot-dip galvanized .
9. Paint Coating: Green epoxy, acrylic, or urethane .
10. Plastic Coating: .
11. Combination Coating: .

2.4 THERMAL HANGER-SHIELD INSERTS

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

1. Buckaroos, Inc.
2. Pipe Shields Inc.
3. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hilti, Inc.
   b. ITW Ramset/Red Head; Illinois Tool Works, Inc.
   c. MKT Fastening, LLC.

B. Mechanical-Expansion Anchors: Insert-wedge-type anchors, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hilti, Inc.
   b. ITW Ramset/Red Head; Illinois Tool Works, Inc.

c. MKT Fastening, LLC.
2. Indoor Applications: Zinc-coated or steel.
3. Outdoor Applications: Stainless steel.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand:

1. Description: Single base unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
2. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
3. Hardware: Galvanized steel or polycarbonate.
4. Accessories: Protection pads.

C. Low-Profile, Single-Base, Single-Pipe Stand:

1. Description: Single base with vertical and horizontal members, and pipe support, for roof installation without membrane protection.
2. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
3. Vertical Members: Two galvanized -steel, continuous-thread, 1/2-inch rods.
4. Horizontal Member: Adjustable horizontal, galvanized -steel pipe support channels.
5. Pipe Supports: Strut clamps Clevis hanger Swivel hanger.
6. Hardware: Galvanized steel.
7. Accessories: Protection pads.
8. Height: 12 inches above roof .

2.7 PIPE-POSITIONING SYSTEMS

A. Description: IAPMO PS 42 positioning system composed of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.8 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-carbon-steel shapes.

2.9 MATERIALS

A. Aluminum: ASTM B 221.

B. Carbon Steel: ASTM A 1011/A 1011M.

C. Structural Steel: ASTM A 36/A 36M carbon-steel plates, shapes, and bars; black and galvanized.

D. Stainless Steel: ASTM A 240/A 240M.

E. Grout: ASTM C 1107/C 1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with requirements in Section 07 8413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb .

3.2 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

C. Thermal Hanger-Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Pipe Stand Installation:

1. Pipe Stand Types, except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.

F. Pipe-Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

G. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms, and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

N. Insulated Piping:

1. Attach clamps and spacers to piping.
   a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating Below Ambient Air Temperature: Use thermal hanger-shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
2. Install MSS SP-58, Type 39 protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
   e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.

6. Thermal Hanger Shields: Install with insulation of same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment, and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches .

3.6 PAINTING

A. Touchup: Clean field welds and abraded, shop-painted areas. Paint exposed areas immediately after erecting hangers and supports. Use same materials as those used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded, shop-painted areas on miscellaneous metal are specified in Section 09 9123 "Interior Painting."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A 780/A 780M.

3.7 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal framing systems and attachments for general service applications.

F. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.

G. Use copper-plated pipe hangers and stainless-steel attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal hanger-shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment of up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable-Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
   a. Light (MSS Type 31): 750 lb.
   b. Medium (MSS Type 32): 1500 lb.
   c. Heavy (MSS Type 33): 3000 lb.
3. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
2. Thermal Hanger-Shield Inserts: For supporting insulated pipe.

O. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

P. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

Q. Use pipe-positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 22 0529

SECTION 22 0553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Valve tags.
5. Warning tags.

1.3 ACTION SUBMITTALS

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

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Brimar Industries, Inc.
b. Kolbi Pipe Marker Co.
c. Marking Services, Inc.

2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
3. Letter Color: Black.
4. Background Color: White.
5. Maximum Temperature: Able to withstand temperatures up to 160 deg F .
6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch .
7. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches , 1/2 inch for viewing distances up to 72 inches , and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
8. Fasteners: Stainless-steel self-tapping screws.
9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

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

1. Brady Corporation.
2. Marking Services, Inc.
3. National Marker Company.

B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.

C. Letter Color: White.

D. Background Color: Red.

E. Maximum Temperature: Able to withstand temperatures up to 160 deg F .

F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch .

G. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches , 1/2 inch for viewing distances up to 72 inches , and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

H. Fasteners: Stainless-steel self-tapping screws.

I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

J. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

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

1. Brady Corporation.
2. Kolbi Pipe Marker Co.
3. Marking Services Inc.

B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

2.4 VALVE TAGS

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

1. Brady Corporation.
2. Carlton Industries, LP.
3. Marking Services, Inc.

B. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch or stainless steel, 0.025-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.

2. Fasteners: Brass **wire-link chain**, **beaded chain**, or **S-hook**.

C. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

2.5 WARNING TAGS

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

1. Brady Corporation.
2. Carlton Industries, Inc.
3. Marking Services, Inc.

B. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: 3 by 5-1/4 inches minimum.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Safety yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Piping Color Coding: Painting of piping is specified in Section 099123 "Interior Painting."

B. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

D. Pipe Label Color Schedule:

1. Low-Pressure Compressed Air Piping:

   a. Background: Safety blue.
   b. Letter Colors: White.

2. High-Pressure Compressed Air Piping:

   a. Background: Safety blue.
   b. Letter Colors: White.

3. Domestic Water Piping:

   a. Background: Safety green.
   b. Letter Colors: White.

4. Sanitary Waste and Storm Drainage Piping:

   a. Background Color: Safety white.
   b. Letter Color: Black.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

   a. All: 1-1/2 inches, round or square.

2. Valve-Tag Colors:

   a. Cold Water: Safety green.
   b. Hot Water: Safety green.
   c. Low-Pressure Compressed Air: Safety blue.
   d. High-Pressure Compressed Air: Safety blue.

3. Letter Colors:

   a. Letter Color: White.

3.6 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 22 0553

SECTION 22 0554 - PLUMBING VALVE TAGGING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide valve tags on all plumbing valves. EXCEPTION: Valves or stops serving only (1) plumbing fixture need not be tagged. Tags shall be stamped with service designation and numbered consecutively for each system. Attach to valves or as directed by the A/E.

B. Prepare valve tag directory with charts showing locations, designations, and sizes of valves. Laminate under plastic and mount as directed by the A/E. Additional copies of valve charts shall be included in the Operating and Maintenance Manuals.

1.2 ACCEPTABLE MANUFACTURERS

A. Seton, Brady, MSI, or Calpico.

PART 2 - PRODUCTS

2.1 TAGS

A. 2 in. diameter, 19 ga., brass tag with brass jack chain. 1/4 in. high stamped letters over 1/2 in. high stamped numbers, both black-filled.

2.2 IDENTIFICATION SCHEDULE

A. Identify as follows:

TYPE OF SERVICE	VALVE TAG DESIGNATION
Water Service	W
Domestic Hot Water (109 deg F.)	DHW-109
Domestic Hot Water Return (109 deg F.)	DHWR-109
Gas	GAS
Compressed Air	AIR

PART 3 - EXECUTION

3.1 INSTALLATION

A. A.Tags:

1. Attach to valve handwheels in such a manner that valve shall be operable without removing or damaging tag.
2. Locate to be easily readable from standing position when valve is in normal position.
3. Add valve tag numbers to Record Drawings.

END OF SECTION 22 0554

SECTION 22 0716 - PLUMBING EQUIPMENT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following plumbing equipment that is not factory insulated:

1. Domestic water, hot-water and pumps.
2. Domestic water storage tanks.

B. Related Sections:

1. Section 22 0719 "Plumbing Piping Insulation."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of insulation and jacket indicated.

1.3 INFORMATIONAL SUBMITTALS

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program , certified by the Department of Labor, Bureau of Apprenticeship and Training.

1.5 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 22 0529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with equipment Installer for equipment insulation application.

C. Coordinate installation and testing of heat tracing.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. All Insulation Installed Indoors and Outdoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Indoor Equipment Insulation Schedule" Article for where insulating materials are to be applied.

B. Products do not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come into contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel are qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell or expanded-rubber materials; suitable for maximum use temperature between minus 70 deg F and 220 deg F. Comply with ASTM C534/C534M, Type II for sheet materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Aeroflex USA.
   b. Armacell LLC.
   c. K-Flex USA.

G. Glass-Fiber Blanket: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 450 deg F in accordance with ASTM C411). Comply with ASTM C553, Type II, and ASTM C1290, Type III, with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Certainteed; SAINT-GOBAIN.
   b. Johns Manville; a Berkshire Hathaway company.
   c. Knauf Insulation.

d. Manson Insulation Inc.
e. Owens Corning.

H. Glass-Fiber Board: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature between 35 deg F and 250 deg F for jacketed and between 35 deg F and 450 deg F for unfaced in accordance with ASTM C411. Comply with ASTM C612, Type IA or Type IB. Provide insulation with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Certainteed; SAINT-GOBAIN.
   b. Johns Manville; a Berkshire Hathaway company.
   c. Knauf Insulation.
   d. Manson Insulation Inc.
   e. Owens Corning.

2.3 ADHESIVES

A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric and Polyolefin Adhesive: Solvent-based adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Aeroflex USA.
   b. Armacell LLC.
   c. K-Flex USA.
2. Flame-spread index is 25 or less and smoke-developed index is 50 or less as tested in accordance with ASTM E84.
3. Wet Flash Point: Below 0 deg F
4. Service Temperature Range: 40 to 200 deg F.
5. Color: Black .

C. Glass-Fiber and Mineral Wool Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller.
   c. Mon-Eco Industries, Inc.

D. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Johns Manville; a Berkshire Hathaway company.
   b. P.I.C. Plastics, Inc.
   c. Proto Corporation.

d. Speedline Corporation.
e. The Dow Chemical Company.

2.4 MASTICS AND COATINGS

A. Materials are compatible with insulation materials, jackets, and substrates.

B. Vapor-Retarder Mastic, Water Based: Suitable for indoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller.
   c. Knauf Insulation.
   d. Mon-Eco Industries, Inc.
   e. Vimasco Corporation.
2. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
3. Service Temperature Range: 0 to plus 180 deg F .
4. Comply with MIL-PRF-19565C, Type II, for permeance requirements.
5. Color: White .

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller.
   c. Knauf Insulation.
   d. Mon-Eco Industries, Inc.
   e. Vimasco Corporation.
2. Water-Vapor Permeance: ASTM E96/E96M, greater than 1.0 perm at manufacturer's recommended dry film thickness.
3. Service Temperature Range: 0 to plus 180 deg F .
4. Color: White .

2.5 SEALANTS

A. Materials are as recommended by the insulation manufacturer and are compatible with insulation materials, jackets, and substrates.

B. Joint Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller.
   c. Mon-Eco Industries, Inc.

d. Owens Corning.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 150 to plus 250 deg F .
4. Color: White or gray.

C. FSK and Metal Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller.
   c. Mon-Eco Industries, Inc.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: Aluminum.

D. ASJ Flashing Sealants and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.

2.6 FIELD-APPLIED JACKETS

A. Field-applied jackets comply with ASTM C1136, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Johns Manville; a Berkshire Hathaway company.
   b. P.I.C. Plastics, Inc.
   c. Proto Corporation.
   d. Speedline Corporation.
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White Color-code jackets based on system. Color as selected by Architect.
4. Factory-fabricated tank heads and tank side panels.

2.7 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. 3M Industrial Adhesives and Tapes Division.
   b. Avery Dennison Corporation, Specialty Tapes Division.
   c. Ideal Tape Co., Inc., an American Biltrite Company.
   d. Knauf Insulation.
2. Width: 3 inches .
3. Thickness: 11.5 mils .
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. 3M Industrial Adhesives and Tapes Division.
   b. Avery Dennison Corporation, Specialty Tapes Division.
   c. Ideal Tape Co., Inc., an American Biltrite Company.
   d. Knauf Insulation.
2. Width: 3 inches .
3. Thickness: 6.5 mils .
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. 3M Industrial Adhesives and Tapes Division.
   b. Ideal Tape Co., Inc., an American Biltrite Company.
2. Width: 2 inches .
3. Thickness: 6 mils .
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

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

a. 3M Industrial Adhesives and Tapes Division.
b. Avery Dennison Corporation, Specialty Tapes Division.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Knauf Insulation.

2. Width: 2 inches .
3. Thickness: 3.7 mils .
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.8 SECUREMENTS

2.9 CORNER ANGLES

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of equipment, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with Contract Documents , unless otherwise approved by the engineer of record.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or area of compression in the insulation.

2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 2 inches o.c.
   a. For below-ambient services, apply vapor-barrier mastic over staples.
4. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints.

L. Cut insulation in a manner to avoid compressing insulation.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

O. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.4 INSTALLATION OF EQUIPMENT, TANK, AND VESSEL INSULATION

A. Glass-Fiber, Pipe and Tank Insulation Installation for Tanks and Vessels: Secure insulation with adhesive and anchor pins and speed washers.

1. Apply adhesives in accordance with manufacturer's recommended coverage rates per unit area, for 100 50 percent coverage of tank and vessel surfaces.
2. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
3. Protect exposed corners with secured corner angles.
4. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:
   a. Do not weld anchor pins to ASME-labeled pressure vessels.
   b. Select insulation hangers and adhesive that are compatible with service temperature and with substrate.
   c. On tanks and vessels, maximum anchor-pin spacing is 3 inches from insulation end joints and 16 inches o.c. in both directions.
   d. Do not compress insulation during installation.

e. Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
f. Impale insulation over anchor pins, and attach speed washers.
g. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

5. Secure each layer of insulation with stainless steel or aluminum bands. Select band material compatible with insulation materials.
6. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately 6 inches from each end. Install wire or cable between two circumferential girdles 12 inches o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of 48 inches o.c. Use this network for securing insulation with tie wire or bands.
7. Stagger joints between insulation layers at least 3 inches.
8. Install insulation in removable and replaceable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.
9. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
10. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.

B. Flexible Elastomeric Thermal Insulation Installation for Tanks and Vessels: Install insulation over entire surface of tanks and vessels.

1. Apply 100 percent coverage of adhesive to surface with manufacturer's recommended adhesive.
2. Seal longitudinal seams and end joints.

C. Insulation Installation on Pumps:

1. Fabricate metal boxes lined with insulation. Fit boxes around pumps and coincide box joints with splits in pump casings. Fabricate joints with outward bolted flanges. Bolt flanges on 6-inch centers, starting at corners. Install 3/8-inch- diameter fasteners with wing nuts. Alternatively, secure the box sections together using a field-adjustable latching mechanism.
2. Fabricate boxes from aluminum [**or**] , at least 0.050 inch thick.
3. For below-ambient services, install a vapor barrier at seams, joints, and penetrations. Seal between flanges with replaceable gasket material to form a vapor barrier.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Install in accordance with manufacturer's written installation instructions and ASTM C1710.

B. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless steel bands 12 inches o.c. and at end joints.

E. Where PVDC jackets are indicated, install as follows:

1. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches or less. 33-1/2-inch-circumference limit allows for 2-inch- overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
2. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

3.7 FINISHES

A. Equipment Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 09 9113 "Exterior Painting" and Section 09 9123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
   a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless steel jackets.

3.8 FIELD QUALITY CONTROL

A. Tests and Inspections: Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection is limited to **one** location(s) for each type of equipment defined in the "Indoor Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.

B. All insulation applications will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.9 INDOOR EQUIPMENT INSULATION SCHEDULE

A. Insulate indoor and outdoor equipment that is not factory insulated.

B. Domestic hot-water pump insulation is one of the following:

1. Glass-Fiber Blanket: 1 inch thick and 2 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 1 inch thick and 2 lb/cu. ft. nominal density.

C. Domestic hot-water storage tank insulation is one of the following, of thickness to provide an R-value of 12.5:

1. Glass-Fiber Blanket: 2 lb/cu. ft. nominal density.
2. Glass-Fiber Board: 2 lb/cu. ft. nominal density.

3.10 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces of up to 72 Inches:

1. PVC : 20 mils thick.

END OF SECTION 22 0716

SECTION 22 0719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Insulate the following items:

1. Domestic cold water supply, domestic hot water supply and return piping, regardless of length or location.
2. Domestic water supply and waste pipe under all lavatories and sink fixtures accessible to the handicapped.
3. All sanitary vent piping within 10 ft. of an exterior wall or roof penetration.

B. All exposed insulated piping and fittings, from floor up to 7 ft.6 in. above floor, shall have a PVC cover applied over pipe insulation and solvent welded together. Material shall be same as PVC fitting covers.

PART 2 - PRODUCTS

2.1 Pipe Insulation

A. Indoor Piping: 1piece, heavyduty, fiberglass insulation with all-purpose vapor barrier jacket of white kraft bonded to aluminum foil and reinforced with fiberglass yarn, longitudinal pressure-sensitive tape for sealing of lap joint, 0 deg. F. to 800 deg. F. temperature rating. Insulation thicknesses:

1. Domestic cold water, electric water cooler waste trap, aboveground waste and vent, and aboveground trap primer piping:
   a. 1 in. and smaller: 1/2 in. thick, minimum.
   b. 1-1/4 in. and larger: 1 in. thick, minimum.
   c. OPTION: 3/4 in. thick fire-rated Armaflex may be used in walls (not in chases).
2. Domestic hot water and domestic hot water recirculating piping:
   a. 2 in. and smaller: 1 in. thick, minimum.
3. Acceptable Manufacturers: Owens Corning Fiberglas 25 ASJ/SSL/II or equal by Schuller, Certainteed, Johns Manville, Knauf, or Manson

B. In-Wall Piping Domestic Hot Water Pipe: Closed cell, foamed plastic, tubular, 1/2 in. minimum wall thickness, fire-rated, 220 deg. F. temperature rating. Pipe and joints shall be sealed with Manufacturer's approved adhesive.

1. Acceptable Manufacturers: Armstrong fire-rated "Armaflex," Rubatex, or Imcoa.
2. OPTION: Indoor pipe insulation, listed in Paragraph A above, may be used in walls.

C. Pipe Fittings:

1. Insulation: Wrapped 1 lb. density fiberglass blanket with reinforced foil and kraft vapor barrier facing or molded fiberglass segments with pre-molded, 1piece PVC plastic covers. Wrapped fiberglass blanket shall be installed to same thickness as pipe insulation.
   a. Acceptable Manufacturers: Owens Corning TIW-1 or equal by Schuller, Certainteed, Johns Manville, Knauf, or Manson.
2. Fitting insulation covers: Pre-molded, 1piece PVC plastic covers, with maximum 25 Flame Spread and 50 Smoke Developed ratings. Shall be listed and certified for installation in ceiling plenum spaces.
   a. Acceptable Manufacturers: Ceelco, Johns Manville, Knauf, Speedline, or Proco.

D. Lavatories Accessible to Handicapped: This applies to Ptrap and hot and cold water supplies for handicapped lavatories and other lavatories in toilet rooms accessible to the handicapped.

1. Offset Ptraps and angle stop/supply assemblies shall be insulated with smooth, abrasion-resistant vinyl plastisol exterior cover with 1/8 in. minimum thickness over cushioned foam insert. Attach pipe covering with nylon tie fasteners. Nylon tie fasteners shall remain substantially out of sight.
2. Acceptable Manufacturers: Brocar Trap Wrap Protective Kit 500R, McQuire ProWrap, Truebro Lav Guard, or Plumberex ProSeries.

2.2 PVC JACKET OVER PIPE INSULATION

A. PVC jacket, 1piece, solvent weld joints.

2.3 MASTICS, ADHESIVES, AND FINISHES

A. Mastics, adhesives, and finishes shall be approved for their intended use by the Insulation Manufacturers.

B. Acceptable Manufacturers: BenjaminFoster, Vimasco, ICC, or Aerobol.

C. Vegetable or wheat paste is prohibited.

2.4 PIPE-INSULATING SUPPORT

A. Piping 11/2 in. and Smaller: Provide 12 in. long, 18 ga. galvanized or stainless steel sheet metal half round piping shield inside clevis hanger.

B. Piping 2 in. and Larger: Pre-compressed fiberglass load-bearing segment, integral fire-retardant vapor barrier jacket and saddle.

1. Acceptable Manufacturers: InsulCoustic Co., InsulShield, or Pipe Shield, Inc.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate installation of insulation with pressure testing of piping.

3.2 GENERAL INSTALLATION NOTES

A. No damaged or water-soaked insulation shall be used.

B. Piping shall be insulated where concealed in walls or chases.

C. Foam insulation shall not be installed in air handling plenum spaces.

D. Insulation to be continuous through sleeves and hangers and thru walls where no sleeves are required.

E. Leave no "raw" ends on insulation. Bevel insulation terminations, seal with insulating cement or mastic, and cover ends same as pipe insulation covering. PVC caps over straight cut ends which have been vapor sealed may be used in lieu of beveling.

F. Exposed insulation shall be finished smooth, sized if required, and left ready for painting.

G. Jacket shall have overlapping joints and shall be sealed with suitable adhesive. Butt joints shall be sealed with 3 in. wide ASJ pressure sensitive tape.

H. Where piping is installed above the ceiling, and below ceiling insulation, this Contractor to assure that ceiling insulation has no insulation voids above piping.

I. Piping shall be pressure tested and accepted before piping insulation is installed.

J. Install insulating saddles of non-compressible insulation with a continuous vapor barrier, and protected by 12 in. long, 18 gauge half round sleeves with bell ends at all pipe hangers, unless insulating type hangers are furnished by the pipe installer. Verify method to be used.

K. All hangers shall be set perpendicular before any insulation is applied. Insulation shall not be applied to cold water piping until the aforementioned insulation saddles are in place at each pipe hanger.

L. Insulate all piping clamps on vertical piping.

M. Application shall be made on clean, dry pipe and tanks, with all joints butted firmly together.

N. Complete installation of insulation and sealing to be in strict accordance with Manufacturer's recommendations.

O. All damaged insulation shall be replaced at this Contractor's expense.

P. Maintain continuity of all insulation. No voids in insulation or vapor barrier will be permitted.

Q. Piping located in walls shall be insulated on required lines with 1/2" thick, fire-rated foam insulation, or indoor pipe insulation as listed.

R. Pipe Jacket Covers: In addition to insulation jacketing and fitting covers listed above, provide PVC jacket over all exposed insulation in Garage Area, including Wash Bay, Repair Bays, and Mezzanine.

3.3 PIPE FITTING INSULATION

A. Unless otherwise noted, valves, unions and flanges for all required services shall be insulated. All couplings shall be insulated and the Insulator shall verify during bidding the extent of these connections and prepare its bid accordingly.

B. Fittings shall be insulated with factory-formed mitered sections of pipe insulation or 1 lb. density fiberglass blanket insulation wrapped under compression to full thickness of the pipe insulation. Mitered sections and blanket insulation shall be secured with double wrapping of tape over the entire fitting. Vapor barrier mastic shall be applied on concealed fittings to maintain vapor barrier. Exposed fittings shall be furnished with insulating cement and glass lagging cloth. Vapor barrier mastic shall be applied to maintain vapor barrier. Cover with molded PVC plastic cover.

C. Do not cover flanges and unions initially. Bevel insulation and apply cement to ends. Then add insulation over these items, so that it can be removed without disturbing adjacent pipe insulation. Cover with molded PVC plastic cover.

END OF SECTION 22 0719

SECTION 22 1116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Connect to water service line above floor slab where shown on Drawings.

B. Contractor shall provide site water service line.

C. Provide a complete system of domestic hot water and cold water piping to fixtures and equipment where shown on Drawings.

D. Sterilize complete domestic water system.

E. Install backflow preventer on domestic water supply line where shown.

F. Provide 3/4 in. valved branches on water service at point of entry into building, just past main backflow preventer and at the beginning of each branch, for injecting chlorine for sterilization.

G. Test complete system.

PART 2 - PRODUCTS

2.1 WATER PIPING

A. Above Ground: Type “L” hard drawn copper tubing with wrought or forged copper solder fittings (ASTM B88). OPTIONS: Copper press fittings or “TDrill” mechanically formed connections, and brazed joints.

B. Piping in Earth and Under Slab:

1. 21/2 in. and smaller: Type “K” soft copper (ASTM B88), wrought copper fitting, and brazed joints.
   a. Acceptable Manufacturers: Clow “Super Bell-Tite” or equal by American Cast Iron Pipe Company or U. S. Pipe & Foundry.

C. Copper press fittings with smart connect feature shall conform to the material and sizing requirements of ASME B16.18 or B16.22. Orings for copper press fittings shall be of EPDM construction.

2.2 SOLDER AND BRAZING ALLOYS

A. Solder: 955 tin-antimony, lead free.

1. Acceptable Manufacturers: Engelhard “Silvabrite 100,” J. W. Harris Co. “Bridgit,” or Oatey.

B. Copper Brazing Alloys: Silver/phosphorous or silver/zinc alloys having a melting point greater than 1,000 deg. F. (ANSI B31.1 and AWS A58).

1. Acceptable Manufacturers: Handy Harman SilFos, Airco Welding Products Aircosil, or ESAB Allstate.

C. Certify that solder and brazing used for entire piping system is lead-free.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate installation height of faucets, hose bibbs, and wall hydrants with Associate Architect.

B. Coordinate piping with beams, joists, walls, HVAC ductwork, equipment and electrical equipment.

C. Coordinate location of rough-in and final connections to equipment with General Trades Contractor.

3.2 INSTALLATION

A. Install all valves in accessible locations. Coordinate installation of access panels.

B. Open valves fully before soldering.

C. Where water lines drop in outside walls, install piping so that the wall insulation is between the pipe and the outside wall. Avoid this condition where at all possible.

D. Install ball valves in lines to equipment and fixtures not provided with stops.

E. Unless otherwise noted, install shock absorbers at the end of each main or branch.

F. Install backflow preventers where indicated or required by code.

G. Provide rigid support for water meter as required to securely hold meter in place.

H. Installation of water meter shall meet Water Utility Company standards.

I. Where piping is installed above ceilings, below ceiling insulation, this Contractor to assure that ceiling insulation has no insulation voids above piping.

J. Install piping in such a manner as to allow complete drainage of the water piping system. Drain toward the source, wherever possible.

K. Provide 3/4" valved inlet immediately downstream of water meter for purpose of adding sterilizing solution into interior domestic water piping system.

3.3 TESTS

A. Perform tests as required by the State and Local Building Code and as specified below:

1. Take precautions to remove all air before performing hydrostatic tests.
2. Test piping at 125 PSIG for (6) hours with no pressure drop. All tests should be made before piping is insulated or concealed. Tests shall be witnessed by the Associate Architect's Representative.
3. If a leak occurs, defective piece or joint shall be replaced. No caulking will be permitted. Tests shall then be repeated.

3.4 STERILIZATION OF WATER LINES

A. After water piping is complete and fixtures have been installed, flush piping clean and sterilize all new hot and cold water piping, including water service line, and water heaters. The sterilization shall be done under the immediate on-the-job supervision of a Water Testing Laboratory regularly engaged in the service. All fees for testing and use of testing equipment shall be paid by this Contractor.

B. With all outlets closed, fill system to working pressure and close valve on supply main.

C. Open all fixtures slightly and pump a sterilization solution into test tap as follows: 400 minimum to 1000 maximum parts per million chlorine solution made from a sanitation grade of hyperchlorite, 70% available chlorine. Hyperchlorites may be either Pittchlor, H.T.H. or Perclorn.

D. Each outlet, hot and cold, shall be tested during fill to prove the presence of chlorine at that outlet. Chlorine shall be present at all outlets.

E. Water piping system shall remain filled for a period of 24 hours and each outlet shall be again tested and shall have at least 100 parts per million of chlorine remaining.

F. Upon completion of sterilizing, all outlets shall be opened wide and the main supply valves opened, flushing system free of chlorine. Outlets shall be again checked and flushed until free of chlorine. Flush main valves and entire building domestic water system. Coordinate with Owner.

G. After final flushing, all electric water cooler inlet strainers and all aerators shall be removed, cleaned and replaced.

H. Chlorination of the system may be performed at same time the pressure test is conducted.

I. Provide Associate Engineer with a "Certificate of Completion of Chlorination" after chlorination is completed.

END OF SECTION 22 1116

SECTION 22 1119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide plumbing piping specialties or accessories as shown or required to complete the installation of all plumbing systems installed on this Project.

PART 2 - PRODUCTS

2.1 THERMOMETERS

A. Blue reading, organic liquid, 9 in. scale, cast aluminum, epoxy powder-coated case, front double-strength window, straight or adjustable angle pattern, brass separable well, range of 30 deg. F. to 180 deg. F. Provide insulation extension.

B. Acceptable Manufacturers: Terice “Industrial Type” or equal by Weiss, Ashcroft, Marsh, Weksler, Winters, or Marshalltown.

2.2 BACKFLOW PREVENTERS

A. BFP1, 2 in. and above: Suitable for continuous pressure, inlet and outlet OS&Y gate valves, inlet strainer, test cocks, differential pressure relief valve with ASME A112.1.2 air gap fitting between (2) independently operated check valves. Entire assembly coated inside and outside with FDA-approved epoxy material.

1. Acceptable Manufacturers: Zurn-Wilkins Model 375OSYFSC or equal by Ames Co., CMB Industries, Febco Backflow Preventers, Hersey Products, Conbraco Industries, or Watts Regulator Co.

B. BFP2, less than 2 in. : Watts Series 9D. Continuous pressure type, bronze body, stainless steel springs, double-check valve with intermediate atmospheric vent assembly, ASSE approved under Std. 1012, 1/2 in. size.

1. Acceptable Manufacturers: Watts Series 9D or equal by Ames Co., CMB Industries, Febco Backflow Preventers, Hersey Products, Conbraco Industries, or Watts Regulator Co.

C. Refer to Fixture and Equipment Branch Size Schedule on Drawings for sizes and applications.

D. Backflow Preventer Manufacturer and Model shall be on the list of accepted equipment published by the U. S. Public Health Service.

E. Note: Before ordering, obtain approval from the Local Water Utility for the specific type and model of backflow preventer to be used.

F. Backflow preventers shall be serviceable without requiring removal from piping.

G. Backflow preventers shall have a permanently attached plate indicating type and listing approvals.

H. Provide ball valve ahead of strainer on inlet side of backflow preventer assembly.

2.3 SHOCK ABSORBERS

A. ASSE Standard 1010, PDIWH201 shock absorbers (water hammer arresters). Size and location as shown on the Drawings.

1. SA1: 3/4 in. pipe. (1 to 11 fixture units.)
2. SA2: 3/4 in. pipe. (12 to 32 fixture units.)
3. SA3: 1 in. pipe. (33 to 60 fixture units.)
4. SA-4: 1 in. pipe. (61 to 113 fixture units.)

B. Acceptable Manufacturers: Wade “Shockstops” or equal by Zurn, J. R. Smith, Josam, Watts, Sioux Chief, or Precision Products.

C. As an option, air chambers may be used. Size of air chambers shall be (1) size larger than supply line and a minimum of 2 ft. in length.

D. Provide shock absorbers at all locations as required to reduce water hammer.

2.4 STRAINERS

A. 1/2 in. to 3 in., Ypattern, bronze body, threaded, #20 mesh stainless steel screen, 200 PSI WOG.

B. Acceptable Manufacturers: Watts Model 777S or equal by Spirax/Sarco, Armstrong, or Hoffman.

2.5 EXTERIOR WALL HYDRANTS

A. HYD2: Bronze faucet face, locking box and cover, freezeresistant faucet, bronze casing, selfdraining, integral vacuum breaker, 3/4 in. size hose connection, length as required to keep valve from freezing. Provide loose key with each hydrant. (ASSE Standard 1019.)

B. Acceptable Manufacturers: Woodford model “68” or equal by J.R. Smith, Josam, Wade, Woodford, or Zurn.

2.6 PRESSURE GAUGES

A. Standard single Bourdon tube, black die cast aluminum case, 41/2 in. diameter dial, chrome removable slip ring, gauge cock and pigtail, ±1% accuracy. Range shall be approximately 50% in excess of maximum pressure anticipated. Provide gauge cock.

B. Acceptable Manufacturers: Weiss 4PGA-1 or equal by Trerice, Marsh, Weksler, Marshalltown, or Ashcroft.

C. Provide spare gauge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate shock absorbers according to PDI Standard WH-201 and where shown on Drawings. Size indicated on Drawings.

B. Install pressure gauge on the water service entrance riser.

C. Install thermometers on the piping at water heater where shown on Drawings.

D. Install wall hydrants flush and level with building wall and generally 18" above finished grade. Confirm exact height with Associate Architect.

E. All products of the same type shall be by the same Manufacturer.

F. Install backflow preventer on all lines to hose bibbs serving maintenance (water) hose reels.

G. Install continuous back pressure type vacuum breakers on all lines to hose bibbs if not furnished with integral vacuum breaker.

H. Install ball valves on inlet and outlet of each backflow preventer, water pressure reducing valve, on upstream line to each wall hydrant, hose bibb, and trap primer.

I. Locate equipment backflow preventers below ceilings in areas where spillage of water will not cause damage.

J. Install backflow preventer at an accessible height.

K. After installation of backflow preventer, flush water supply line to remove debris. Clean out backflow preventer after flushing. Test backflow preventer to confirm working correctly.

L. Test backflow preventers at time of installation. A person or firm certified by the Ohio Department of Health shall perform the test and provide the testing equipment. Submit proper test report to Associate Architect.

M. Discharge from backflow preventer shall have an open air gap. Indirect waste to nearest drain unless otherwise noted.

N. Install strainer on upstream line to each water pressure reducing valve and backflow preventer, past ball valve.

O. Install each thermometer and pressure gauge so they may be read from floor.

P. Provide drain valve on each strainer.

Q. Provide individual 3/4" gravity drains from trap primer to inlet of each floor drain trap where indicated on drawings. Mount trap primer exposed on wall in accessible location, according to Manufacturer's Instructions. Provide access panels where necessary.

R. Provide 3/4" drain from water heater drain pan to floor drain.

END OF SECTION 22 1119

SECTION 22 1316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide a complete system of interior soil, waste, and vent piping to fixtures and equipment, including traps, floor drains and cleanouts. Building drain shall extend to a point 5 ft. beyond the foundation wall, unless otherwise indicated on Drawings.

B. Connect to site sanitary sewer system 5 ft. outside building foundation wall where shown on Drawings. Extend sanitary line into building.

C. “Dead end” sanitary branches longer than 2 ft.0 in. will not be permitted.

D. Test complete system.

1.2 ACCEPTABLE MANUFACTURERS

A. Piping and Fittings:

1. Cast iron: Charlotte, Clow, American Cast Iron, Tyler Pipe, U. S. Pipe & Foundry or Griffin.
2. Copper: American Brass Co., Revere, Chase Brass Co. or Nibco.
3. ABS or PVC plastic: Yardley, Nibco, Crestline or Charlotte.
4. Steel: Armco, Republic or Wheeling.

B. Floor Drains and Cleanouts: Zurn, Jay R. Smith, Wade, Josam or Watts.

C. Manufacturer and Model Number listed under Part 2 shall be considered to be the Design Base Manufacturer and Model Number.

PART 2 - PRODUCTS

2.1 PIPING

A. Sanitary, waste, and vent piping and fittings under slab:

1. Extraheavy weight, single hub cast iron (ASTM A74), factory-coated with coal tar enamel.
2. Hubless cast iron (ASTM A74), factory-coated with coal tar enamel.
3. Schedule 40 PVC/DWV plastic (ASTM D2665).
4. Schedule 40 ABS/DWV plastic (ASTM D2661).

B. Interior above-grade sanitary waste piping and fittings:

1. Service weight, single hub cast iron (ASTM A74), factory-coated with coal tar enamel.
2. Hubless cast iron (ASTM A74), factory-coated with coal tar enamel.
3. Copper DWV tube, 4 in. and smaller (ASTM B306): Type L drainage tube, drawn temper.
4. PVC Schedule 40 solid wall pipe according to ASTM D 1784, D 1785, and D 2665. PVC DWV fittings conforming to ASTM D 1784 and D 2665.

C. Interior above-grade vent piping and fittings:

1. Service weight, single hub cast iron (ASTM A74), factory-coated with coal tar enamel.
2. Hubless cast iron (ASTM A74), factory-coated with coal tar enamel.
3. Steel pipe, 21/2 in. and smaller (ASTM A53): Type E or S, Grade A or B, Schedule 40, galvanized.
4. Copper DWV tube, 4 in. and smaller (ASTM B306): Type L drainage tube, drawn temper.
5. PVC Schedule 40 solid wall pipe according to ASTM D 1784, D 1785, and D 2665. PVC DWV fittings conforming to ASTM D 1784 and D 2665.

D. Plastic piping is not permitted where it may be vulnerable to physical damage, or where run exposed.

E. Plastic piping shall not be installed in ceiling spaces used for return air plenums. Refer to Architectural and HVAC Drawings for the location of these areas.

F. Any exposed vent piping shall be galvanized steel.

2.2 JOINTS

A. Cast Iron:

1. Tarred jute or oakum with lead poured flush with hub.
2. (ASTM C564) Compression-type plastic seal.
3. Joints in hubless cast iron pipe sizes 11/2 in. to 10 in. shall be made with coupling approved to FMG 1680 Class 1 and marked with the logo. Couplings shall be ClampAll Corporation Model #80, for pipe sizes 11/2 in. to 4 in., Model #125 pipe sizes 5 in. to 10 in.
4. Joints in hubless cast iron pipe sizes 11/2 in. to 2 in. where exposure to head pressure cannot exceed 10 ft. shall be approved to CISPI Standard 31085. Couplings shall be manufactured by Anaco, Tyler, Charlotte, or Jones.

B. Copper: Cast (ASTM B16.23) or wrought (ASTM B16.29) copper drainage fittings with solder joints.

C. Plastic: Solvents and cements as recommended by the Manufacturer.

D. All fittings shall be compatible with piping for size, material, and joint type.

E. Cast iron pipe and fittings shall be factory-coated with coal tar enamel.

2.3 FLOOR DRAINS

A. Drains shall be adjustable, coated cast iron double drainage pattern, bottom outlet, flashing clamp, strainers, sediment buckets, and with other accessories and features as noted below.

B. Each floor drain grate that has a load rating shall have an ANSI load rating indicated on shop drawings. If rating is not indicated on shop drawings, they will be rejected.

C. Each floor drain that is required to have a secured grate shall have at least (3) screws for attachment of grate.

D. Slot in grates shall be free of flashing (clean cut), and tops shall not have sharp edges that may be injurious to bare feet.

E. FD1: Type 304 stainless steel body, adjustable 6 in. x 6 in. square, Type B strainer, secured, nikaloy finish, nickel/bronze strainer, caulk or push-on outlet, 3 in. or 4 in. pipe size, as noted. Provide vandal-resistant screws on strainer.

1. Acceptable Manufacturers: Zurn #Z-1727-4IC-VP or equal by J.R. Smith, Wade, Josam, or Watts.
2. Provide with barrier type trap seal device.

F. FD2: Dura-coated Cast iron body, 9 in. epoxy-coated cast iron slotted grate, caulk or push-on outlet, 3 in. or 4 in. pipe size, as noted.

1. Acceptable Manufacturers: Zurn #ZN-415N-4NH-AR-G-VP or equal by J.R. Smith, Wade, Josam, or Watts.
2. Provide with barrier type trap seal device.

2.4 CLEANOUTS

A. All cleanouts shall be line size (6 in. size on 6 in. or larger line) and installed in accessible locations.

B. Provide membrane clamps on all cleanouts in floors having waterproofing membrane.

C. Floor Cleanouts: Each floor cleanout shall have an ANSI load rating indicated on shop drawings. If rating is not indicated on shop drawings, they will be rejected. Each floor cleanout that is required to have a vandalresistant top shall have at least (3) screws for attachment to top.

1. Floors with ceramic tile finish: Zurn #ZN1400VP. Adjustable cast iron body, heavy-duty load rating, vandalresistant, round, nickel/bronze scoriated cover, ABS plastic plug, line size, and caulk or push-on outlet.
2. Floors with vinyl tile finish: Zurn #ZN1400VP. Adjustable cast iron body, heavy-duty load rating, vandal-resistant, round, nickel/bronze cover, ABS plastic plug, line size, and caulk or push-on outlet.

3. Bare concrete floors: Zurn #Z1400HDVP. Adjustable cast iron body, heavy-duty load rating, vandal-resistant cast iron scoriated cover, threaded ABS plastic plug, line size, and caulk or push-on outlet.
4. Vehicular traffic: Zurn #Z1400HDVP. Adjustable cast iron body, heavy-duty load rating, vandal-resistant cast iron scoriated cover, threaded ABS plastic plug, line size, and caulk or push-on outlet.

D. Wall Cleanouts: Zurn #Z-1446-VP. Round polished stainless steel access cover, and vandal-resistant screw.

E. Exterior Cleanouts: Zurn #Z1400HDVP. Adjustable cast iron body, heavy-duty load rating, vandal-resistant cast iron scoriated cover, threaded ABS plastic plug, line size, and caulk or push-on outlet.

F. Additional acceptable Manufacturers: In addition to the basis of design products listed above, an equal product from the following manufactures may be used: J.R. Smith, Wade, Josam, or Watts.

2.5 VENT FLASHING

A. Provide roof vent boots and flashing.

PART 3 - EXECUTION

3.1 SITE INSPECTION

A. Contractor must examine the areas and the conditions under which sanitary sewer system work is to be installed and notify the Associate Architect of conditions detrimental to the proper and timely completion of the Work.

B. Do not proceed with the Work until unsatisfactory conditions have been corrected and existing sewer location and depth has been established.

C. The Contractor is responsible for determining the exact location and elevation of any existing pipe to which it must make connection, or which it may disturb during earth moving operations, or which may be affected by its work in any way.

3.2 INSTALLATION OF SEWER LINE

A. General:

1. Install pipe in accordance with the requirements of the Local and State Code Authority except where more stringent requirements are required by these Specifications.
2. Inspect piping before installation to detect any apparent defects. Mark defective materials with white paint and promptly remove from the site.
3. Lay piping beginning at the low point of a system, true to the elevation and alignment indicated, with unbroken continuity of invert.

4. Place groove or bell end of pipe facing upstream.
5. Install gaskets in accordance with Manufacturer's recommendations for use of lubricants, cements, and other special installation requirements.
6. Vitrified Clay Sewer Pipe: Install in accordance with applicable provisions of ASTM C,"Class C, Recommended Practice for Installing Clay Sewer Pipe", unless otherwise noted.
7. Cast Iron Pipe: Install in accordance with applicable provisions of the Cast Iron Soil Pipe Institute's "Cast Iron Soil Pipe and Fittings Handbook".
8. Plastic Pipe Option: Install in accordance with Manufacturer's recommendations at the elevation, depth, and slope indicated on the Drawings.
9. Contractor shall provide and install construction stakes, lines, and grades or any other items necessary for the installation of the sewer line.
10. Sewer pipe crossing under or over water lines, with less than 18" between pipes, shall be water pressure pipe, and extend a minimum of 10 feet each side of the water line crossing and shall be laid at least 10 feet horizontally from new or existing water lines, and shall be so arranged that the sewer joints shall be equidistant and as far as possible from the water main. This portion of sewer pipe shall be pressure tested at 50 PSI for a period of not less than 15 minutes, with no loss in pressure.
11. Coordinate location, size and depth of sewer lines with General Trades Contractor and Associate Architect prior to beginning work.
12. Install pipe tape coating on underground steel piping according to manufacturer recommendations.
13. Repair damaged pipe tape coating.

B. Cleaning:

1. Clear the interior of all pipe of dirt and other superfluous material. Maintain a swab or drag in the line and pull past each joint as it is completed.
2. Place plugs in the ends of uncompleted pipe at the end of the day or whenever work stops.
3. Flush lines if required to remove collected debris.
4. Sewer pipe, manholes, and cleanouts upon their completion, are to be left clean and free from rubbish until acceptance.

C. Inspection:

1. Inspect pipe to determine whether line displacement or other damage has occurred.
2. If the inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, take whatever steps are necessary to correct these deficiencies.

3.3 INSTALLATION OF EXTERIOR CLEANOUTS

A. Cleanouts to be installed in center of 18 in. square concrete slab, 6 in. thick, with mitered edges. Install cleanout and slab flush with finished grade or pavement.

B. Concrete to be provided, formed, placed and mitered by the General Trades Contractor.

3.4 EXCAVATION AND BACKFILL AND RELATED SAFETY REQUIREMENTS

A. Refer to Section 22 0505, "Plumbing Excavation and Backfill".

B. Refer to Division 31, "Earthwork", for additional requirements.

3.5 TESTING

A. A.Perform testing of complete new sanitary sewer system in accordance with requirements of the Local Code Authority.

END OF SECTION 22 1316

SECTION 22 3300 – GAS FIRED WATER HEATERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide gas fired tank type water heaters including accessories specification and as necessary for proper operation of system.

B. Install per manufacturer's recommendations.

1.2 Warranty

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures including storage tank and supports.
   b. Faulty operation of controls.
   c. Deterioration of metals, metal finishes, and other materials beyond normal use.

B. Warranty Period(s): 5 years From date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WATER HEATER

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

1. Smith, A. O. Water Products Company (Basis of design)
2. Lochinvar Corporation.
3. PVI Industries, LLC.
4. Rheem Water Heater Div.; Rheem Manufacturing Company.
5. Ruud Water Heater Div.; Rheem Manufacturing Company.

B. Storage-Tank Construction: ASME Code steel with 150-psig working-pressure rating.

1. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
   a. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
   b. NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.

C. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.

1. Factory-Installed, Storage-Tank Appurtenances:
   a. Anode Rod: Replaceable magnesium.
   b. Dip Tube: Provide unless cold-water inlet is near bottom of tank.
   c. Drain Valve: Corrosion-resistant ball valve complying with ASSE 1005.
   d. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
   e. Jacket: Steel with enameled finish.
   f. Combination Temperature and Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

D. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.

2.2 THERMAL EXPANSION TANKS

A. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air - to minimum system-operating pressure at tank.

1. Manufacturers:
   a. AMTROL Inc.
   b. Armstrong Pumps, Inc.
   c. Taco, Inc.
   d. Watts Regulator Co.
   e. Wessels Co.
2. Construction:
   a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
   b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
   c. Air-Charging Valve: Factory installed.
3. Capacity and Characteristics:
   a. Working-Pressure Rating: 150 psig.
   b. Air Pre-charge Pressure: 60 psig.
   c. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.

2.3 WATER HEATER ACCESSORIES

A. Gas Shutoff Valves: ANSI Z21.15/CGA 9.1, manually operated. Furnish for installation in piping.

B. Gas Pressure Regulators: ANSI Z21.18, appliance type. Include pressure rating, capacity, and pressure differential required between gas supply and water heater.

C. Gas Automatic Valves: ANSI Z21.21, appliance, electrically operated, on-off automatic valve.

D. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.

END OF SECTION 22 3300

SECTION 22 4003 - PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specifications Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:

1. Pumps.

B. Provide pumps with manufacturer's name, model number, and rating/capacity identified.

C. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are nonoverloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

D. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:

1. American Gas Association (AGA).
2. National Sanitation Foundation (NSF).
3. American Society of Mechanical Engineers (ASME).
4. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
5. National Electrical Manufacturers' Association (NEMA).
6. Underwriters' Laboratories (UL).

1.3 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division 01.

B. Include dimension drawings of water heaters indicating components and connections to other equipment and piping.

C. Include heat exchanger dimensions, size of tappings, and performance data.

D. Include dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

E. Indicate pump type, capacity, power requirements, and affected adjacent construction.

F. Submit certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.

G. Submit manufacturer's installation instructions under provisions of Division 01.

1.4 REGULATORY REQUIREMENTS

A. Conform to AGA, NSF, NBBPVI, ANSI/NFPA 54, ANSI/NFPA 70, UL 174, ANSI/UL 1453 requirements for water heaters.

B. Conform to ANSI/ASME Section 8D for manufacture of pressure vessels for heat exchangers.

C. Conform to ANSI/ASME Section 8 D and ANSI/NFPA 30 for tanks.

D. Conform to ASHRAE 90A (latest edition) for thermal efficiency and stand-by-loss.

E. Heaters over 120 gallons or over 200,000 BTUH fuel input or over 210°F outlet temperature shall bear ASME stamp and include hand hole for tank cleanout.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Division 01.

B. Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division 01.

B. Store and protect products under provisions of Division 01.

C. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.7 WARRANTY

A. See Division 01 specification section for warranty requirements.

PART 2 - PRODUCTS

2.1 INLINE CIRCULATOR PUMPS

A. Casing: Bronze, rated for 125 psig working pressure.

B. Impeller: Over 20 gpm: Bronze. Under 20 gpm: 30% glass-filled PES composite.

C. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.

D. Seal: Carbon rotating against a stationary ceramic seat. (Good for up to 225°F.)

E. Drive: Flexible coupling.

F. Acceptable Manufacturers:

1. Bell & Gossett
2. Grundfos
3. Thrush
4. Taco

PART 3 - EXECUTION

3.1 PUMP INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide air cock and drain connection on horizontal pump casings.

C. Provide line sized gate valve and strainer on suction and line sized soft seated check valve and globe valve on discharge.

D. Decrease from line size, with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4 inches and over.

E. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are nonoverloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

F. Align, and verify alignment of base mounted pumps prior to startup.

G. Ensure shaft length allows sump pumps to be located minimum 24 inches below lowest invert into sump pit and minimum 6 inches clearance from bottom of sump pit.

END OF SECTION 22 4003

SECTION 22 4200 - COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide plumbing fixtures installed in place, complete with supports, supply, and waste trim as indicated on the Drawings.

B. All fixtures shall have vandal-resistant handles, aerators, escutcheons, carriers, nuts, and bolts.

C. All trim and exposed piping shall be chrome-plated, unless noted otherwise.

D. Faucets shall have ceramic disc valve cartridges or camactivated diaphragm valve cartridges.

E. Exposed metal parts shall be nonferrous and chrome-plated, unless otherwise noted. Vitreous china or enamel fixtures and trim shall be free of defects. Plumbing fixtures shall be white in color, unless otherwise noted.

F. All plumbing fixtures shall be of commercial quality and free of defects.

G. Provide trim, fittings, carriers, angle stops, chrome water supply piping, and all accessories required for a complete installation.

H. Fixture connection sizes are shown on Drawings.

I. All vitreous china plumbing fixtures resting against a wall or floor shall have ground mating surfaces and shall be caulked with silicone sealant of a color to match the fixture. Remove excess material after fixture installation.

J. Provide a 1/4 in. bead of caulk or silicone sealant around the perimeter of casework openings for all countertop fixtures. Remove excess material after fixture installation.

K. Water closet flush valve handle shall be lefthanded operation, unless required to be right-handed operation to comply with ADA Guidelines. Flush valve trip lever shall be mounted on the wide side of the water closet stall.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND ACCESSORIES

A. Acceptable Fixture Manufacturers:

1. Vitreous China Fixtures: American Standard, Kohler, Eljer, or Crane.
2. Urinal: Sloan, Kohler, or American Standard.

3. Mop Service Basin: American Standard, Fiat, Powers, Standard Elsmere, Stern Williams, Mustee, Florestone, Swan, Creative Industries, Zurn, or Ceco.
4. Sinks: Elkay, Just, American Standard, Mustee.

B. Acceptable Accessory Manufacturers:

1. Flush Valves (with vandal-resistant stop): Sloan, Delany, or Zurn.
2. Water Closet Seats: Beneke, Church, Kohler, Bemis, Olsonite, Centoco, or Sperzel.
3. Faucets: Chicago Faucet, American Standard, Elkay, Kohler, Eljer, Crane, T & S Brass Company, Grohe, Speakman, Moen, Zurn, Delta, Sloan, or Symmons.
4. Supplies, Escutcheons, and Traps: Brasscraft, Bridgeport, Consolidated, Frost, Waterway, McGuire Mfg. Co., Dearborn, Sanitary-Dash, Speedway, Zurn, or Anso-Flex.

2.2 CARRIERS

A. All carriers shall be specifically chosen to accommodate the particular brand and style of fixture actually installed, the particular type of floor and wall actually present at each fixture location, and the piping arrangement at each fixture. Furnish plastic or metal positioning frames to isolate carrier bolts from wall construction.

B. Provide a heavy-duty, rectangular vertical support, floor-supported, commercial type fixture carrier for each wall-mounted plumbing fixture, unless noted otherwise.

C. Water Closets: Watts series ISCA-101-L/R-BF for floor-mounted, rear outlet bowl.

D. Urinals: Heavy-duty type Zurn Model Z1222.

E. Additional Acceptable Manufacturers: In addition to the basis of design products listed above, an equal product from the following manufactures may be used: Watts, Jay R. Smith, Wade, or Josam.

2.3 WATER CLOSETS

A. WC (floor-mounted, rear spud flush valve, back outlet): American Standard “Priolo,” Model 3697.001. Low consumption, 1.6 GPF, siphon jet, elongated bowl, vitreous china, and 11/2 in. rear spud.

1. Seat: American Standard 5905.100. Commercial-grade, open front, extra heavy-duty, solid white, flame-retardant polypropylene plastic, with self-sustaining check hinge, integral molded bumper, and no cover.
2. Flush valve: Zurn model ZEMS6140AV-HYMOB. Concealed, Sensor Activated with true mechanical override push-button, 24 VAC operation. 1 in. wheel handle angle stop, and vacuum breaker.
   a. Conform to ADA Accessibility Guidelines concerning location of flush valve push button.
3. Carrier: Provide with carrier for floor-mounted, back outlet bowl. Carrier shall include compression seal.

B. AWC: (floor-mounted, rear spud flush valve, bottom outlet): American Standard "Madera" Model 2234.001, low consumption, 1.6 GPF, siphon jet, elongated bowl, vitreous china, with bolt caps, and 1-1/2 in. rear spud.

1. Seat: American Standard 5905.100. Commercial-grade, open front, extra heavy-duty, solid white, flame-retardant polypropylene plastic, with self-sustaining check hinge, integral molded bumper, and no cover.
2. Flush valve: Zurn model ZEMS6140AV-HYMOB. Concealed, Sensor Activated with true mechanical override push-button, 24 VAC operation. 1 in. wheel handle angle stop, and vacuum breaker.
   a. Conform to ADA Accessibility Guidelines concerning location of flush valve push button.

2.4 URINALS

A. UR1 (wall-mounted, rear spud flush valve, back outlet): American Standard "Washbrook" Model 6515.001. Vitreous china, 2 in. back outlet. ¾" rear inlet spud.

1. Flush Valve: Zurn model ZEMS6195AV-HYMOB. Concealed, Sensor Activated with true mechanical override push-button, 24 VAC operation. 3/4 in. wheel handle angle stop, and vacuum breaker.
   a. For ADA urinal, conform to ADA Accessibility Guidelines concerning location of flush valve push button.
2. Carrier: Provide heavy-duty carrier.

2.5 LAVATORIES

A. LAV1 (wall-mounted, single hole): American Standard "Decorum" model 9024.001 EC.

1. Faucet: Zurn model Z6913-XL. Chrome, deck mounted single hole, sensor activated, with vandal-resistant 0.5 GPM aerator, chrome water supply piping with lockshield angle stops. Faucet shall have full flow during all times of operation.
2. Thermostatic mixing valve: ASSE 1050 temperature limiting device.
3. Drain: Chicago Faucet Chrome grid, 11/4 in. chrome 17 ga. tailpiece, chrome cast brass trap with cleanout plug, and chrome 17 ga. drain to wall. coordinate with sink bowl.
4. Escutcheon plates: Chrome metal supply and waste.

2.6 Mop Service Basin

A. MS: Fiat Model MSB2424. Molded stone, 24 in. x 24 in. x 10 in. high, 3 in. outlet.

1. Faucet: Chicago Faucet Model 897. Service sink faucet at 3.0 GPM, bucket hook, hose end rigid spout with top wall brace, vacuum breaker, lever handles, stops in shanks, rough chrome-plated. Mount faucet at 36 in. above finished floor.
2. Strainer: Fiat Model 1453BB.
3. Hose and hose bracket: Fiat Model 832AA.

4. Mop hanger: Fiat Model 889CC. Install at 4 ft.0 in. above finished floor on abutting wall from faucet and centered on basin.
5. Vinyl bumper guards: Fiat Model E77AA. Provide for all exposed edges.
6. Wall guards: Fiat Model MSG 2424. 18 ga. stainless steel with stainless steel screws on (2) abutting walls and Fiat #833AA silicone sealant

PART 3 - PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate exact location and installed height of plumbing fixtures with Associate Architect.

B. Countertop openings shall be cut by the General Trades Contractor. Furnish templates and locate. Coordinate with General Trades Contractor and Associate Architect.

C. Coordinate mounting height of all fixtures and controls to be used by the physically handicapped. Refer to ADA Guidelines.

D. Coordinate countertop fixture selection with cabinet sizes, and with General Trades Contractor.

3.2 INSTALLATION

A. A.Install fixtures according to Manufacturer's recommendations.

B. B.Wall hung fixtures to be mounted at the following heights or according to Manufacturer's recommendations, unless noted or directed otherwise:

1. Wall Hung Water Closet 15 in. to top (not including seat).
2. Handicapped Water Closet 17 to 19 in. to top of seat; FV @ 44 in. max.
3. Wall Hung Urinal 19 in. to lip.
4. Handicapped Urinal 17 in. to lip; FV @ 44 in. max.

C. At floor and wall-mounted plumbing fixtures, the General Trades Contractor shall caulk between fixture, floor and wall with caulking compatible with the wall finish. Exception: Electric water coolers, caulk top and side of basin.

D. D. Install fixture carriers and drainage fittings on wall hung fixtures, such as water closets, urinals, lavatories, and electric water coolers. Carriers to be anchored securely to floor.

E. E.Chrome plated brass escutcheons shall be installed on waste and supply piping at walls, including piping in cabinets.

F. F.Install stops on all cold and hot water supplies to fixtures.

G. G. All fixtures shall be thoroughly cleaned of paper and dirt before final acceptance.

H. H. Plug-in unit and adjust electric water cooler flow for correct operation and temperature of 55 Deg. F. outlet.

I. I. Provide all required seals, gaskets, nuts, bolts and washers.

J. J. Fixtures shall be carefully assembled and connected to the required plumbing inlets and outlets, and tested so the fixtures will be functioning correctly when the Work is completed.

K. K.After the installation of the plumbing fixtures is completed, all connecting pipes shall be flushed out through the fixtures to eliminate scale. Clean faucet strainers. Refer to Section 22 1116, "Domestic Water Piping", Sterilization of Water Lines.

L. L. Self-sustaining water closet seats shall be field adjusted to self-sustain in any position.

M. M. Provide anchors and supports behind walls and chases for flush valve supply piping.

N. N. Insulate all hot water and drain piping that could come in contact with wheelchair occupants. Refer to Section 22 0709, "Plumbing Piping Insulation".

3.3 WIRING

A. Receptacle and power wiring for electric water coolers shall be a part of Division 26 Work.

B. Power wiring for garbage disposal shall be a part of Division 26 Work.

END OF SECTION 22 4200

SECTION 22 4700 - DRINKING FOUNTAINS AND WATER COOLERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide electric water coolers and drinking fountains installed in place, complete with supports, supply, and waste trim as indicated on the Drawings.

B. All fixtures shall have vandal-resistant handles, escutcheons, carriers, nuts, and bolts.

C. All trim and exposed piping shall be chrome-plated, unless noted otherwise.

D. All electric water coolers and drinking fountains shall be of commercial quality and free of defects.

E. Provide trim, fittings, carriers, angle stops, chrome water supply piping, and all accessories required for a complete installation.

F. Fixture connection sizes are shown on Drawings.

G. All electric water coolers and drinking fountains resting against a wall shall be caulked with silicone sealant of a color to match the fixture. Remove excess material after fixture installation.

1.2 WARRANTY

A. Special Warranty: 5year warranty on the sealed refrigeration system.

B. See Division 1 specification section for additional warranty requirements.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND ACCESSORIES

A. Acceptable Fixture Manufacturers: Electric water coolers: Oasis, Aquarius, Elkay, Haws, Sunroc, White-Westinghouse, Halsey-Taylor, or Western.

B. Acceptable Accessory Manufacturers for Supplies, Escutcheons, and Traps: Brasscraft, Bridgeport, Consolidated, Frost, Waterway, McGuire Mfg. Co., Dearborn, Sanitary-Dash, Speedway, Zurn, or Anso-Flex.

C. Manufacturer and Model Number listed below under other paragraphs of Part 2 shall be considered to be the Design Base Manufacturer and Model Number. Other Acceptable Manufacturers listed herein will be permitted, unless specifically excluded.

2.2 CARRIERS

A. All carriers shall be specifically chosen to accommodate the particular brand and style of fixture actually installed, the particular type of floor and wall actually present at each fixture location, and the piping arrangement at each fixture. Furnish plastic or metal positioning frames to isolate carrier bolts from wall construction.

B. Provide a heavy-duty, rectangular vertical support, floor-supported, commercial type fixture carrier for each wall-mounted plumbing fixture, unless noted otherwise.

C. Acceptable Manufacturers: Zurn Model Z1225 or equal by Jay R. Smith, Wade, or Josam.

2.3 ELECTRIC WATER COOLERS

A. EWC1 (ADA-compliant, Wall-mounted): Oasis Model PG8EBFSL. “Flex-Guard” bubbler, lead-free waterways, push-and-release push pads, rated at 8 GPH of 50 deg. F. water at 80 deg. F. EWT, 90 deg. F. room temperature, 1/4 HP compressor, 120 volts, cord and plug, UL-listed/labeled, 11/2 in. tailpiece, and stainless steel top. Cabinet shall be “Sandstone” powdercoated paint on galvanized steel. Set outlet thermostat for 50 deg. F. Chrome cast brass trap with cleanout plug, 17 ga. drain to wall, chrome water supply piping with wheel angle stop, and chrome metal supply and waste escutcheon plates. PROVIDE CARRIER.

PART 3 - EXECUTION

3.1 3.01 COORDINATION

A. A.Coordinate exact location and installed height of plumbing fixtures with Associate Architect.

B. B.Coordinate mounting height of all fixtures and controls to be used by the physically handicapped. Refer to ADA Guidelines.

3.2 3.02 INSTALLATION

A. A.Install fixtures according to Manufacturer's recommendations.

B. B.Wall hung fixtures to be mounted at the following heights or according to Manufacturer's recommendations, unless noted or directed otherwise:

1. Dual-Level Water Cooler (EWC-1) LO: 36 in. from floor to bubbler outlet, 27 in. min-imum clearance from floor to underside of fixture. HI: 40 in. from floor to bubbler outlet.

C. C. At floor and wall-mounted plumbing fixtures, the General Trades Contractor shall caulk between fixture, floor and wall with caulking compatible with the wall finish. Exception: Electric water coolers, caulk top and side of basin.

D. D. Install fixture carriers and drainage fittings on wall hung fixtures, such as water closets, urinals, lavatories, and electric water coolers. Carriers to be anchored securely to floor.

E. E.Chrome plated brass escutcheons shall be installed on waste and supply piping at walls, including piping in cabinets.

F. F.Install stops on all cold and hot water supplies to fixtures.

G. G. All fixtures shall be thoroughly cleaned of paper and dirt before final acceptance.

H. H. Plug-in unit and adjust electric water cooler flow for correct operation and temperature of 55 Deg. F. outlet.

I. I. Provide all required seals, gaskets, nuts, bolts and washers.

J. J. Fixtures shall be carefully assembled and connected to the required plumbing inlets and outlets, and tested so the fixtures will be functioning correctly when the Work is completed.

K. K.After the installation of the plumbing fixtures is completed, all connecting pipes shall be flushed out through the fixtures to eliminate scale. Clean faucet strainers. Refer to Section 22 1116, "Domestic Water Piping System", Sterilization of Water Lines.

3.3 WIRING

A. A.Receptacle and power wiring for electric water coolers shall be a part of Division 26 Work.

END OF SECTION 22 4700

SECTION 23 0500 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work includes, but is not limited to, the following:

1. Alternates.
2. Vibration isolators.
3. Systems balancing.
4. HVAC Insulation
5. Temperature controls.
6. Ductwork
7. Dampers
8. Louvers.
9. Diffuser, registers, and grilles
10. Filters
11. Furnaces
12. Air-cooled condensing units
13. Energy recovery units
14. Temporary heat (indirect-fired only)

B. In Drywall, Masonry, or Concrete Wall Construction:

1. Provide sleeves for piping, refrigerant piping, and duct penetrations
2. Option for above ceiling only: Contractor shall omit block(s) where required for penetrations, and shall provide squarefinished opening. Do not omit blocks under bearing points or in firerated or smokerated walls. Do not omit blocks in walls which serve as sound barriers.
3. Contractor shall provide openings through metal building walls and roof, and seal watertight.

C. In precast concrete work, in lieu of sleeves, cut holes after erection of concrete.

D. Sleeve where pipes and ductwork pass exposed through walls, and where any piping or ductwork passes through smoke-rated or fire-rated separations, equipment room walls, or above-grade floors.

E. Verify which walls, ceilings, or floors are fire-rated, if any, and provide approved fire-blocking or fire-protective devices.

F. Carefully coordinate and check locations of sleeves immediately before and after each concrete pour and masonry installation.

G. Sleeves are not required in floor slabs on grade or in core-drilled openings not requiring water-proofing or fire suppression. Exception: Sleeves are required at core drilling

through hollow core pre-cast slabs and through concrete block walls, to facilitate containment of required fire-stopping material.

H. Sleeving with absolutely watertight seal is required for piping passing through exterior walls above grade, and underground foundation walls and other below-grade penetrations into building.

1.2 WARRANTY

A. See Division 1 specification section for warranty requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Any specified Material or Equipment Manufacturer furnished by the Contractor other than the Design Base Manufacturer shall be, in the opinion of the A/E, equivalent in quality, design, features, performance, arrangement, and appearance to that of the Design Base equipment or material, including any special features or requirements.

B. No consideration will be given to any Manufacturer which the Contractor proposes as an “Approved Equal,” unless the Manufacturer has been approved by the A/E during the bid period, and specifically named in the Contract Documents or Addenda thereto.

C. Recognizing that since no two Manufacturers are “identical,” whenever the Contractor elects to furnish specified equipment or material manufactured by other than the Design Base Manufacturer, the Contractor shall be responsible for the cost and coordination of all modifications required to accommodate the elected equipment or material.

D. Where deemed necessary by the A/E, the Contractor shall, at no additional cost to the Owner, prepare new layouts for these other brands of equipment which may have different dimensional or service requirements from the Design Base Manufacturer Standard. Submit these layouts to the A/E for review.

2.2 EQUIPMENT SUITABILITY

A. All equipment provided shall perform as intended. All items listed shall function properly, and as the Manufacturer intended. Install equipment according to the Manufacturer’s recommendations. Properly attach equipment to the floor, wall, or structure. Each item of equipment shall be compatible with all other accessories or hook-ups, including flues, piping, controls, wiring, and other equipment that are not furnished by the equipment Manufacturer, but that are required as an accessory or modification to achieve its intended function.

2.3 MISCELLANEOUS ACCESSORIES

A. Provide any additional adapters, fittings, trim, structural steel angles, channels, Unistrut, brackets, etc., as necessary to securely mount and install all items of equipment specified or shown on the Drawings. All steel installed outside or exposed to moisture shall be hot-dipped galvanized.

B. These accessories are required even though they may not be shown or detailed on the Drawings.

C. Installation shall be compatible with the building construction on which the item is to be located.

D. Verify the type of construction prior to ordering the equipment item, so that all required accessories are included.

2.4 QUANTITIES

A. Equipment may be referred to in these Specifications, or on the Drawings, as either singular or plural; the Contractor shall verify the exact number of items required to complete its Work.

2.5 STANDARD SLEEVES

A. Material:

1. Pipe sleeves:
   a. Up to 8 in. diameter: Machine-cut Schedule 40 black steel pipe.
   b. Bare copper piping: Copper sleeves.
   c. Option In walls: Schedule 40 plastic pipe may be used for pipe sleeves, except where adjacent ceiling space is used for return air plenum. Refer to Drawings.
2. Duct sleeves: 14 ga. steel.

B. Sizing: Sleeves shall be large enough for insulation to be continuous, or for watertight or fire-rated sleeve seals to be installed. Size to allow 1/2 in. minimum clearance all around pipe or pipe insulation, and ductwork.

2.6 WATERTIGHT SLEEVE SEALS

A. Oakum Caulking: With lead-pour or elastomeric sealant. Elastomeric sealant shall be 2component, polysulfide or polyurethane.

2.7 FIRE-RATED SLEEVE SEALS

A. ASTM E119 and E814 Silicone RTV foam, UL-approved.

2.8 PAINTING OF HVAC SYSTEMS

A. Refer to Division 9 for painting specifics.

B. HVAC systems in “Finished Spaces” shall be painted, color to match adjacent finishes. Mechanical Rooms, Plumbing Chases, and Janitor’s Closets shall NOT be considered “Finished Spaces”.

END OF SECTION 23 0500

SECTION 23 0508 - HVAC ELECTRICAL COORDINATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Unless noted otherwise, the Electrical Contractor shall provide all line voltage wiring required to power HVAC equipment.

B. Unless noted otherwise, the HVAC Contractor shall provide all low voltage wiring for control, monitor, or interlock HVAC equipment.

C. HVAC Contractor shall supervise all final power connections to HVAC and temperature control equipment and devices.

PART 2 - PRODUCTS

2.1 DISCONNECT SWITCHES

A. HVAC Contractor shall provide factory-installed disconnects only where specifically listed in Division 23 Specification Sections. Electrical Contractor shall provide all other disconnects.

2.2 MOTOR STARTERS

A. HVAC Contractor shall provide factory-installed starters only where specifically listed in Division 23 Specification Sections. Electrical Contractor shall provide all other starters.

2.3 CONTROL WIRING

A. HVAC Contractor shall provide all control wiring.

PART 3 - EXECUTION

3.1 PREPARATION

A. Consult Drawings which may affect the location of equipment, conduit or wiring, and make minor adjustments in locations as necessary to secure coordination.

END OF SECTION 23 0508

SECTION 23 0512 - HVAC VIBRATION ISOLATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide a complete vibration isolation system to isolate motorized equipment, piping, ductwork, and appurtenances from the building structure and ceiling construction.

1.2 ACCEPTABLE MANUFACTURERS

A. Peabody Noise Control or equal by Vibration Mountings and Controls, Inc., or Mason Industries, Inc.

B. Manufacturer and Model Number listed under Part 2 shall be considered to be the Design Base Manufacturer and Model Number. Other Acceptable Manufacturers will be permitted, unless specifically excluded.

C. Vibration isolation devices, including auxiliary steel bases and pouring forms, shall be designed and furnished by a single Manufacturer or Supplier.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Pad “F” Mounts: Peabody Noise Control Model KIP. Pre-compressed molded fiberglass isolation pads, neoprene-jacketed and stabilized during manufacture. Pads shall be sized for loading from 40 PSI to 60 PSI.

B. Hanger “H” Mounts: Peabody Noise Control Type SFH or Type SH. Combination spring and fiberglass isolation hangers incorporating 2 in. thick neoprene-jacketed fiberglass inserts in series with spring, all encased in welded steel brackets. The spring shall have a minimum additional travel of 50% between the design height and the solid height.

C. Inertia “I” Bases: Peabody Noise Control Model CIB. Prefabricated base frame with primer steel perimeter members, recessed isolator brackets, and welded in and tied reinforcing bars. Combination spring and neoprene isolation hangers in series with top and bottom load plate assembly. Fill with concrete.

2.2 ISOLATOR SCHEDULE

A. Furnish isolator types as follows:

1. EQUIPMENT ITEM PEABODY ISOLATOR

Fans	SFH	Condensing units	KIP	Gas-fired furnaces	KIP

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install vibration isolators for motor driven equipment.

END OF SECTION 23 0512

SECTION 23 0529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide hangers, supports, and inserts required for piping, ductwork, flue vents, and equipment installed under the HVAC Contract.

B. Provide all necessary inserts, expansion shields, beam clamps, pipe floor supports, and auxiliary steel.

C. For Precast Flexicore Concrete: Provide concrete inserts, toggle bolts, etc., as required for hanging HVAC Work.

D. Hangers for all insulated piping shall be sized for outer diameter of insulation.

E. Provide any additional supports, auxiliary steel, or fasteners required for attaching to structure.

1.2 ACCEPTABLE MANUFACTURERS

A. Pipe Hangers, Beam Clamps, Wall Brackets: Anvil International, Inc., BLine Systems, Inc., Carpenter & Patterson, Inc., Globe Pipe Hanger Products, Inc., Erico/Michigan Hanger Co., Inc., National Pipe Hanger Corp., PHD Manufacturing, Inc., or KloShure.

B. Channel Support Systems: BLine Systems, Inc., GS Metals Corp., Erico/Michigan Hanger Co., Inc., National Pipe Hanger Corp., Unistrut Corp., Wesanco, Inc., or Powerstrut.

C. Thermal Hanger Shield Inserts: Buckaroos, Inc., Carpenter & Patterson, Inc., PHS Industries, Inc., Pipe Shields, Inc., Rilco Manufacturing Co., Inc., or Value Engineered Products, Inc.

PART 2 - PRODUCTS

2.1 HANGERS

A. Un-insulated Piping:

1. Steel, cast iron, or plastic: 1/2 in. to 8 in.: Anvil Fig. 69. Galvanized carbon steel, adjustable swivel ring.
2. Copper, 1/2 in. to 4 in.: Anvil Fig. CT99. Copper-plated hangers, adjustable tubing ring, carbon steel ring, and malleable iron adjusting nut.

B. Insulated Piping:

1. Steel, plastic, or copper; all sizes: Anvil Fig. 260. Adjustable clevis, carbon steel yoke, Ustrap, rod, and hex nuts.
2. Thermal protector:
   a. 2 in. and smaller: 12 in. long segment of rigid pipe insulation supported by Anvil Fig. 167, 18 ga. galvanized steel protection shield.
3. Hanger size shall be sufficient to accommodate pipe and insulation without compressing the insulation.
4. For insulated refrigerant piping use insulated couplings by KloShure.

C. Vertical Piping: Anvil Fig. 261. Friction riser clamp with 2point bearing. Use Anvil Fig. CT121 copper-plated riser clamp for copper pipe. Shorten legs as required to conceal riser clamp within pipe chase and still provide adequate support.

2.2 TRAPEZE HANGERS

A. Unistrut P1000 or Superstrut A1200. Angle iron, or channel of sufficient length to support pipes and insulation on individual hangers, roller supports or saddles with insulation protectors, support capacity, support spacing, trapeze hanger rod diameter, and quantity as required to support total piping load.

B. Provide individual piping attachment to each Unistrut hanger, angle, or channel.

C. Design support system and obtain approval of a Structural Engineer licensed in Ohio. Submit details to the A/E for approval.

2.3 SUPPORTS

A. Pipe hanger rods shall be solid steel, threaded ends or all-thread rods of diameter listed below, with double nut attachment to the hanger and at the hanger attachment. 3/8 in. rod diameter for pipe sizes up to 2 in.

B. Beam Clamps (up to 8 in. diameter pipe):

1. Anvil Fig. 227. Top beam clamp, steel jaw, hook rod with nut, and spring washer steel eye-bolt, with Anvil Fig. 157 for appropriate rod diameter.
2. Option: Anvil Fig. 86. Malleable iron clamp, hardened steel cup point set screw with Fig. 89 steel retaining clip. C-CLAMPS WITHOUT RETAINING CLIPS ARE EXPRESSLY PROHIBITED.

C. Purlin Clamps: PHD Fig. 290 Purlin Clamp. Malleable iron with jam nut, and pointed steel set screw.

D. Wall Brackets: Carbon steel, back plates, and bolts.

1. Anvil Fig. 194. Lightweight 750 lb. load.
2. Anvil Fig. 195. Medium-weight 1,500 lb. load.
3. Option: Unistrut Superstrut A1200.

2.4 PIPE-INSULATING SUPPORT

A. Piping 11/2 in. and Smaller: Anvil Fig. 167. Provide 12 in. long, 18 ga. sheet metal half round piping shield inside clevis hanger.

2.5 Concrete INSERTS

A. In Precast Concrete: Anvil Fig. 117. Hilti or Philips. Malleable iron, expansion case, interior standard pipe threads, external helical wedge.

B. Refer to Manufacturer's recommendations for correct selection as to pipe size and loading.

2.6 FINISH

A. Unless otherwise noted, all steel hangers and supports shall be standard black. Exception: Hangers and supports for exposed exterior applications shall be galvanized.

2.7 Miscellaneous materials

A. Structural Steel: ASTM A36 / ASTM A36M, steel plates, shapes, and bars, black and galvanized.

PART 3 - EXECUTION

3.1 PIPE HANGERS AND SUPPORTS

A. Support horizontal standard weight steel piping and copper piping as follows:

PIPE SIZE	PVC PIPE	STEEL PIPE	COPPER PIPE
3/4 Inch or Smaller	2.5 Feet	7 Feet	5 Feet
1 Inch	3 Feet	7 Feet	6 Feet
1-1/4 Inches	3 Feet	7 Feet	7 Feet
1-1/2 Inches	3.5 Feet	9 Feet	8 Feet
2 Inches	3.5 Feet	10 Feet	8 Feet
2-1/2 Inches	4 Feet	11 Feet	9 Feet
3 Inches	4 Feet	12 Feet	10 Feet
4 Inches and Larger	4.5 Feet	12 Feet	12 Feet

B. Plastic pipe shall be supported per manufacturer's recommendations for material and service condition.

C. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

D. Place a hanger within 12 inches of each horizontal elbow.

E. Use hangers with 11/2 inch minimum vertical adjustment.

F. Support horizontal PVC pipe with 4 feet maximum spacing between hangers.

G. Support all vertical piping at every other floor.

H. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

I. Support riser piping independently of connected horizontal piping.

3.2 EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of concrete type specified in Division 03.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct support of steel members. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.3 FLASHING

A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash and seal.

C. Provide acoustical lead flashing around pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control.

3.4 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Extend sleeves through floors three inch above finished floor level in unfinished areas and flush with wall or floor in finished areas. Caulk sleeves full depth and provide floor plate.

C. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with fire stopping insulation and caulk seal. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

D. Install chrome plated steel escutcheons at finished surfaces.

END OF SECTION 23 0529

SECTION 23 0553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Identify by labels and tags the following items:

1. Equipment such as makeup air units, furnaces, fans, condensing units, control cabinets, and similar items.
2. Piping exposed in equipment rooms, accessible service areas, or accessible chases.
3. Piping running above accessible ceiling construction.
4. Exposed ductwork and ductwork in equipment rooms and running above accessible ceiling construction.

B. Install laminated plastic nameplates for equipment, and stencils for piping and ductwork.

C. Install piping identification at MAXIMUM 25 FT. intervals.

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION

A. Engraved laminated plastic nameplates, sized for 3/4 in. high letters or numbers, Gothic style.

2.2 PIPING AND DUCTWORK IDENTIFICATION

A. Stencils. Letter size shall be as follows:

OVERALL PIPE SIZE	MINIMUM LETTER HEIGHT
Up to 1-1/4 in. diameter	1/2 in. high
1-1/2 in. to 2 in. diameter	3/4 in. high
2-1/2 in. to 6 in. diameter	1-1/4 in. high

2.3 IDENTIFICATION SCHEDULE

A. Identify as follows:

1. PIPING

TYPE OF SERVICE	BACKGROUND COLOR	TEXT COLOR	DESIGNATION
Refrigerant Liquid	Yellow	Black	L
Refrigerant Suction	Yellow	Black	S
Air Conditioner Condensate	Green	White	COND

2. DUCTWORK

TYPE OF SERVICE	BACKGROUND COLOR	TEXT COLOR	DESIGNATION
Low Pressure Supply Air	Green	White	SUPPLY
Low Pressure Return Air	Green	White	RETURN
Low Pressure Outside Air	Green	White	O.A.
Exhaust Air	Blue	White	EXH.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Division 09 for stencil painting.

3.2 INSTALLATION

A. Plastic Nameplates: Install with corrosive resistant mechanical fasteners, or adhesive.

B. Plastic or Metal Tags: Install with corrosive-resistant chain.

C. Stencil Painting: Apply in accordance with Division 09.

D. Plastic Pipe Markers: Install in accordance with manufacturer's instructions.

E. Plastic Tape Pipe Markers: Install complete around pipe in accordance with manufacturer's instructions.

F. Underground Plastic Pipe Markers: Install 6 to 8 inches below finished grade, directly above buried pipe.

G. Equipment: Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as inline pumps, may be identified with metal tags.

H. Controls: Identify control panels and major control components outside panels with plastic nameplates.

I. Valves: Identify valves in main and branch piping with tags.

J. Piping: Identify piping, concealed or exposed, with stenciled painting. Tags may be used on small diameter piping. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION 23 0553

SECTION 23 0593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specifications Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:

1. Testing, adjustment, and balancing of air systems.
2. Measurement of final operating conditions of HVAC systems.

1.3 QUALITY ASSURANCE

A. Agency shall be company specializing in the adjusting and balancing of systems specified in this Section with minimum three years documented experience certified by AABC. Perform Work under supervision of AABC Certified Test and Balance Engineer.

B. Total system balance shall be performed in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance.

1.4 SUBMITTALS

A. Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.

B. Submit test reports as a submittal under provisions of Division 01 submittals.

C. Prior to commencing work, submit draft reports indicating adjusting, balancing, and equipment data required.

D. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.

E. Provide reports in soft cover, letter size, 3ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

F. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.

1.5 REPORT FORMS

A. Submit reports on AABC National Standards for Total System Balance forms.

1.6 PROJECT RECORD DOCUMENTS

A. Submit record documents under provisions of Division 01 contract closeout.

B. Accurately record actual locations of flow measuring stations, balancing valves and rough setting.

1.7 SEQUENCING AND SCHEDULING

A. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

PART 2 - PRODUCTS

2.1 AGENCIES

A. Kahoe Air Balance Co.

B. Heat Transfarr Inc.

C. Airdronics Inc.

D. Any member of AABC or NEBB.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before commencing work, verify that systems are complete and operable. Ensure the following:

1. Equipment is operable and in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Correct fan rotation.
7. Fire and volume dampers are in place and open.
8. Coil fins have been cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.

11. Duct system leakage has been minimized.

B. Report any defects or deficiencies noted during performance of services to Architect/ Engineer.

C. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.

D. If, for design reasons, system cannot be properly balanced, report as soon as observed.

E. Beginning of work means acceptance of existing conditions.

3.2 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

B. Provide additional balancing devices as required to properly balance system(s).

3.3 INSTALLATION TOLERANCES

A. Adjust air handling systems to plus or minus 5 percent for supply systems and plus or minus 10 percent for return and exhaust systems from figures indicated.

3.4 ADJUSTING

A. Recorded data shall represent actually measured, or observed condition.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.5 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

M. Check multizone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.

N. For variable air volume system powered units, set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

O. On fan powered VAV boxes, adjust air flow switches for proper operation.

END OF SECTION 23 0593

SECTION 23 0700 - HVAC INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Insulate the following items:

1. Piping:
   a. Indoor air conditioning condensation drain.
   b. Refrigerant suction.
2. Round ductwork:
   a. Above-ceiling supply.
   b. Exposed supply.
   c. Return.
   d. Outside air.
3. Rectangular ductwork:
   a. Above-ceiling supply.
   b. Exposed supply.
   c. Return.
   d. Outside air.
   e. Exterior louver plenum and first five feet of attached intake or exhaust duct.

B. Insulation is not required on exhaust ducts.

PART 2 - PRODUCTS

2.1 Insulation

A. Foam: Shall only be used for air conditioning condensation drain piping and refrigerant suction piping. Obtain approval from the Code Authority having Jurisdiction for use of this insulation type.

1. Closed cell, foamed plastic, tubular, 1/2 in. minimum wall thickness, fire-rated, 220 deg. F. temperature rating. Pipe and joints shall be sealed with Manufacturer's approved adhesive.
2. Acceptable Manufacturers: Armstrong fire-rated "Armaflex," or equal by Rubatex, or Imcoa.

B. HVAC Ductwork:

1. Concealed rectangular and round ducts: 11/2 in. thick, 1 lb. density flexible fiberglass blanket, with reinforced foil and kraft vapor barrier facing, 250 deg. F. temperature rating.
2. Exposed round ducts: Flexible, 1-1/2 in. thick, 1 lb. density, fiberglass blanket with reinforced foil and kraft vapor barrier facing, 250 deg. F. temperature rating.

3. Exposed rectangular ducts: Semi-rigid, 11/2 in. thick, 3 lb. density, fiberglass board with ASJ vapor barrier facing, 250 deg. F. temperature rating.
4. Outside air intake ducts: 2 in. thick, 3 lb. density, fiberglass, with reinforced foil and kraft vapor barrier facing, 250 deg. F. temperature rating.
5. Acceptable Manufacturers: Owens Corning Fiberglas, Schuller, Certainteed, Armstrong, Rubatex, Imcoa, Manson, or Knauf.

PART 3 - EXECUTION

3.1 Installation

A. Install in accordance with NAIMA National Insulation Standards.

B. Insulated ductwork conveying air below ambient temperature:

1. Provide insulation with vapor barrier jackets.
2. Finish with tape and vapor barrier jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

C. Duct Liner Application:

1. Adhere insulation with adhesive for 100 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA Standards for spacing. (Do not use with elastomeric foam duct liner.)
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for liner thickness.

END OF SECTION 23 0700

SECTION 23 0933 - ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide a complete operating control system for all heating, ventilating, and air conditioning systems.

B. Contractor shall coordinate all controls and wiring thereof, regardless of who furnishes the item. Contractor is responsible for all wiring diagrams, and writing all Sequences of Operation.

1.2 Warranty

A. See Division 1 specification section for warranty requirements.

PART 2 - PRODUCTS

2.1 Miscellaneous products

A. Heating/Cooling Thermostats:

1. Air-Handling Units: Electronic, 7-day programmable thermostat that can control the fan, condensing unit, electric heater. Provide with remote sensor.
2. Radiant heaters: Line-voltage, remote mounted thermostat.
3. Unit heaters: Thermostats furnished with equipment by Manufacturer
4. Thermostats shall be wall-mounted, programmable, unless noted otherwise.

2.2 CONTROL DAMPER OPERATORS

A. Provide proper sized damper motor operator, 24 volt DC (verify with equipment manufacturer).

B. Dampers and linkage specified in section 23 3313

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount thermostats at 4’-0” above floor, unless noted otherwise.

3.2 CHECKOUT

A. Check the function of each item. Assure each item starts and functions properly.

3.3 ADJUSTMENT

A. Calibrate all controls.

B. Return and make adjustments during guarantee period, at no charge.

3.4 WIRING INSTALLATION

A. HVAC Contractor shall provide all wiring to electric damper motors. Items within the temperature control cabinet shall be prewired by the Controls Contractor.

B. The Controls Contractor shall provide and install control cabinets with power and control terminal strips and all wiring inside of cabinet. The Controls Contractor shall oversee all final connections to all equipment and controls. He shall also immediately furnish and turn over to the HVAC Contractor all required interlock wiring diagrams.

C. Electrical Contractor shall provide and install electrically-operated smoke detectors and power and signal wiring associated with these detectors. HVAC Contractor shall coordinate the wiring of these control devices with the Controls Contractor and the Electrical Contractor to insure the proper sequence of operation.

3.5 SEQUENCES OF OPERATION

A. Air-Handling Units: With "FAN/OFF/AUTO" switch in "AUTO" position, wall thermostat cycles fan and heating or cooling as required to maintain space temperature. In "FAN" position, fan runs continuously. With "HEAT/AUTO/ COOL" switch in "HEAT" position, wall thermostat cycles electric heater input to maintain space temperature. With switch in "COOL" position, wall thermostat cycles compressor to maintain space temperature. With switch in "HEAT" position, cooling will be locked out; with switch in "COOL" position, heating will be locked out; with switch in "AUTO" position, unit will automatically provide heating or cooling as required. Outdoor air damper to open when fan runs.

B. Electric Unit Heaters: Integral thermostat cycles heater as required to maintain room temperature.

C. Energy Recovery Units: Supply and exhaust fans are controlled from starters tied to air-handling unit. Refer to Electrical Drawings. Provide and install all necessary damper motor operators.

END OF SECTION 23 0933

SECTION 23 2115 - CONDENSATE DRAIN PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide piping for the following:

1. Condensation drain from each cooling coil.
2. All furnace direct expansion (DX) cooling coils.
3. All furnace combustion chamber drains.

PART 2 - PRODUCTS

2.1 PIPING

A. Type “L” hard copper tubing (ASTM B88).

B. Insulation: Refer to Section 23 07 .0.

2.2 FITTINGS

A. Wrought copper or wrought bronze solder fittings (ASME B16.11).

B. Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or B16.22. Orings for copper press fittings shall be of EPDM construction.

2.3 SOLDER

A. 95/5 Tin-Antimony.

PART 3 - EXECUTION

3.1 INSTALLATION OF CONDENSATE DRAIN PIPING

A. Provide condensation drain piping from outlets on drain pans of cooling coils. Run to floor drain, or as shown on the Drawings.

B. All condensation drain lines shall be trapped at unit. Refer to Manufacturer's Instructions.

C. Height of water in condensate traps shall be equal to static pressure available at the drain pan plus a minimum of 2 inches.

D. Pitch all condensation lines down a minimum of 1 in. in 30 ft. in the direction of flow.

E. Provide cleanouts consisting of plugged tees at all changes of direction, including at traps.

F. Drains from combustion system exhaust pipe to be run to drain completely independent of cooling coil condensation drain lines.

END OF SECTION 23 2115

SECTION 23 2300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SCOPE

A. Provide refrigerant piping between the indoor evaporator units and outdoor condensing units. Install oil and refrigerant charge, and test system.

B. Size refrigerant piping according to Manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 REFRIGERANT PIPING

A. Hard drawn, Type "ACR" copper tubing (ASTM B88), cleaned, and capped. Option: Pre-charged, pre-insulated line set.

B. Insulation: Refer to Section 23 07 .0.

2.2 FITTINGS

A. Wrought copper or wrought bronze fittings, (ANSI B16.22) with joints brazed.

2.3 BRAZING ALLOYS

A. 45% silver/phosphorous or silver/zinc alloys with a melting point greater than 1,000 deg. F.

B. Acceptable Manufacturers: Sil-Fos by Handy Harmon, Aircosil by Airco Welding Products, or ESAB Allstate.

2.4 SERVICE VALVES

A. Henry Type 203.

2.5 FLEXIBLE CONNECTORS

A. Corrugated stainless inner tube with braided outer shield, 500 lb. maximum working pressure, sweat connections.

B. Acceptable Manufacturers: Metraflex, Flexonics, Flexicraft, or Hyspan Precision Products.

2.6 ACCESSORIES

A. Liquid line dryer, expansion valve, sight glass, charging valves, if not packaged with units.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Clean ends immediately before brazing joints. Maintain a continual flow of inert gas (nitrogen) through the tubing while brazing joints. Plug ends to exclude dirt and foreign matter during construction.

B. Adequately support tubing with consideration for expansion, contraction and vibration.

C. Install refrigerant piping and refrigerant specialties according to recommendations of Manufacturer of evaporator coils and condensing units.

3.2 LEAK TESTING

A. After refrigerant piping system is completed, but before insulation is applied, the system shall be thoroughly tested for leaks. Inert gas at 450 PSIG may be used for initial test.

B. After system is tight, all inert gas shall be evacuated. During evacuation, all Schrader valves to be capped, rate not to exceed 2" Hg. per second, perform triple evacuation procedure in accordance with trade standard, leave 20 psig minimum static charge in refrigeration system for layover period, until properly charged. Full refrigerant charge for proper operation shall be furnished and placed in the system by this Contractor. System shall be leak tested with halide leak detector after installation of refrigerant. All defective materials shall be replaced. Leaking joints shall be completely re-done, and the entire testing procedure performed again.

C. No test shall be performed when outside air temperature is below 65 Degrees F.

D. Test to be witnessed by Associate Architect. Schedule well in advance.

END OF SECTION 23 2300

SECTION 23 3113.01 - METAL DUCTS (LOW VELOCITY)

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide ductwork, including turning vanes, extractors, splitter-dampers, volume dampers, access doors, and flex connections, for the following:

1. Outside air.
2. Supply air.
3. Return air.
4. Exhaust air:
   a. Toilet rooms.
   b. Janitor's rooms.

B. Ductwork layout is schematic; provide risers, drops, offsets around obstructions, flattened sections, etc., and all fittings as necessary to install the ductwork.

PART 2 - PRODUCTS

2.1 STEEL DUCTWORK

A. SMACNA Section I. Galvanized steel, 24 ga. through 16 ga., intermediate reinforcing bracing, slip joints, mechanical formed seams, beaded, and cross-broken.

B. Elbows, Branches, Transitions, Offsets: SMACNA Section II. Round duct fittings shall be conical with scoops at branch takeoffs. Round elbows shall be 3piece type.

C. Turning Vanes: SMACNA Section II, Fig. 23. Double-thickness airfoil.

1. Acceptable Manufacturers: Tuttle & Bailey "Duct-Turns" or equal by Titus or Anemostat.

D. Equipment Casings, Flexible Connections, Curbs, Plenum Access Doors: SMACNA Section VI.

E. Hangers, Attachments, and Supports: SMACNA Section IV.

2.2 PLENUMS AND MIXING BOXES

A. SMACNA Section VI, Galvanized steel. Insulated galvanized steel access doors with Ventlock #206 latches and Ventlock #264 hinges.

2.3 FLEXIBLE DUCTWORK and Flexible duct connections

A. Flexible Ductwork:

1. Contractor-fabricated insulated round rigid sheet metal ductwork for branch runouts with insulated flexible duct connections to diffusers (maximum 5 ft. long flexible duct).
2. Option to insulated rigid round ductwork: Flexmaster Type TLV. Pre-insulated, semi-rigid, triple-lock, aluminum, flexible, round ductwork for branch runouts and connections to diffusers. 6 in. pressure rating.
3. Flexible duct connections to diffusers (maximum 5 ft. long): Flexmaster Type 3M. Insulated with a trilaminate of aluminum foil, fiberglass, and aluminized polyester. Fire-retardant-reinforced aluminum outer jacket. 12 in. positive pressure rating.
4. UL 181 Class I, shall not exceed 25 Flame Spread and 50 Smoke Developed.

B. Flexible Duct Connections: Ventfabrics “Ventglas.” 30 oz. neoprene-coated glass fabric.

2.4 DUCT SEALER

A. Acceptable Manufacturers: United McGill Corporation “United Duct Sealer” or equal by Hardcast or Foster.

2.5 DAMPERS

A. Refer to Section 23 33 .13 for extractors, splitter-dampers, volume dampers, backdraft dampers, and motorized control dampers.

2.6 DUCT ACCESS DOORS

A. Ward Industries. Constructed of corresponding metal, minimum 22 ga. with felt stripping or foam rubber gasketing, and completely airtight. Provide QUICK-OPENING LATCHES OR WING NUTS.

1. Rectangular door equal to width of duct minus 1 in. in one direction, and at least 12 in. in the other direction for access to motorized, or fire dampers. Larger size, if noted.

2.7 Finishing

A. Exposed round or rectangular ductwork in finished spaces shall be coated with Glidden #5229 galvanized primer or provided with “paint grip” primed by the Contractor for field painting. Provide (primed) sheet metal escutcheons wherever ductwork penetrates a finished wall surface.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Ductwork installation shall comply with all recommendations of applicable SMACNA Section.

B. Install turning vanes at all changes of direction in rectangular ducts. Option: Use standard radius turns, with centerline radius a minimum 11/2 times duct dimensions.

C. Install extractors at all rectangular supply branches. (Option: Install 45° or 90° side take-off at all round supply branches.) Install combination scoop extractors/butterfly dampers at all round supply branches to diffusers. Insure damper quadrant operator is exposed after insulating ductwork. Tape around operator to maintain vapor barrier.

D. Apply sealer to all joints per Manufacturer's instruction.

E. Make final connections to diffusers in suspended ceilings with insulated flexible duct (5 ft. long maximum).

F. Install a minimum 4 in. flexible connection where ductwork connects to motor-driven equipment. Do not bulge or install on a bind.

G. Duct access doors: Install in accessible usable locations.

H. Install duct access doors at all fire dampers and at each motorized damper. (When located in diffuser neck, damper shall be accessible by removing diffuser). Provide ceiling or wall access panels where necessary.

I. Keep ductwork as tight as possible to underside of structure or roof above. Maintain at least 7 in. clear between duct or duct insulation and suspended acoustical tile ceiling construction where recessed fluorescent lights occur. Maintain additional clearance where recessed can lights occur. Otherwise, provide 3" minimum clearance.

J. Install all dampers and provide blank-off plates to seal frames air-tight.

K. Contractor shall coordinate size and location of ductwork and insulation with structure, piping, lighting, equipment, conduit, ceiling construction, and clear height above, and other items which may present a potential conflict. For shop-lined insulation work, refer to Section 23 0700, "HVAC Insulation". Note that the dimensions indicated are net inside clear dimensions.

L. Install sheet metal escutcheon around ducts passing through walls exposed.

M. All return air ductwork connections to registers or grilles shall be made with proper transitions. Abrupt connections such as round to rectangular are prohibited. All duct transitions to be smooth, with a minimum 30 degree pitch to sides of transition.

N. Seal all outside air and exhaust air sheet metal plenums, where snow could blow in, melt and cause moisture damage to ceilings, walls, etc.

O. Paint inside of all ductwork that will be exposed to view black.

3.2 TESTING

A. A.Pressurize ductwork to 110% of design pressure. Air leakage shall not exceed 0.5% of the design CFM in any main or branch.

END OF SECTION 23 3113.01

SECTION 23 3300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide all fixed dampers for adjusting air flow.

B. Install motor-operable control dampers furnished by the Temperature Controls Subcontractor. Temperature Controls Subcontractor shall provide low-voltage transformers as necessary for proper damper operation.

C. Provide gravity backdraft dampers where indicated.

D. Motor operable dampers for louvers shall be furnished with the units.

1.2 ACCEPTABLE MANUFACTURERS

A. Ruskin or equal by American Warming and Ventilating, Air Balance, Arrow, National Controlled Air, Inc., Cesco, Flexmaster, Honeywell, Johnson Controls, Louvers and Dampers, Tamco, Vent Products, or Airstream.

B. Manufacturer and Model Number listed under Part 2 shall be considered to be the Design Base Manufacturer and Model Number. Other Acceptable Manufacturers will be permitted, unless specifically excluded.

PART 2 - PRODUCTS

2.1 Conical take-off (FOR ROUND BRANCH DUCTS)

A. Combination Conical Take-Off / Butterfly Damper: Flexmaster Model FLDE. Spin collar 45 deg. scoop, with butterfly damper with adjustable operator.

B. Option: Flexmaster Model CBDE. Conical Bellmouth fitting, with butterfly damper with adjustable operator.

2.2 EXTRACTORS (FOR RECTANGULAR BRANCH DUCTS)

A. Steel frame and parallel diverting blades, angle bracket, pivot bearing assembly, worm gear operator, and control shaft.

B. Acceptable Manufacturer: Tuttle & Bailey “Vectrols” or equal by Titus or Amnemostat.

2.3 SPLITTER DAMPER (FABRICATED)

A. Steel frame and adjustable diverting blades, angle bracket, pivot bearing assembly, worm gear operator.

2.4 BALANCING DAMPERS (volume dampers)

A. Galvanized steel, steel blades, molded synthetic bearings, locking quadrant with stand-off bracket.

1. Rectangular for ducts larger than 12 in.: Ruskin Type MD35.
2. Rectangular for ducts 12 in. and smaller: Ruskin Type MD25, single-blade.
3. Round: Ruskin Type MDRS25, single-blade.

2.5 CONTROL DAMPERS (OUTSIDE AIR INTAKE AND exhaust ONLY)

A. Low leakage type, aluminum frame, 6 in. heavy-gauge extruded aluminum airfoil blades, concealed linkage, 1/2 in. hexagonal steel axles, vinyl blade edge seal, molded synthetic bearings, extended 1/2 in. control shaft, motor operator bracket, maximum leakage less than 4 CFM per sq. ft. at 4 in. W.G.

1. Acceptable Manufacturers: Ruskin Type CD50, American Warming Type VC29, Vent Products Model 5900, or equal by Louvers and Dampers.

B. Furnish motoroperable dampers. All linkages for operators shall be furnished with dampers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install dampers in ductwork and provide access to adjustments. Contractor shall provide stops or adjust the linkage as required to fix and maintain the balance position.

B. Provide access doors in duct at each motorized damper location. HVAC Contractor shall provide ceiling or wall access panels where necessary for access to motorized dampers.

C. Coordinate the selection and installation of motor operators provided by the Controls Sub-Contractor.

D. Provide a solid place for installation of motor operators.

E. Ensure balancing damper quadrant operator is exposed after insulating ductwork. Tape insulation around operator to maintain vapor barrier.

F. HVAC Contractor shall provide ceiling access panels where necessary for access to dampers.

G. Provide duct access panels where necessary for access to dampers and operators.

H. Provide stops for the motorized damper for balancing the outside air quantity. If the motorized damper is not capable of being used for balancing, then provide manual balancing damper (not shown) on outside air intake separate from motorized damper for balancing.

END OF SECTION 23 3300

SECTION 23 3713 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide grilles, registers, and diffusers as indicated on the Drawings.

B. Service shall be for supply, return, or exhaust as noted on the Drawings.

PART 2 - PRODUCTS

2.1 DIFFUSERS, REGISTERS, AND GRILLES GENERAL REQUIREMENTS

A. Factory-fabricated to evenly distribute design CFM throughout the space without causing noticeable drafts. Steel or aluminum. Diffusers, registers, and grilles shall have white, baked enamel finish.

B. Acceptable Manufacturers

1. Titus
2. Greenheck
3. Tuttle & Bailey
4. Kruger
5. Price

2.2 RECTANGULAR OR SQUARE CEILING DIFFUSERS

A. Rectangular, adjustable pattern, stamped, multicore type diffuser to discharge air in a 360-degree pattern with sectorizing baffles where indicated.

B. Provide surface mount, snapin, inverted Tbar or spline type frame to match adjacent ceiling type. In plaster ceilings, provide plaster frame and ceiling frame. See Architectural Reflected Ceiling Plans.

C. Provide radial opposed blade damper and multilouvered equalizing grid with damper adjustable from diffuser face.

2.3 CEILING SUPPLY REGISTERS/GRILLES

A. Streamlined and individually adjustable curved blades to discharge air along face of grille, twoway deflection.

B. Fabricate 11/4 inch margin frame with concealed mounting and gasket.

C. Fabricate of aluminum extrusions with factory finish.

D. Provide integral, gangoperated opposed blade dampers with removable key operator, operable from face.

2.4 WALL SUPPLY RESISTERS/GRILLS

A. Streamlined and individually adjustable blades, depth of which exceeds 3/4 inch maximum spacing with spring or other device to set blades, horizontal face, double deflection.

B. Fabricate 11/4 inch margin frame with countersunk screw mounting and gasket.

C. Fabricate of steel with 20 gage minimum frames and 22 gage minimum blades, steel and aluminum with 20 gage minimum frame, or aluminum extrusions, with factory finish.

D. Provide integral, gangoperated opposed blade dampers with removable key operator, operable from face.

2.5 CEILING AND WALL EXHAUST AND RETURN REGISTERS/GRILLES

A. Streamlined blades, depth of which exceeds 3/4 inch spacing, with spring or other device to set blades, horizontal face.

B. Fabricate 11/4 inch margin frame with concealed mounting.

C. Fabricate of steel with 20 gage minimum frames and 22 gage minimum blades, steel and aluminum with 20 gage minimum frame, or aluminum extrusions, with factory finish.

D. Where not individually connected to exhaust fans, provide integral, gangoperated opposed blade dampers with removable key operator, operable from face.

E. No straight blades will be permitted on return or exhaust grilles or registers. Only curved blades that have a minimum deflection of 45 deg. will be accepted.

2.6 CEILING GRID CORE EXHAUST AND RETURN REGISTERS/GRILLES

A. Fixed grilles of 1/2 x 1/2 x 1/2 inch louvers.

B. Fabricate 11/4 inch margin frame with concealed mounting or layin frame for suspended grid ceilings.

C. Where not individually connected to exhaust fans, provide integral, gangoperated opposed blade dampers with removable key operator, operable from face.

2.7 LIEAR SLOT CEILING DIFFUSERS

A. Linear slot diffusers shall be provided with ¾-inch slot spacing of the sizes and mounting types shown on the plans and outlet schedule.

B. Diffuser lengths greater than 6 feet shall be furnished in multiple sections and will be joined together end-to-end with alignment pins to form a continuous slot appearance.

C. All alignment components to be provided by the manufacturer. The return (and blank) models shall be constructed the same as supply diffusers without the pattern controllers.

D. The frame and support bars shall be constructed of heavy gauge extruded aluminum. The pattern controller shall be an aerodynamically curved “ice-tong” shaped steel deflector capable of 180° pattern adjustment from the face of the diffuser and shall allow dampering if required. Maximum pattern controller length shall be 3 feet, for diffusers longer than 3 feet pattern controllers shall be furnished in multiple sections.

E. The finish shall be white on the face and black on the pattern controllers. The paint must pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint must pass a 250-hour ASTM D870 Water Immersion Test.

F. The paint must also pass the ASTM D2794 Reverse Impact Cracking Test with a 50-inch pound force applied.

G. Heavy gauge extruded aluminum end borders, end caps and mitered corners shall be available to close off the ends of the diffusers. Plenums shall be manufactured by the same manufacturer of the linear slot diffusers.

H. The manufacturer shall provide published performance data for the linear slot diffuser. The diffuser shall be tested in accordance with ANSI/ASHRAE Standard 70-1991.

2.8 LOUVERS

A. Provide minimum 4-inch deep louvers with blades on 45 degree slope with center baffle and return bend, heavy channel frame, birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake.

B. Fabricate of 16 gage Galvanized steel or 12 gage extruded aluminum, welded assembly, with factory color anodized finish.

C. Furnish with exterior flange and screw holes in jamb for installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install items in accordance with manufacturers' instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with airtight connection.

D. Provide balancing dampers on duct takeoff to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Paint ductwork visible behind air outlets and inlets matte black.

END OF SECTION 23 3713

SECTION 23 4300 - ELECTRONIC AIR CLEANERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specifications Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:

1. Electronic air cleaners.

1.3 QUALITY ASSURANCE

A. Provide all filters as product of one manufacturer.

B. Entire assembly shall be UL Listed.

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division 01 on air cleaner performance data, and installation.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Division 01.

B. Include instructions for operation, changing, and periodic cleaning.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store and protect products under provisions of Division 01.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Environmental Group, Inc. (RGF) – HALO-LED – REME-LED UV, Zero ozone air purification system.

B. No other approved equals.

2.2 ELECTRONIC AIR CLEANERS

A. Duct-mounted UVC LED lamp with factory-assembled controller.

B. Power Pack: Self-contained, pre-wired rectifying unit to convert 115 volt AC to required 24 volt AC.

C. Safety Accessories: Fan control relay, air sensing switch.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install air cleaning devices in accordance with manufacturer's instructions.

B. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction.

C. Install air cleaners in ductwork directly downstream of air handling equipment..

END OF SECTION 23 4300

SECTION 23 5413 – GAS-FIRED FURNACES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide a high efficiency 4-way gas-fired furnace of the capacities shown on the Drawings complete with natural gas or propane burner, heat exchanger, valves, filters, direct expansion cooling coil, thermostat, blowers and factory controls.

B. Provide matching air-cooled condensing unit complete with fan, coil and compressor.

1.2 QUALITY ASSURANCE

A. Standards: Design certified by AGA.

B. Unit will be designed, tested and constructed to the current ANSI Z21.47/CSA2.3 design standard for gas-fired central furnaces.

C. Unit efficiency testing will be performed per the current DOE test procedure as listed in the Federal Register.

D. Unit will be certified for capacity and efficiency and listed in the latest AHRI Consumer's Directory of Certified Efficiency Ratings.

E. Unit will carry the current Federal Trade Commission Energy Guide efficiency label.

1.3 WARRANTY

A. Provide a one-year parts and labor warranty on the entire unit commencing at substantial completion. Provide a 20-year heat exchanger warranty.

PART 2 - PRODUCTS

2.1 VERTICAL UP-FLOW/DOWN-FLOW/HORIZONTAL FURNACE WITH ECM MOTORS

A. Unit shall be furnished complete and include the following features:

1. Printed-circuit control center with blower relay and 40 VA transformer.
2. Blower compartment safety cut-off switch which automatically cuts off electric power to unit when blower door is removed.
3. Hot surface ignition system.
4. Combustion air safety switch to shut off furnace when excessive heat, caused by insufficient combustion air, is sensed in the burner control compartment.
5. Galvanized blower wheel shall be centrifugal type, statically and dynamically balanced. Blower motor of ECM type shall be permanently lubricated with sealed ball bearings of a horsepower meeting the specifications and have infinitely

variable speed from 600- 1200 RPM operating only when motor inputs are provided. Blower motor shall be direct drive and soft mounted to the blower housing to reduce vibration transmission.

6. Primary Heat Exchangers shall be 3-Pass corrosion-resistant aluminized steel of fold-and-crimp sectional design and applied operating under negative pressure.
7. Secondary Heat Exchangers shall be of a stainless-steel flow-through of fin-and-tube design and applied operating under negative pressure.
8. Controls shall include a micro-processor-based integrated electronic control board with at least 16 service troubleshooting codes displayed via diagnostic flashing LED light on the control, a self-test feature that checks all major functions of the furnace, and a replaceable automotive-type circuit protection fuse. Multiple operational settings available, including separate blower speeds for low heat, high heat, low cooling, high cooling and continuous fan on multi-stage equipment. Continuous fan speed may be adjusted from an appropriately selected thermostat. Cooling airflow will be selectable between 325 to 400 CFM per ton of air conditioning. Features will also include temporary reduced airflow in the cooling mode for improved dehumidification when a compatible thermostat is provided.

B. Manufacturers: Bryant, **Lennox**, **Trane**, or Carrier.

2.2 ACCESSORIES

A. Factory supplied accessories including but not limited to: vent kits, concentric vent terminals, vent terminal brackets, freeze protection, condensate neutralizer, external trap, combustible floor base, return air base, gas conversion, twinning, and media filters.

B. Thermostat: Honeywell Model TH8320. Electronic, 7-day programmable thermostat.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Gas piping final connection is the responsibility of the HVAC Contractor. Plumbing Contractor will provide shutoff valve, dirt leg and union for equipment connection.

B. Install exhaust gas-venting system through exterior wall.

C. Install thermostat and adjust blower speed.

D. Install flexible duct connections at supply and return connections to furnace.

E. Filters shall be installed prior to operating the unit.

F. Perform all start up and adjustment procedures as outlined in the installation instructions.

G. At final completion, replace all filters with clean, new filters, and turn one complete set of replacement filters over to the Owner.

3.2 WIRING

A. Power wiring to unit is the responsibility of the Electrical Contractor.

B. Thermostat control wiring shall be the responsibility of the HVAC Contractor.

END OF SECTION 23 5413

SECTION 23 6213 - PACKAGED AIR-COOLED REFRIGERANT COMPRESSOR AND CONDENSER UNITS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide factory-assembled and factory-tested air-cooled heat pump condensing units as scheduled on the Drawings, complete with compressors, refrigeration circuits, condensing coils, fans, and controls.

B. Heat pump shall be used as the primary source of heating with the gas furnace as the backup. Provide controls as necessary per section 23 0933 Coordinate refrigerant coil and controls with the indoor gas fired furnace.

C. Heat pump to be energy star qualified.

1.2 WARRANTY

A. See Division 1 specification section for warranty requirements.

PART 2 - PRODUCTS

2.1 AIR-COOLED CONDENSING UNITS

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

1. Trane
2. Bryant
3. Carrier
4. Lennox

B. Fully weatherproofed, galvanized steel, with zinc phosphate and baked-on enamel finish. Each unit shall match the capacity as required for its respective evaporator coil unit. Provide openings for all connectors and gasketed access panels for servicing and maintenance.

1. Coil: Aluminum plate fins mechanically bonded to seamless copper tubing. Provide coil guard.
2. Fans and Motors: Propeller-type vertical discharge, with permanently lubricated, resiliently mounted, direct-drive motors, UL-listed for outdoor use, with overload protection in windings, statically and dynamically balanced fans. Provide fan guard.

3. Refrigerant: Unit shall utilize a non-CFC type refrigerant R-454B or an equivalent. R-22 is not acceptable.
4. Compressor: Directdrive scroll compressors, external spring isolation mounts, crankcase heater, centrifugal oil pump, suction gas cooled, filter/dryer, and 5year (parts-only) warranty.
5. Controls: Fully factory-wired within a separate enclosure. All controls and wiring must be completely enclosed. Safety devices:
   a. High-pressure and low-pressure switches.
   b. Compressor overload control.
   c. Oil pressure cutout.
   d. Anti-recycle timer.
   e. Low voltage cutout.
   f. Separate circuit breakers for each compressor and fan motor.
   g. Compressor motor contactors.
   h. Relays.
   i. Control power transformer.
   j. Low ambient operation (down to 30 deg. F.).
   k. Time delay.
   l. Lockout thermostat
   m. Changeover valve and accessories and controls.
6. Accessories:
   a. Liquid line dryers.
   b. Sight glasses.
   c. Expansion valves.
   d. Charging valves.
   e. Suction and liquid line service valves.
7. Long Line Accessories:
   a. Compressor start assist capacitor and relay.
   b. Crankcase heater.
   c. Hard shutoff thermostatic expansion valve.
   d. Any additional accessories required for proper operation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount Condensing units as shown on the drawings.

B. Concrete pads shall be the responsibility of the General Trades Contractor.

C. Make all refrigerant line connections and fully charge system.

3.2 TEST

A. Conduct leak test of the refrigerant piping system.

3.3 WIRING

A. Disconnect switch and power wiring are specified in Division 26.

END OF SECTION 23 6213

SECTION 23 7200 - AIR-TO-AIR ENERGY RECOVERY EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specifications Sections, apply to this Section.

1.2 SUMMARY

A. This Section Includes:

1. Fixed-plate sensible heat exchangers.
2. Packaged energy recovery units.

1.3 QUALITY ASSURANCE

A. Fan Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.

B. Sound Ratings: AMCA 301; tested to AMCA 300 and bear AMCA Certified Sound Rating Seal.

C. Fabrication: Conform to AMCA 99 and ARI 430.

1.4 WARRANTY

A. See Division 01 specification section for warranty requirements.

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division 01 Submittals.

B. Shop drawings shall indicate assembly, unit dimensions, weight loading, required clearances, construction details, and field connection details.

C. Product data shall indicate dimensions, weights, capacities, ratings, fan performance, motor electrical characteristics, and gages and finishes of materials.

D. Provide fan curves with specified operating point clearly plotted.

E. Submit sound power levels for both fan outlet and casing radiation at rated capacity.

F. Submit product data of filter media, filter performance data, filter assembly, and filter frames.

G. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factoryinstalled and field-installed wiring.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data under provisions of Division 01.

B. Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in factoryfabricated protective containers, with factoryinstalled shipping skids and lifting lugs.

B. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.9 EXTRA STOCK

A. Provide one set of disposal panel filters.

PART 2 - PRODUCTS

2.1 PACKAGED ENERGY RECOVERY UNITS

A. Acceptable Manufacturers:

1. Greenheck
2. RenewAire LLC.
3. Trane Co.
4. American Energy Exchange, Inc.
5. SEMCO LLC.

B. Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

C. Housing: Manufacturer's standard construction with corrosion-protection coating and exterior finish, hinged access doors with neoprene gaskets for inspection and access to

internal parts, minimum 1-inch thick thermal insulation, knockouts for electrical and piping connections, exterior drain connection, and lifting lugs.

D. Heat Recovery Device: Fixed-plate heat exchanger.

E. Supply and Exhaust Fans: Forward-curved, fan with spring isolators.

1. Motor and Drive: Belt driven with adjustable sheaves, motor mounted on adjustable base.
2. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 23 0508 "HVAC Electrical Coordination."
3. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

F. Disposable Panel Filters:

1. Comply with NFPA 90A.
2. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.
3. Factory-fabricated, viscous-coated, flat-panel type.
4. Thickness: 2 inches.
5. Minimum Arrestance: 80, according to ASHRAE 52.1.
6. MERV: 8, according to ASHRAE 52.2.
7. Media: Interlaced glass fibers sprayed with nonflammable adhesive.
8. Frame: Galvanized steel with metal grid on outlet side, steel rod grid on inlet side, hinged, and with pull and retaining handles.

G. Piping and Wiring: Fabricate units with space within housing for piping and electrical conduits. Wire motors and controls so only external connections are required during installation.

1. Indoor Enclosure: NEMA 250, Type 12 enclosure contains relays, starters, and terminal strip.

H. Accessories:

1. Duct flanges.
2. Hinged access doors with quarter-turn latches.

2.2 CONTROLS

A. Variable Speed Drives (one for each fan motor): receives low-voltage signal from air-handling unit to energize unit (Low-Speed), and low-voltage signal from occupancy sensors control speed (High-Speed).

2.3 CAPACITIES AND CHARACTERISTICS

A. Provide unit capable of performance identified on drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fixed-plate heat exchangers so supply and exhaust airstreams flow in opposite directions.

1. Install duct access doors in both supply and exhaust ducts, both upstream and downstream, for access to heat exchanger. Access doors and panels are specified in Section 23 3313 "Air Duct Accessories."

B. Install floor-mounted units on 4-inch high concrete base. Secure air-to-air energy recovery equipment to concrete base with anchor bolts.

C. Install units with clearances for service and maintenance.

D. Install new filters at completion of equipment installation and before testing, adjusting, and balancing.

END OF SECTION 23 7200

SPECIFICATIONS GROUP

SECTION 26 0500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish material, labor, tools, accessories, and equipment to complete and leave ready for operation all electrical systems of this Project as described in these Specifications and as shown on the Drawings.

B. It is the intent that the Electrical Work be complete in every respect. Install Work in compliance with the Latest Enforced Edition of all applicable Codes, Regulations, and Standards. Obtain all permits, licenses, and certifications required by the Code Authority having Jurisdiction.

C. Only a Contractor and craftsmen with an Electrical Contractor State License shall install this Electrical Work.

D. Use sufficient journeymen electricians and competent supervisors in execution of this portion of the Work to ensure proper and adequate installation throughout.

E. Shop drawings for the installation of an electrical system shall be submitted and reviewed by the A/E before any electrical system is installed, enlarged, or extended. Under NO circumstances shall any work be performed prior to receiving shop drawings reviewed by the A/E.

F. Coordinate location of all work and equipment with other trades.

G. Work includes, but is not limited to, the following:

1. Concrete conduit encasement and pull box encasement.
2. Installation of HVAC variable speed drives.
3. Electric heating - wall heaters.
4. Control wiring.
5. Lighting controls.
6. Power systems.
7. Transient voltage surge suppressor.
8. Lighting systems.
9. Site electrical systems

H. Work Not Included:

1. The Owner shall provide the following work directly or through a separately negotiated Contract:
   a. Telephones and related switching equipment.
   b. Computers and modems.

c. Security system equipment and wiring.

I. The electrical system shall not be considered complete and acceptable unless, and until, all Code and Governing Agency requirements are satisfied.

J. The bedding and backfill requirements listed in this Section represent a minimum requirement. If Local or State requirements are in excess of listed requirements, such requirements shall supersede.

K. ALL EXCAVATION AND BACKFILL WORK SHALL COMPLY WITH REQUIREMENTS OF THE LATEST STANDARDS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).

L. Provide excavation and backfilling for Electrical Work. Backfill to finish grade or to levels suitable for finish grading and provide finish grading.

M. Coordinate routing of underground lines with the A/E to minimize disruption and damage to trees, shrubs, walks, drives, and other landscape features.

N. Excavation, backfill, surface repair, and traffic control within the public right-of-way shall be in accordance with governing agency rules and regulations. Pay any fee associated with alteration of the roadway.

O. Remove unusable or surplus excavated material from the site. Deposit any usable excavated material where directed by the A/E.

P. Locate and touch existing underground utilities, if any, in the areas of new work. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, notify the A/E immediately for instructions before proceeding. Cooperate with Utility Companies and the Owner in keeping services and the facilities in operation.

Q. Excavation damage to, or interruption of service of, any underground utility shall be a liability of the Contractor, whether or not plotted on the Drawings. Promptly repair or replace all damage to any existing utility to the full satisfaction of the Utility Company, the Utility Owner, and the A/E.

R. All existing utility service conduits, wiring, etc., which are uncovered, whether within or beyond the property lines, shall be suitably supported, protected, and maintained in operation, and shall be protected against settlement when excavations are refilled.

S. Coordinate timing of excavations where required by Code Authority having Jurisdiction or where otherwise specified herein.

T. Obtain approval from the A/E for bearing conditions.

U. Contact the A/E to obtain copies of Soils reports, if available. Bidders are strongly urged to visit the site and investigate existing soil conditions themselves.

V. (11) months after Contract Completion, review the excavated areas and add backfill soil as required to fill in any deformations or areas where grade was not maintained due to settling, erosion, etc. Re-seed or re-sod areas where backfill is added for full ground grass coverage throughout any affected area.

W. The contractor shall provide seed grass cover to reestablish landscape to existing conditions where disturbed by its Work. This includes replacement of existing plants, shrubs, and related items.

X. Repair and restore plants, shrubs, trees, sodded areas, paving, streets, curbs, and walks to match existing surfaces in the area where excavations are made.

Y. Maintain seeded lawns not less than (11) months after Contract Completion and add any backfill as required to restore grade due to settling, erosion, etc. If seeded in non-growing season and not given full (11) months of maintenance, or if not considered acceptable at that time, continue the following growing season until an acceptable lawn is established, as determined by the A/E.

Z. In Drywall, Masonry, or Concrete Wall Construction:

1. Furnish sleeves for conduit, and control wiring, and other electrical items.
2. Option for above ceiling only: The Masonry Contractor shall omit block(s) where required for penetrations and shall provide square finished opening. Do not omit blocks under bearing points or in fire rated or smoke rated walls.
3. The General Contractor shall provide openings through exterior building walls and seal watertight.

AA. The General Contractor is to provide sleeves where electrical work passes exposed through walls, and where any electrical work passes through smoke-rated or fire-rated separations, equipment room walls, or above-grade floors.

BB. If sleeves are not installed in construction, due to fault of the General Contractor, holes through masonry or concrete construction shall be core drilled by the Electrical Contractor at the General Contractor's expense.

CC. Sleeves are not required in floor slabs on grade.

DD. Sleeving with a watertight seal is required for electrical work passing through exterior walls above grade, and underground foundation walls and other below-grade penetrations into the building.

1.2 WARRANTY

A. See Division 1 specification section for warranty requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Any specified Material or Equipment Manufacturer furnished by the Contractor other than the Design Base Manufacturer shall be, in the opinion of the A/E, equivalent in quality, design, features, performance, arrangement, and appearance to that of the Design Base equipment or material, including any special features or requirements.

B. Recognizing that since no two Manufacturers are “identical,” whenever the Contractor elects to furnish specified equipment or material manufactured by other than the Design Base Manufacturer, the Contractor shall be responsible for the cost and coordination of all modifications required to accommodate the elected equipment or material, including any Work of other Trades that might be affected. Where changes to other Trades’ Work are required, the Contractor shall include the additional costs of all such Work in its bid.

C. Where deemed necessary by the A/E, the Electrical Contractor shall, at no additional cost to the Owner, prepare new layouts for these other brands of equipment which may have different dimensional or service requirements from the Design Base Manufacturer Standard. Submit these layouts to the A/E for review.

2.2 EQUIPMENT SUITABILITY

A. All equipment provided shall perform as intended. All items listed shall function properly, and as the Manufacturer intended. Install equipment according to the Manufacturer’s recommendations. Properly attach equipment to the floor, wall, or structure. Each item of equipment shall be compatible with all other accessories or hook-ups, including controls, wiring, and other equipment that are not furnished by the equipment Manufacturer, but that are required as an accessory or modification to achieve its intended function.

2.3 MISCELLANEOUS ACCESSORIES

A. Provide any additional adapters, fittings, trim, structural steel angles, channels, Unistrut, brackets, etc., as necessary to securely mount and install all items of equipment specified or shown on the Drawings.

1. All steel installed outside or exposed to moisture shall be hot-dipped galvanized.

B. These accessories are required even though they may not be shown or detailed on the Drawings.

C. Installation shall be compatible with the building construction on which the item is to be located.

D. Verify the type of construction prior to ordering the equipment item, so that all required accessories are included.

2.4 QUANTITIES

A. Equipment may be referenced in these Specifications, or on the Drawings, as either singular or plural; the Contractor shall verify the exact number of items required to complete its Work.

2.5 BACKFILL

A. Typical backfill conditions:

1. Where bedding is not specified or required by Code: replace with previously excavated material.
2. Concrete pads and bases: provide granular material conforming to Division 02 requirements.

B. Materials:

1. Crushed stone: (ODOT Item 304).
2. Pea gravel: 1/8 in. minimum to 3/4 in. maximum diameter.
3. Sand: Clean, dry, coarse or medium.
4. Washed gravel: 3/4 in. size.
5. Concrete encasement: Material conforming to Division 03 requirements.

C. Materials Prohibited from Being Used for Backfill:

1. Material containing large rocks (over 2 in.), building materials, masonry debris, cinders, rubbish, wood, or other material subject to decay.
2. Any material which may cause damage to cable, conduit, or duct banks.
3. Frozen earth.

2.6 STANDARD SLEEVES

A. Sleeve material, up to 8 in. diameter: machine-cut Schedule 40 black steel pipe.

B. Sizing: sleeves shall be large enough for insulation to be continuous, or for watertight or fire-rated sleeve seals to be installed. Size to allow 1/2 in. minimum clearance all around.

2.7 WATERTIGHT SLEEVE SEALS

A. Oakum Caulking: Thiokol Corp. With lead-pour or elastomeric sealant. Elastomeric sealant shall be 2-component polysulfide or polyurethane.

1. Other Acceptable Manufacturers: 3M, Calpico, or Hilti.

B. Compression Seals: Thunderline Corp. Linkseal. Use stainless steel bolts and nuts. Provide correct size seal and coordinate with sleeve size.

1. Other Acceptable Manufacturers: Wayne, Michigan, or Calpico.

C. Provide sleeves with waterstop anchor flange at midpoint where penetrating structure at or below grade.

1. Acceptable Manufacturers: Calpico, 3M, or Hilti.

2.8 FIRE-RATED SLEEVE SEALS

A. ASTM E119 and E814 Silicone RTV foam, UL-approved.

B. The sealant shall be red to allow easy inspection by building personnel.

2.9 PAINTING OF ELECTRICAL SYSTEMS

A. Refer to Division 9 for painting specifics.

B. Electrical systems in “Finished Spaces” shall be painted with color(s) and finishes to match adjacent finishes. Mechanical Rooms, Plumbing Chases, and Janitor’s Closets shall NOT be considered “Finished Spaces”.

END OF SECTION 26 0500

SECTION 26 0511 - EQUIPMENT HOOK-UP AND FINAL CONNECTIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Coordinate the electrical requirements of equipment with the Supplying Contractor or Manufacturer.

B. Provide plug-in or rough-in and final connection for each piece of equipment requiring power, including, but not limited to, the following:

1. Plumbing equipment, such as electric water coolers, recirculating pump, water heater, hot water heater control, well pump, water softening, water treatment and sewage ejecting.
2. All heating, ventilating, and cooling equipment, including air handling units, energy recovery units, furnaces, baseboard heaters, motor-operated dampers, condensing units, exhaust fans, and similar items.
3. Vending machines.
4. Owner furnished equipment.

END OF SECTION 26 0511

SECTION 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide conductors and cable for secondary feeder and branch circuit wiring, special system wiring, and control wiring.

B. Unless otherwise noted, all conductors shall be enclosed in a continuous, grounded raceway system.

1.2 1.02 RELATED DOCUMENTS

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

1.3 1.03 QUALITY ASSURANCE

A. A.Underwriters' Laboratories (UL).

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. All line voltage (120 volts and higher) conductors shall be stranded copper, 600 volt insulation, Type THWN or XHHW 75 deg. C., and color-coded per Part 3 of this specification.

B. Type THHN 90 deg. C. conductors shall be used for connecting all lighting fixtures.

C. MC Cable shall be stranded copper, 600 volt insulation, Type THWN, 75 deg. C, with full size, copper insulated ground conductor and interlocking aluminum outer sheath. Uses are limited as outlined in Part 3 of this section.

2.2 PLUG CONNECTED CABLE

A. Flexible cord for short connection to equipment shall be 600 volt, heat-resistant, rubber insulated portable cable with neoprene jacket, UL Type “ST” on “SRDT.” Cord shall be extra-flexible stranded copper with ground conductor. Provide termination plug with NEMA configuration to match receptacle, for a complete and functional installation.

B. Flexible cable is NOT permitted for motor connections.

2.3 SPLICES

A. Splices in conductors #10 AWG and smaller wire shall be made with Minnesota Mining and Manufacturing Company insulated “Scotch Locks,” Ideal Company “Wingnut,” or Thomas & Betts Type “PT” connectors, or with mechanically crimped sleeves as manufactured by Minnesota Mining and Manufacturing Company “3M Scotchlok”, Thomas & Betts or Ideal Company, then insulated with pressure-sensitive electrical tape.

B. Splices in conductors #8 AWG and larger shall be made with pressure type mechanical connectors and insulated with (2) layers of insulating putty and (2) layers of pressure-sensitive electrical tape.

PART 3 - PART 3 - EXECUTION

3.1 WIRING INSTALLATION

A. Unless noted otherwise, all conductors shall be installed in conduit, including special systems.

B. MC Cable shall be only used where fished (concealed) through the SIPS panel exterior walls.

C. The Electrical Contractor shall increase branch circuit wiring shown on the Drawing by (1) size for homeruns over 100 ft. long and increase wire by an additional (1) size every 100 ft. thereafter.

D. A maximum of (3) homeruns shall be permitted in any (1) conduit run, however, a full size neutral must be provided for each homerun. All multiple wiring installations shall be derated in accordance with NEC Table 310-16.

E. Free ends and loops at boxes and enclosures are to be pushed back in box and protected by blank covers or other means until the interior painting and decorating work is completed. Swab all conduits clean and dry before pulling wire. Wires #8 AWG and smaller are to be hand pulled. Use only UL-listed pulling lubricants such as Ideal Co. "WireLube", 3M “Clear Lube” or NSI “Slyder”.

F. Leave at least six (6) inches of free conductor at all outlets, except where conductors are intended to loop without joints through outlets for fixtures or wiring devices.

G. The following wire color code shall be used:

VOLTAGE	120/240V-1ph (where applicable)	120/208V-3ph (where applicable)	277/480V-3ph (where applicable)
Phase A	Black	Black	Brown
Phase B	Red	Red	Purple
Phase C	N/A	Blue	Yellow
Neutral	White	White	Gray
Ground	Green	Green	Green

H. Branch circuits to be connected as numbered on Drawings.

I. Test and permanently tag by circuit number each conductor wire, including neutrals, in panelboard gutter before connecting to panelboard. Use adhesive tapes wrapped around the wire and formed into a flag.

J. Use deoxidant cleaner on all wiring connections.

K. Tag and identify all conductors entering or leaving terminal wiring strips.

L. Motor control, low voltage and line voltage conductors shall be installed in separate conduits.

M. The following special system conductors shall be installed in separate conduits:

1. CCTV system
2. Access Control System
3. Speaker system

N. All wiring installed in air handling plenums shall be in conduit.

O. Wiring installation shall be acceptable to the Local Code Authority having jurisdiction.

END OF SECTION 26 0519

SECTION 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
5. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

C. Building Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 2 inches (6.3 by 50 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Length to be as specified on drawings. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by10 feet (19 mm by 3 m) diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger.

B. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors, except at test wells.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. All HVAC and plumbing pumps, air handlers, water heaters and other equipment items.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main electrical service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor to the street side of the dielectric fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically span water meters. Connect to pipes with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing the grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Test the completed grounding system at each location where a maximum ground-resistance level is allowed and specified, including the service disconnect enclosure grounding terminal, and ground test wells.
   a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
   b. Perform tests by fall-of-potential method according to IEEE 81.

B. Report measured ground resistances that exceed 5 ohms:

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 0526

SECTION 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 QUALITY ASSURANCE

A. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Allied Tube & Conduit.
   b. Cooper B-Line, Inc.
   c. GS Metals Corp.
   d. Thomas & Betts Corporation.
   e. Unistrut.
2. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
3. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
4. Toggle Bolts: All-steel springhead type.
5. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are more strict.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Strength of Support Assemblies: Where not indicated on drawings, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Light Steel: Sheet metal screws.
6. Items Mounted on Hollow Walls, Structural Insulated Panels and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, and other devices on slotted-channel racks attached to substrate.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 PAINTING

A. Refer to Division 09 and architectural finish schedule.

END OF SECTION 26 0529

SECTION 26 0533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide boxes for devices, lighting fixtures, motors and equipment connections, system equipment connections, and special outlets. Provide pullboxes where more than (2) 90 deg. bends are required or if conductors are pulled further than 100 ft.

B. Unless otherwise noted, all conductors shall be enclosed in a continuous, grounded, steel conduit or raceway.

C. The conduit system shall be made mechanically tight and electrically continuous throughout. Conduit system shall be grounded at the service entrance.

D. Use galvanized steel conduit. Exception: Conduit exposed outside shall be rigid aluminum. No aluminum conduit is permitted inside or encased in concrete.

E. Schedule 40 PVC and coilable Schedule 80 HDPE conduit is permitted underground with limitations or below slabs.

F. Minimum Size: 1/2 in. for control and low voltage wiring only; 3/4 in. for line voltage wiring; 1 in. minimum below slab or underground, except as otherwise indicated.

PART 2 - PRODUCTS

2.1 BOXES

A. All outlet boxes shall be galvanized pressed steel of standard knockout type.

B. Lighting outlet boxes shall be standard 4 in. octagonal, 1-1/2 in. minimum deep boxes with 3/8 in. fixture-mounting stud. Outlet boxes having more than (2) conduits, or when 3/4 in. conduit is used, shall be standard 4 in. square boxes 1-1/2 in. deep or deeper as might be required to accommodate the wiring contained therein.

C. Flush device boxes in masonry walls shall be masonry boxes designed for the purpose, or 4 in. square boxes with raised covers designed for masonry.

D. Wiring device boxes for surface conduit work and those located in potentially damp areas shall be FS Series cast boxes. Exterior exposed boxes shall be weatherproof or airtight with gaskets.

E. Flush device boxes in plaster or drywall construction shall be 4 in. square, 2-1/8 in. deep boxes or gangable 2-1/2 in. deep boxes. Shallow 1-1/2 in. deep boxes may be used only in walls too thin for standard depth boxes.

F. Boxes shall be large enough to accommodate the size and number of conduits secured thereto and the size and number of wiring conductors.

G. All fittings, covers, and hardware shall be galvanized steel.

H. Boxes shall be NEMA type approved for the prevailing environmental conditions.

2.2 OUTDOOR PULL BOXES

A. Provide grade-mounted, precast polymer concrete, watertight, open bottom, with heavy-duty gasketed covers, suitable for occasional non-deliberate heavy vehicle drive-over application, with logo, size as required for installation of quantity of conduits and cables, or indicated on drawings. Minimum size to be 13”x27”x18”.

B. Acceptable Manufacturers: Hubbell “Quazite”, Old Castle “Synertech” or Armorcast.

2.3 CONDUIT SYSTEMS

A. Use electrical metallic tubing, intermediate metal conduit, or rigid steel conduit, as specified below:

1. Threaded rigid or intermediate conduit is required where conduit is ANY of the following:
   a. 2-1/2 in. or larger.
   b. Exposed to physical damage.
   c. Exposed within 8 ft. of finished floor.
   d. Run in slab or in exterior walls.
2. Threaded rigid or intermediate conduit is required where vertical drops are made to equipment in open space. The vertical conduit shall be rigidly supported from the equipment, extending to a minimum of 10 ft. above floor level, and be not less than 1 in. diameter.
3. Steel thin-wall EMT up through 2 in. diameter may be used elsewhere in interior construction, where rigid or intermediate is not otherwise required.
4. Schedule 40 PVC conduit may be installed underground and below the ground floor slab WITH 24 IN. MINIMUM COVER. PVC conduit shall terminate below the slab and connect to rigid steel or intermediate metal riser conduit. Encase conduits in concrete that run under driveways, parking lots, and sidewalks.

B. Flexible Steel Conduit: Final connections to motors and equipment subject to vibration or moisture shall be made with 3/4 in. flexible steel conduit, 18 in. to 36 in. long, with PVC jacket, and containing copper phase and ground conductors. Connections between recessed lighting fixtures and junction boxes may be installed using 1/2 in. flexible steel conduit not over 72 in. long.

2.4 Steel CONDUIT FITTINGS

A. Rigid or intermediate conduit fittings shall be threaded. EMT conduit fittings shall be compression type only. Conduit bodies shall be malleable iron, threaded for heavy wall

conduit and compression type for EMT, with cadmium finish and cadmium-plated sheet steel covers. Provide neoprene cover gaskets for conduit body covers exposed to the weather.

2.5 LIQUID-TIGHT FLEXIBLE METAL CONDUIT (LTFMC)

A. LTFMC may be used in short lengths to provide some vibration isolation. Contractor may use 1/2 in. LTFMC in short lengths (5 ft. maximum) to match equipment hubs on such items as motors, damper operators, limit switches, and similar controls where it is impractical to use 3/4 in. fittings.

PART 3 - EXECUTION

3.1 BOX INSTALLATION

A. Install plaster rings where boxes are concealed in drywall.

B. All boxes to be rigidly supported from building structure independent of the conduit system. Boxes are to be screwed to studs; no "caddy clips" are permitted. Boxes cast into masonry or concrete are considered to be rigidly supported.

C. Flush boxes must finish within 1/4" of surface of non-combustible materials. Boxes shall not project beyond finished surfaces.

D. Boxes installed in masonry walls shall be placed with top or bottom of box at the nearest block joint.

E. Flush device and outlet boxes in walls are not to be installed back-to-back. Offset for sound isolation.

3.2 CONDUIT INSTALLATION

A. Square cut all conduit ends, ream and file to remove burrs; clean and cap all empty conduits. Cut at least 5 threads and draw up tight.

B. All conduits shall be concealed wherever possible. Exposed conduit will be permitted in mechanical room, plumbing chases and in similar unfinished spaces, and overhead in areas without dropped ceilings. Conduit shall be adequately supported from substantial structural elements of the building such as beams, joists, purlins, and columns using suitable straps, clamps and hangers and shall not rest nor be supported from ceilings, or piping or ductwork. Conduits shall be run perpendicular to walls and parallel to floors and ceilings. Secure conduits every 10 ft. and within 3 ft. of every bend, box, fitting or coupling.

C. Do not use field fabricated bends containing indentations or elliptical sections. All conduit bends shall be done with an approved bending device.

D. Install insulated bushings and throat fittings on all conduit ends. Bushings smaller than 1-1/2" to be all metal with formed radius to prevent insulation damage. Bushings 1-1/2" and larger to be insulating type constructed of metal insert and bakelite plastic, molded to the metal insert, as manufactured by O. Z., T & B, or Appleton.

E. The use of running threads, either concealed or exposed, is prohibited. Use split coupling equal to O. Z. Type, SP, or Erickson.

F. All threaded conduits entering panelboards, pullboxes or outlet boxes shall be secured by galvanized locknuts (inside and outside) and insulated bushings.

G. Install and identify nylon pull line or #16 galvanized iron wire in all empty conduits.

H. All conduits to be continuous from outlet to outlet, and installed complete before pulling conductors. Swab conduits free of dirt, grease and moisture before pulling conductors.

3.3 LIQUID-TIGHT FLEXIBLE METAL CONDUIT (LTFMC) INSTALLATION

A. Install a wired equipment grounding conductor with appropriate terminations in all LTFMC. Grounding wire shall be sized in accordance with NEC Article 250, except #12 AWG Cu shall be the smallest size ground wire permitted. Drill and tap a hole in motor pigtail box and other enclosures if a suitable ground lug attachment means is not provided. Spring steel box grounding clips are not acceptable attachments.

END OF SECTION 26 0533

SECTION 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Identify each piece of electrical equipment, such as switchboards, automatic transfer switches, disconnects, starters, power and lighting panels, and auxiliary systems. Identification to be installed on the front cover or trim according to its designated name or number/letter as shown on the Drawings along with the voltage available within the panel and the source from where it is fed. In finished areas, identify panelboards in the inside cover.

B. Equipment identification to be laminated plastic nameplates. Identification format shall be as indicated by the following example:

PANEL “RPA”
120/240 volt, 1-phase, 3-wire
Fed From “MDP”

1.2 *ACCEPTABLE* LABEL MANUFACTURERS

A. Seton “Setmark” or equal by Brady, MSI, or Calpico.

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION MATERIALS

A. Laminated plastic nameplates, sized for minimum 1/4 in. high white letters or numbers engraved into a black background, Gothic style font.

B. “Dymo” or similar tape type self adhesive labels shall NOT be used for equipment identification.

C. Type written panelboard schedules shall be included and installed inside panelboard covers.

D. Identify the covers of each junction and pull box with self-adhesive vinyl labels indicating the number for the circuits concealed within.

E. Provide labels for electrical conduits after painting is complete.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Where surfaces require finish, apply identification devices after completing finish work.

D. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

END OF SECTION 26 0553

SECTION 26 0573 - OVERCURRENT PROTECTIVE DEVICE COORDINATION STUDY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. 26 0573.13 Overcurrent Protective Device Short-Circuit Study.

C. 26 0573.19 Arc-Flash Hazard Analysis.

1.2 SUMMARY

A. This Section includes computer-based fault-current, overcurrent protective device coordination, and arc-flash studies. Protective devices shall have settings based on results of the protective device coordination study.

1. Series rated devices are not permitted.
2. All three studies, the Fault Current Study, Overcurrent Protective Device Short-Circuit Study, and Overcurrent Protective Device Arc-Flash Study, shall be done by a single source using the same software package for all three studies.

1.3 ACTION SUBMITTALS

A. Product Data: For approval of computer software program to be used for studies.

B. Other Action Submittals: The following submittals shall be made after the approval process for system protective devices has been completed. Submittals shall be in digital form.

1. Coordination-study input data, including completed computer program input data sheets.
2. Study and Equipment Evaluation Reports.
3. Coordination-Study Report.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For coordination-study specialist.

B. Product Certificates: For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399.

1.5 QUALITY ASSURANCE

A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.

B. Coordination-Study Specialist Qualifications: An individual experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices. Additional qualifications:

1. Professional engineer, licensed in the state where Project is located, shall be responsible for the study. All elements of the study shall be performed under the direct supervision and control of engineer.

C. Comply with IEEE 242 for short-circuit currents and coordination time intervals.

D. Comply with IEEE 399 for general study procedures.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE APPLICATION

A. Available Computer Software: Subject to compliance with requirements, companies may use computer software programs in the Work.

B. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. CGI CYME.
2. EDSA Micro Corporation.
3. ESA Inc.
4. Operation Technology, Inc.
5. SKM Systems Analysis, Inc.
6. ETAP

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

A. Comply with IEEE 399.

B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

C. The computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. The computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination through computer-generated, time-current coordination plots.

1. Optional Features:
   a. Arcing faults.
   b. Simultaneous faults.
   c. Explicit negative sequence.
   d. Mutual coupling in zero sequence.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.

1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.2 POWER SYSTEM DATA

A. Gather and tabulate the following input data to support coordination study:

1. Product Data for overcurrent protective devices specified in other electrical Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Impedance of utility service entrance.
3. Electrical Distribution System Diagram: In hard-copy and electronic-copy formats, show the following:
   a. Circuit-breaker and fuse-current ratings and types.
   b. Relays and associated power and current transformer ratings and ratios.
   c. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
   d. Generator kilovolt amperes, size, voltage, and source impedance.
   e. Cables: Indicate conduit material, sizes of conductors, conductor material, insulation, and length.
   f. Busway ampacity and impedance.
   g. Motor horsepower and code letter designation according to NEMA MG 1.
4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:
   a. Special load considerations, including starting inrush currents and frequent starting and stopping.
   b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
   c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
   d. Generator thermal-damage curve.

e. Ratings, types, and settings of the utility company overcurrent protective devices.
f. Special overcurrent protective device settings or types stipulated by the utility company.
g. Time-current-characteristic curves of devices indicated to be coordinated.
h. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
j. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.

3.3 FAULT-CURRENT STUDY

A. Calculate the maximum available short-circuit current in amperes rms symmetrical at circuit-breaker positions of the electrical power distribution system. The calculation shall be for fault current immediately after event initiation and for three-phase bolted short circuit at each of the following:

1. Switchgear and switchboard bus.
2. Distribution panelboard.
3. Branch circuit panelboard.
4. Automatic Transfer Switches
5. Generator Output Circuit Breakers.
6. Include Motor Contribution in the Maximum Available Fault Currents at each location
7. Base Fault-Current Calculation on the maximum peak let through current of the service transformer with an infinite primary availability.

B. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.

C. Calculate momentary and interrupting duties on the basis of maximum available fault current.

D. Study Report:

1. Show calculated X/R ratios and equipment interrupting rating (1/2-cycle) fault currents on electrical distribution system diagram.
2. Show interrupting (5-cycle) and time-delayed currents (6 cycles and above) on medium-and high-voltage breakers as needed to set relays and assess the sensitivity of overcurrent relays.

E. Equipment Evaluation Report:

1. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

2. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
3. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

3.4 COORDINATION STUDY

A. Perform coordination study using an approved computer software program. Prepare a written report using results of fault-current study. Comply with IEEE 399.

1. Calculate the maximum and minimum 1/2-cycle short-circuit currents.
2. Calculate the maximum and minimum ground-fault currents.

B. Comply with IEEE 242 recommendations for fault currents and time intervals.

C. Transformer Primary Overcurrent Protective Devices:

1. Device shall not operate in response to the following:
   a. Inrush current when first energized.
   b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
   c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.
2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.

D. Motors served by voltages more than 600 V shall be protected according to IEEE 620.

E. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

F. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:

1. Tabular format of Settings selected for Overcurrent Protective Devices:
   a. Device tag.
   b. Relay-current transformer ratios and tap, time-dial, and instantaneous-pickup values.
   c. Circuit-breaker sensor rating and long-time, short-time, and instantaneous settings.
   d. Fuse-current rating and type.
   e. Ground-fault relay-pickup and time-delay settings.

2. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
   a. Device tag.
   b. Voltage and current ratio for curves.
   c. Three-phase and single-phase damage points for each transformer.
   d. No damage, melting, and clearing curves for fuses.
   e. Cable damage curves.
   f. Transformer inrush points.
   g. Maximum fault-current cutoff point.
   h. Three-phase and single phase damage points for each generator.

G. Completed data sheets for setting of overcurrent protective devices.

END OF SECTION 26 0573

SECTION 26 0573.13 - SHORT-CIRCUIT STUDIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Computer-based, fault-current study to determine minimum interrupting capacity of circuit protective devices.

B. Related Requirements:

1. Section 26 0573.16 "Coordination Studies" for overcurrent protective device coordination studies.
2. Section 26 0573.19 "Arc-Flash Hazard Analysis" for arc-flash studies.

1.2 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled. Existing to remain items must remain functional throughout construction period.

B. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion of the circuit from the system.

D. SCCR: Short-circuit current rating.

E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

F. Single-Line Diagram: See "One-Line Diagram."

1.3 ACTION SUBMITTALS

A. Product Data:

1. For power system analysis software to be used for studies.

B. Short-Circuit Study Report:

1. Submit the following after approval of system protective devices submittals. Submittals be in digital form.

a. Short-circuit study input data, including completed computer program input data sheets.
b. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
c. Revised one-line diagram, reflecting field investigation results and results of short-circuit study.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For short-circuit study software, certifying compliance with IEEE 399.

1.5 QUALITY ASSURANCE

A. Study must be performed using commercially developed and distributed software designed specifically for power system analysis.

B. Software algorithms must comply with requirements of standards and guides specified in this Section.

C. Manual calculations are unacceptable.

PART 2 - PRODUCTS

2.1 POWER SYSTEM ANALYSIS SOFTWARE

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

1. CGI CYME.
2. EasyPower, LLC (formerly ESA Inc.).
3. EDSA Micro Corporation.
4. ESA Inc.
5. Operation Technology, Inc.
6. Power Analytics, Corporation.
7. SKM Systems Analysis, Inc.

B. Comply with IEEE 399 and IEEE 551.

C. Analytical features of power systems analysis software program must have capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. Computer software program must be capable of plotting and diagramming time-current-characteristic curves as part of its output.

E. Computer program must be designed to perform short-circuit studies or have function, component, or add-on module designed to perform short-circuit studies.

F. Computer program must be developed under supervision of licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

2.2 SHORT-CIRCUIT STUDY REPORT CONTENTS

A. Executive summary of study findings.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.

C. One-line diagram of modeled power system, showing the following:

1. Protective device designations and ampere ratings.
2. Conductor types, sizes, and lengths.
3. Transformer kVA and voltage ratings.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, and panelboard designations and ratings.
6. Derating factors and environmental conditions.
7. Any revisions to electrical equipment required by study.

D. Comments and recommendations for system improvements or revisions in a written document, separate from the one-line diagram.

E. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to available short-circuit currents. Verify that equipment withstand ratings exceed available short-circuit current at equipment installation locations.
2. Tabulate circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.
3. For 600 V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
4. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in standards to 1/2-cycle symmetrical fault current.
5. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

F. Short-Circuit Study Input Data:

1. One-line diagram of system being studied.
2. Power sources available.
3. Manufacturer, model, and interrupting rating of protective devices.

4. Conductors.
5. Transformer data.

G. Short-Circuit Study Output Reports:

1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. Equivalent impedance.
2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated symmetrical fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. Calculated asymmetrical fault currents:
      1) Based on fault-point X/R ratio.
      2) Based on calculated symmetrical value multiplied by 1.6.
      3) Based on calculated symmetrical value multiplied by 2.7.
3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
   a. Voltage.
   b. Calculated symmetrical fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. No AC Decrement (NACD) ratio.
   e. Equivalent impedance.
   f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on symmetrical basis.
   g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on total basis.

PART 3 - EXECUTION

3.1 POWER SYSTEM DATA

A. Obtain data necessary for conduct of study.

1. Verify completeness of data supplied on one-line diagram. Call discrepancies to Architect's attention.
2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.
3. For equipment that is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers in accordance with NFPA 70E.

B. Gather and tabulate required input data to support short-circuit study. Comply with requirements in Section 01 7839 "Project Record Documents" for recording circuit protective device characteristics. Record data on Record Document copy of one-line

diagram. Comply with recommendations in IEEE 551 as to amount of detail that is required to be acquired in field. Field data gathering must be by, or under supervision of, qualified electrical professional engineer. Data include, but are not limited to, the following:

1. Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Electrical power utility impedance at service.
3. Power sources and ties.
4. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
5. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
6. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
7. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
8. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
9. Motor horsepower and NEMA MG 1 code letter designation.
10. Conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
11. Derating factors.

3.2 SHORT-CIRCUIT STUDY

A. Perform study following general study procedures contained in IEEE 399.

B. Calculate short-circuit currents according to IEEE 551.

C. Base study on device characteristics supplied by device manufacturer.

D. Extent of electrical power system to be studied is indicated on Drawings.

E. Begin short-circuit current analysis at service, extending down to system overcurrent protective devices as follows:

1. To normal system low-voltage load buses where fault current is 5 kA or less.
2. Exclude equipment supplied by single transformer smaller than 75 kVA.
3.

F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

G. Include AC fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase AC

systems. Also account for fault-current DC decrement to address asymmetrical requirements of interrupting equipment.

H. Calculate short-circuit momentary and interrupting duties for three-phase bolted fault and single line-to-ground fault at each equipment indicated on one-line diagram.

1. For grounded systems, provide bolted line-to-ground fault-current study for areas as defined for three-phase bolted fault short-circuit study.

I. Include in report identification of protective device applied outside its capacity.

END OF SECTION 26 0573.13

SECTION 26 0573.19 - ARC-FLASH HAZARD ANALYSIS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Computer-based, arc-flash study to determine arc-flash hazard distance and incident energy to which personnel could be exposed during work on or near electrical equipment.

B. Related Requirements:

1. Section 26 0573.13 Overcurrent Protective Device Short-Circuit Study.
2. Section 26 0573 Overcurrent Protective Device Coordination Study.

1.2 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

B. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.

C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.

D. p.u.: Per unit. The reference unit, established as a calculating convenience, for expressing all power system electrical parameters on a common reference base.

E. SCCR: Short-circuit current rating.

F. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

G. Single-Line Diagram: See "One-Line Diagram."

1.3 ACTION SUBMITTALS

A. Product Data:

1. Power system analysis software to be used for studies.

B. Study Submittals:

1. Submit the following after approval of system protective devices submittals. Submittals may be in digital form:
   a. Arc-flash study input data, including completed computer program input data sheets.
   b. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
   c. Revised one-line diagram, reflecting field investigation results and results of arc-flash study.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

1.5 QUALITY ASSURANCE

A. Study must be performed using commercially developed and distributed software designed specifically for power system analysis.

B. Software algorithms must comply with requirements of standards and guides specified in this Section.

C. Manual calculations are unacceptable.

1.6 REGULATORY AGENCY APPROVALS

A. Submittals for arc-flash hazard analysis requiring approval by authorities having jurisdiction must be signed and sealed by qualified electrical professional engineer responsible for their preparation. Obtain approval by authorities having jurisdiction prior to submitting for action by Architect.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE

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

1. CGI CYME.
2. EasyPower, LLC (formerly ESA Inc.).
3. EDSA Micro Corporation.
4. ESA Inc.
5. Operation Technology, Inc.
6. Power Analytics, Corporation.

7. SKM Systems Analysis, Inc.

B. Comply with IEEE 1584 and NFPA 70E.

C. Analytical features of device coordination study computer software program must have capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

D. The computer program must be designed to perform arc-flash analysis or have function, component, or add-on module designed to perform arc-flash analysis.

E. The computer program must be developed under supervision of licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

2.2 ARC-FLASH STUDY REPORT CONTENT

A. Executive summary of study findings.

B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.

C. One-line diagram, showing the following:

1. Protective device designations and ampere ratings.
2. Conductor types, sizes, and lengths.
3. Transformer kVA and voltage ratings, including derating factors and environmental conditions.
4. Motor and generator designations and kVA ratings.
5. Switchgear, switchboard, motor-control center, panelboard designations, and ratings.

D. Study Input Data: As described in "Power System Data" Article.

E. Short-Circuit Study Output Data: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 26 0573.13 "Short-Circuit Studies."

F. Protective Device Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 26 0573.16 "Coordination Studies."

G. Arc-Flash Study Output Reports:

1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each equipment location included in report:
   a. Voltage.
   b. Calculated symmetrical fault-current magnitude and angle.
   c. Fault-point X/R ratio.
   d. No AC Decrement (NACD) ratio.
   e. Equivalent impedance.

f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on symmetrical basis.
g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on total basis.

H. Incident Energy and Flash Protection Boundary Calculations:

1. Arcing fault magnitude.
2. Protective device clearing time.
3. Duration of arc.
4. Arc-flash boundary.
5. Restricted approach boundary.
6. Limited approach boundary.
7. Working distance.
8. Incident energy.
9. Hazard risk category.
10. Recommendations for arc-flash energy reduction.

I. Fault study input data, case descriptions, and fault-current calculations including definition of terms and guide for interpretation of computer printout.

2.3 ARC-FLASH WARNING LABELS

A. Comply with requirements in Section 26 0553 "Identification for Electrical Systems" for self-adhesive equipment labels. Produce 3.5 by 5 inch self-adhesive equipment label for each work location included in analysis.

B. Label must have orange header with wording, "WARNING, ARC-FLASH HAZARD," and must include the following information taken directly from arc-flash hazard analysis:

1. Location designation.
2. Nominal voltage.
3. Protection boundaries.
   a. Arc-flash boundary.
   b. Restricted approach boundary.
   c. Limited approach boundary.
4. Arc flash PPE category.
5. Required minimum arc rating of PPE in Cal/cm squared.
6. Available incident energy.
7. Working distance.
8. Engineering report number, revision number, and issue date.

C. Labels must be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.2 ARC-FLASH HAZARD ANALYSIS

A. Comply with NFPA 70E and its Annex D for hazard analysis study.

B. Preparatory Studies: Perform Short-Circuit and Protective Device Coordination studies prior to starting Arc-Flash Hazard Analysis.

1. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 26 0573.13 "Short-Circuit Studies."
2. Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 26 0573.16 "Coordination Studies."

C. Calculate maximum and minimum contributions of fault-current size.

1. Maximum calculation must assume maximum contribution from utility and must assume motors to be operating under full-load conditions.
2. Calculate arc-flash energy at 85 percent of maximum short-circuit current in accordance with IEEE 1584 recommendations.
3. Calculate arc-flash energy at 38 percent of maximum short-circuit current in accordance with NFPA 70E recommendations.
4. Calculate arc-flash energy with utility contribution at minimum and assume no motor contribution.

D. Calculate arc-flash protection boundary and incident energy at locations in electrical distribution system where personnel could perform work on energized parts.

E. Include medium- and low-voltage equipment locations, except equipment fed from transformers smaller than 75 kVA.

F. Calculate limited, restricted, and prohibited approach boundaries for each location.

G. Incident energy calculations must consider accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations must take into account changing current contributions, as sources are interrupted or decremented with time. Fault contribution from motors and generators must be decremented as follows:

1. Fault contribution from induction motors must not be considered beyond three to five cycles.

2. Fault contribution from synchronous motors and generators must be decayed to match actual decrement of each as closely as possible (for example, contributions from permanent magnet generators will typically decay from 10 p.u. to 3 p.u. after 10 cycles).

H. Arc-flash energy must generally be reported for maximum of line or load side of circuit breaker. However, arc-flash computation must be performed and reported for both line and load side of circuit breaker as follows:

1. When circuit breaker is in separate enclosure.
2. When line terminals of circuit breaker are separate from work location.

I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.3 POWER SYSTEM DATA

A. Obtain data necessary for conduct of arc-flash hazard analysis.

1. Verify completeness of data supplied on one-line diagram on Drawings. Call discrepancies to Architect's attention.
2. For new equipment, use characteristics from approved submittals under provisions of action submittals and information submittals for this Project.
3. For existing equipment, whether or not relocated, obtain required electrical distribution system data by field investigation and surveys conducted by qualified technicians and engineers.

B. Electrical Survey Data: Gather and tabulate the following input data to support study. Comply with recommendations in IEEE 1584 and NFPA 70E as to amount of detail that is required to be acquired in field. Field data gathering must be under direct supervision and control of the engineer in charge of performing study, and must be by, or under supervision of a qualified electrical professional engineer. Data must include, but is not limited to, the following:

1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance or available short circuit current at service.
3. Power sources and ties.
4. Short-circuit current at each system bus (three phase and line to ground).
5. Full-load current of loads.
6. Voltage level at each bus.
7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
8. For reactors, provide manufacturer and model designation, voltage rating and impedance.

9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
10. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
11. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
12. Busway manufacturer and model designation, current rating, impedance, lengths, size, and conductor material.
13. Motor horsepower and NEMA MG 1 code letter designation.
14. Low-voltage conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
15. Medium-voltage conductor sizes, lengths, conductor material, conductor construction and metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).

3.4 LABELING

A. Apply one arc-flash label on front cover of each section of equipment and on side or rear covers with accessible live parts and hinged doors or removable plates for each equipment included in study. Base arc-flash label data on highest values calculated at each location.

B. Each piece of equipment listed below not fed by single transformer smaller than 75 kVA must have arc-flash label applied to it:

1. Medium-voltage switchgear.
2. Medium-voltage switches.
3. Medium voltage transformers.
4. Low-voltage switchgear.
5. Switchboards.
6. Panelboards.
7. Motor-control centers.
8. Low voltage transformers.
9. Safety switches.
10. Control panels.

C. Note on record Drawings location of equipment where personnel could be exposed to arc-flash hazard during their work.

1. Indicate arc-flash energy.
2. Indicate protection level required.

3.5 APPLICATION OF WARNING LABELS

A. Install arc-flash warning labels under direct supervision and control of a qualified electrical professional engineer.

END OF SECTION 26 0573.19

SECTION 26 0900 - INSTRUMENTATION AND CONTROL FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

A. Relays, control power transformers, and wiring inside temperature control panels shall be the responsibility of the Division 23 Contractor.

B. Systems shall be wired to perform the operation required in Section 23 0933, "Electric and Electronic Control System".

C. Unless otherwise noted on drawings, provide all line voltage wiring and conduit.

D. Provide conduit rough-in's for low voltage control wiring. Coordinate with the Division 23 Contractor.

1.2 DESCRIPTION OF CONTROL WIRING REQUIREMENTS

A. Air Cooled Condensing Unit: Provide weatherproof non-fused disconnect switch, power wiring and conduit, and 3/4" conduit rough-in for control wiring.

B. Energy Recovery Unit: Provide non-fused disconnect switch, power wiring and conduit, and 3/4" conduit rough-in for control wiring.

C. Air Handling Unit: Provide non-fused disconnect switch, power wiring and conduit, and 3/4" conduit for control wiring.

D. Electric Water Heater: Provide power wiring and conduit.

E. Thermostats: Unless noted otherwise, provide rough-in boxes, and conduit.

F. Well pump: Provide disconnect switch, power wiring and conduit.

1.3 WIRING DIAGRAMS

A. It will be the responsibility of the Division 22 and 23 Contractors to provide a full set of detailed wiring diagrams for the use of the Division 26 Contractor.

END OF SECTION 26 0900

SECTION 26 0923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Time switches
2. Photoelectric switches
3. Standalone daylight-harvesting dimming control
4. Indoor occupancy sensors.
5. Switchbox-mounted occupancy sensors
6. Lighting contactors.

B. Related Requirements:

1. Section 26 2726 "Wiring Devices" for manual light switches.

1.2 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.

1. Warranty Period: Two (2) year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Acceptable Manufacturers

1. Tork, a part of NSI Industries
2. Paragon Electric Co.
3. Intermatic, Inc

B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Contact Configuration: DPDT.
3. Contact Rating: 20-A ballast load, 120-/240-V ac.
4. Programs: Eight on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.

5. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
6. Astronomic Time: All channels.
7. Automatic daylight savings time changeover.
8. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

C. OUTDOOR PHOTOELECTRIC SWITCHES

1. Description: Solid state, with SPST dry contacts rated to operate digital time clock input; complying with UL 773A.
   a. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   b. Light-Level Monitoring Range: 1.5 to 10 fc with an adjustment for turn-on and turn-off levels within that range and a directional lens in front of the photocell to prevent fixed light sources from causing turn-off.
   c. Time Delay: Fifteen-second minimum, to prevent false operation.
   d. Surge Protection: Metal-oxide varistor.
   e. Mounting: Twist lock complies with NEMA C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.
   f. Failure Mode: Luminaire stays ON.

2.2 INDOOR OCCUPANCY AND VACANCY SENSORS

A. Acceptable manufacturer:

1. nLight; a part of Acuity Brands, Inc (basis of design)
2. Wattstopper
3. Hubbell Building Automation
4. Lutron

B. General Description: Dual-Technology Type wall or ceiling-mounting, solid-state units with a separate relay unit, detect occupancy by using a combination of PIR and microwave detection methods in area of coverage.

1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 30 seconds to 20 minutes.
2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
3. Power Pack/Relay Unit, with 0-10V dimming: Dry contacts rated for full 20 amp load at 120- and 277-V ac and for 1 hp at 120-V ac. Power supply to sensor shall be 15-V dc, 150-mA, Class 2 power source as defined by NFPA 70. Unit shall have 0-10V dimming output for LED fixtures, or dimming output rated for connected lighting source. nLight model #NPP16D (0-10V), #NSP5-PCD-ELV-120 (phase adaptive), (basis of design).
4. Mounting:
   a. Sensor: Suitable for mounting in any position on a standard outlet box.

b. Power Pack/Relay Unit: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
c. Time-Delay and Sensitivity Adjustments.

5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
6. Bypass Switch: Override the on function in case of sensor failure.
7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; keep lighting off when selected lighting level is present.

C. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and microwave detection methods in area of coverage.

1. Time Delay: 30 seconds to 20 minutes, adjustable.
2. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 450 sq. ft. when mounted on a 96-inch- high ceiling. nLight #NCM-PDT-9.
3. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2450 sq. ft. when mounted on a 96-inch- high ceiling. nLight #NCM-PDT-10.

D. Wall Pod: 3-button wall switch with “on/off”, “raise” and “lower” buttons.

1. Connects to power pack to control dimming level.
2. Only controls light when room is occupied.
3. Color: White, with matching cover plate.
4. nLight #nPOD-DX-WH (basis of design)

2.3 DAYLIGHT-HARVESTING DIMMING CONTROLS

A. Acceptable manufacturer:

1. nLight; a part of Acuity Brands, Inc (basis of design)
2. Wattstopper
3. Hubbell Building Automation
4. Lutron

B. Description: Sensing daylight and electrical lighting levels, the system adjusts the indoor electrical lighting levels. As daylight increases, lights are dimmed.

1. Lighting control set point is based on the following two lighting conditions:
   a. When no daylight is present (target level).
   b. When significant daylight is present.
2. System programming is done with remote-control tools.
   a. Initial setup tool.
   b. Tool for occupants to adjust the target levels by increasing the set point up to 25 percent, or by minimizing the electric lighting level.

C. Ceiling-Mounted Photosensor: Solid-state, light-level sensor unit, with separate power pack to detect changes in indoor lighting levels that are perceived by the eye.

D. Electrical Components, Devices, and Accessories:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Sensor Set-Point Adjustment Range: 20 to 60 fc (120 to 640 lux).

E. Power Pack/Relay Unit, with 0-10V dimming: Dry contacts rated for full 20 amp load at 120- and 277-V ac and for 1 hp at 120-V ac. Power supply to sensor shall be 15-V dc, 150-mA, Class 2 power source as defined by NFPA 70. Unit shall have 0-10V dimming output for LED fixtures, or dimming output rated for connected lighting source. nLight model #NPP16D (0-10V), #NSP5-PCD-ELV-120 (phase adaptive), (basis of design).

2.4 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

A. Acceptable Manufacturers:

1. Sensorswitch, a part of Acuity Brands, Inc (basis of design)
2. Wattstopper
3. Hubbell Building Automation
4. Lutron

B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox, using hardwired connection.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 30 minutes.
3. Dimming control: 0-10V dimming output.
4. Switch Rating: Not less than 1200-VA LED load at 120/277 V.

C. Wall-Switch Sensor

1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft..
2. Sensing Technology: Dual technology - PIR and ultrasonic.
3. Switch Type: SP, field-selectable automatic "on," or manual "on," automatic "off.", with 0-10V dimming output. Include Raise/Lower buttons on switch.
4. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
5. Concealed, "off" time-delay selector at 30 seconds and 5, 10, and 20 minutes.
6. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
7. Color: White
8. Faceplate: Color matched to switch.
9. Sensorswitch #WSX-PDT-D-WH (basis of design)

2.5 LIGHTING CONTACTORS

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

1. Allen-Bradley.
2. ASCO Power Technologies.
3. Square D; Schneider Electric.

B. Description: Electrically operated and mechanically or electrically held (as required), combination type with fusible switch, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.
4. Provided with control and pilot devices as required, matching the NEMA type specified for the enclosure.

2.6 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1 Good Workmanship standard.

B. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

C. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

D. Install and aim sensors in locations to achieve not less than 90-percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

E. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.2 WIRING INSTALLATION

A. Wiring Method: Comply with Section 26 0519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch (13 mm).

B. Size conductors in accordance with lighting control device manufacturer's written instructions unless otherwise indicated.

C. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 IDENTIFICATION

A. Identify components and power and control wiring in accordance with Section 26 0553 "Identification for Electrical Systems."

B. Label time switches and contactors with a unique designation.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 26 0923

SECTION 26 2416 - PANELBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide factory-assembled panelboards having main lugs or main breaker and branch breakers as shown on the Drawings.

B. Provide GFI, shunt-trip, undervoltage trip, and HACR-rated and HID-rated circuit breakers as indicated on the Panel Schedule(s) or required for the load being served.

1.2 QUALITY ASSURANCE

A. Meet UL-50, 67, and 489.

B. NEMA PB-1, 1977.

C. NEMA AB-1, 1978.

D. ANSI C 33.38

E. Federal W-P-115b, W-C375B

1.3 RATINGS AND CAPACITIES

A. Refer to Drawings for voltage, ampacity and breaker requirements.

1.4 ACCEPTABLE MANUFACTURERS

A. Design Base: Square D.

B. Other Manufacturers: Siemens, General Electric or Eaton (Cutler Hammer).

PART 2 - PRODUCTS

2.1 PANELBOARDS

A. Dead front, steel cabinet, baked enamel finish, concealed hinges, flush lock, typed circuit directory, copper bussing, separate ground and neutral bars, lugs and adapters suitable for feeder sizes (CU/AL), bolt-on thermal magnetic circuit breakers and tripped circuit indicator. Provide lock-on or lock-out straps where indicated on drawings.

B. Minimum interrupting capacity shall be 22,000 amps RMS.

C. Furnish integral transient voltage surge suppressor with status indicator lights and a rated-for-minimum-peak surge current of 80,000 amps per mode.

D. Furnish bolt-on breakers. For all air conditioning, compressor, and similar motor loads, furnish HACR-type circuit breakers.

E. Size (up to 400 amps): 20 in. wide x 5-3/4 in. deep.

F. Size (up to 800 amps): 42 in. wide x 9” deep.

G. Panelboard at Service entrance shall be service entrance rated.

2.2 MOLDED-CASE CIRCUIT BREAKERS

A. Thermal-Magnetic Circuit Breakers (Breakers 400A and smaller): Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

B. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

C. Electronic Trip Circuit Breakers (Breakers Larger than 400 Amps and Main Breaker): Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.

D. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers (for personnel protection): Single- and two-pole configurations with Class A ground-fault protection (5-mA trip).

E. Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers (for equipment protection): With Class B ground-fault protection (30-mA trip).

F. Features and Accessories:

1. Lugs: Compression type, suitable for number, size, trip ratings, and conductor material.
2. Application Listing: Appropriate for application: Type SWD for switching LED loads. HACR-rated for HVAC loads.
3. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.

PART 3 - Execution

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install panelboards and accessories according to NEMA PB 1.1.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

D. Mount panelboard so that the operating handle is no more than 72” above finished floor unless otherwise indicated.

E. Install overcurrent protective devices and controllers if not already factory installed.

F. Subparagraph below assumes that settings are indicated on Drawings or a coordination report is available for Contractor to use.

1. Set field-adjustable, circuit-breaker trip ranges.

G. Install filler plates in unused spaces.

H. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.3 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Load Balancing: After Contract Completion, but not more than 60 days after Final Acceptance, measure loads and make circuit changes to achieve load balance.

C. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.

D. After circuit changes, re-check loads during normal load period. Record all load readings before and after changes and submit test records.

E. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

END OF SECTION 26 2416

SECTION 26 2726 - WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide wiring devices and cover plates. Wiring devices shall be NEMA type approved for the prevailing environmental conditions.

B. Equipment Termination: Prior to rough-in, verify termination requirements, including but not limited to, plug-receptacle configuration.

C. All devices shall be white.

1.2 Quality assurance

A. Underwriters' Laboratories (UL) Label

B. Meet NEMA WD 1 and WD 6 standards.

1.3 Acceptable manufacturers

A. Hubbell, Pass & Seymour, Arrow-Hart, or Leviton

PART 2 - PRODUCTS

2.1 SWITCHES

A. 20 amp, 120/277 volt, Heavy-Duty Specification Grade, backwired and sidewired.

2.2 RECEPTACLES

A. 20amp, 125 volt, Heavy-Duty Specification Grade, 2pole, 3wire, grounding, back-wired and side-wired, NEMA 5-20R.

2.3 GFCI RECEPTACLES

A. GFCI receptacles in interior spaces: 20amp, 125 volt, Heavy-Duty Specification Grade, 2-pole, 3-wire, non-feed thru type, with integral GFCI and indicator light that is lighted when device is tripped, NEMA 5-20R.

B. GFCI receptacles in exterior walls: 20amp, 125 volt, Heavy-Duty Specification Grade, 2-pole, 3-wire, non-feed thru type, with integral GFCI and indicator light that is lighted when device is tripped, Weather resistant rated, NEMA 5-20R.

2.4 PLATES

A. Plates for flush devices in interior partitions shall be Specification Grade stainless steel type 302/304.

B. Plates for flush devices in concrete block walls shall be Specification Grade stainless steel type 302/304 “Jumbo” plates.

C. Plates for devices in surface fittings shall be cadmium-plated steel surface covers. Covers shall fit without overlap and have round corners.

D. Plates for heavy-duty outlets and for specialty switches and outlets required for auxiliary systems shall be stainless steel.

E. All metal plates shall be grounded.

F. Wet location, weatherproof cover plates with type 3R weather-resistant “in-use” die-cast lockable cover.

PART 3 - PRODUCTS

3.1 INSTALLATION

A. Switches shall be installed adjacent to strike side of door openings. Prior to roughing in, Contractor shall verify which side of the door opening is the strike side.

B. Devices and cover plates to be absolutely plumb and horizontal with no visible gaps around edge of plates. Install top or bottom of box at nearest block joint.

C. Install cover plates on all devices.

D. Install galvanized, blank, screw or hinge covers on all junction boxes.

E. Install gang plates on gang devices.

F. Connect green insulated ground wire to each device grounding terminals. Extent green wire to panel ground bar.

G. All exterior outlets shall include ground fault interrupting type receptacle with weather resistant rating.

H. Flush devices in walls are not to be installed back-to-back.

I. Coordination with Other Trades:

1. Take steps to ensure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install wiring devices after all wall preparation, including painting is complete.

J. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

K. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15-A or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

L. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up; on horizontally mounted receptacles to the right.

END OF SECTION 26 2726

SECTION 26 2816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide fused and non-fused disconnect switches as shown on the Drawings, and as required by Code.

B. Fusible switches are indicated on Drawings with a subscript-indicated Buss fuse type/size.

1.2 QUALITY ASSURANCE

A. Switches: NEMA Standard KS1-1975, UL-98, ANSI-C33.64.

B. Fuses: UL-198.

1.3 ACCEPTABLE MANUFACTURERS

A. Switches: Square D, Siemens, General Electric or Eaton (Cutler Hammer).

B. Fuses: Bussman, Gould-Shawmut, or Littlefuse.

PART 2 - PRODUCTS

2.1 DISCONNECT SWITCHES

A. Non-fused: NEMA heavy-duty Type HD, steel enclosure, dual-cover interlocks, HP-rated plated contacts, indicating handle and provisions for padlocking. Switches shall be NEMA Type approved for the environmental conditions prevailing. Toggle-operated disconnect switches shall be acceptable for loads less than 16 amps.

B. Fusible: NEMA heavy-duty Type HD, steel enclosure, dual-cover interlocks, HP-rated plated contacts, indicating handle with clips or bolt pads to accommodate indicated fuses, and provisions for padlocking. Switches shall be NEMA type approved for the environmental conditions prevailing. Provide Class R rejection fuse clips.

C. Accessories (Fusible and Non-Fusible switches):

1. Apply subparagraphs below to applicable switch paragraphs above. Verify that accessories specified are available and applicable to switch types and ratings in this article.
2. Equipment Ground Kit: Internally mounted and labeled for copper conductors.

3. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper conductors.
4. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper neutral conductors.
5. Class R Fuse Kit (fusible switches): Provides rejection of other fuse types when Class R fuses are specified.
6. Hookstick Handle: Allows use of a hookstick to operate the handle.
7. Lugs: Compression type, suitable for number, size, and conductor material.

2.2 SWITCH FUSES

A. 250 volt, 600 amps and below. NEMA Class RK1 dual element, time delay, current-limiting, sizes as shown on the Drawings.

2.3 MOLDED-CASE CIRCUIT BREAKERS

A. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

B. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (5-mA trip).

C. Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

D. Type SWD for switching fluorescent lights.

E. Type HACR for heating, air conditioning, and refrigerant equipment.

F. Features and Accessories:

1. Lugs: Compression type, suitable for number, size, trip ratings, and conductor material.
2. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered or remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
3. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
4. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.

2.4 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.

2. Outdoor Locations: NEMA 250, Type 3R.
3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated on Drawings.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Install fuses in fusible devices.

D. Comply with NECA 1.

E. Provide identification label per Division 26 Section "Identification for Electrical Systems."

3.2 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges.

END OF SECTION 26 2816

SECTION 26 5000 - LED LIGHTING FIXTURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide LED lighting fixtures as shown on drawings, complete with drivers, frames, canopies, hangers, straps, and trim, as required for a complete installation.

B. Coordinate fixture mounting type with ceiling type listed on the Architectural Room Finish Schedule.

1.2 Quality assurance

A. Underwriters' Laboratories (UL) Label.

B. CBM/ETL Certification.

PART 2 - PRODUCTS

2.1 Lighting fixtures

A. Refer to Drawings for Lighting Fixture Schedule.

B. Only Manufacturers listed on the Lighting Fixture Schedule will be approved.

2.2 REQUIREMENTS

A. CRI - minimum of 70. COLOR CORRECTED TEMPERATURE of 4100 K.

B. Rated lamp life of 50,000 hours to L70.

C. If amps dimmable, range to be from 100 percent to 10 percent of maximum light output.

D. Fixtures shall have internal dimmable drivers unless specifically permitted/required by the fixture selection or installation.

2.3 EXTERIOR AREA LIGHTING STEEL POLES

A. Round, straight pole complying with ASTM A500/A500M, Grade B carbon steel with a minimum yield of 42,000 psig, one-piece construction with access handhole in pole wall. Pole to have powder coated finish as noted in the lighting fixture schedule. Finish shall comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.

B. Pole handhole cover secure with stainless steel tamper resistant screws.

C. Second mode vibration dampener installed within pole. Conductors shall be protected from contact with vibration dampener.

PART 3 - EXECUTION

3.1 INSTALLATION OF FIXTURES

A. Fixtures to be securely mounted to elements of the building structure or suspended therefrom, such that fixtures will be square, plumb, and rigid, will not fall or sag, and will not cause the ceiling system to sag or wall board to pull away. Provide unistrut support between structural framing members where necessary. Provide additional hanger supports as required to support fixture from structure, not ceiling or wallboard. .

B. Fixtures to be cleaned of dirt both inside and outside. No fixtures to be installed until painting work is completed.

C. Damaged, deformed or defective drivers and fixtures shall be replaced.

D. Hold insulation 3” away from all fixtures installed in insulated ceilings.

3.2 DEFECTIVE drivers/LEDs

A. Contractor shall replace all defective or noisy drivers and inoperative LEDs that fail during the 1 year guarantee period.

3.3 CEILING LOCATION

A. Contractor shall coordinate the location of all lighting fixtures with the Architectural reflected ceiling plan, diffusers, grilles, and sprinkler heads.

END OF SECTION 26 5000

SECTION 27 0500 - COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 GENERAL

A. Responsibilities and requirements outlined within this Specification apply to all Division 27 specification sections.

B. Drawings and Specifications are to be considered as supplementing each other. Work described on either document shall be provided and incorporated into the project whether or not it is specifically identified on the corresponding document.

1.2 SUMMARY OF WORK

A. This specification division provides for the complete installation of the building telecommunications systems.

B. The work for this project consists of but is not limited to, providing a telecommunications infrastructure, premise cabling, telecommunications system, video distribution, wireless voice and data, and all other work as shown on the contract documents.

C. The telecommunications work to be provided under Division 26 shall include, but not be limited to: communications conduit and pathways, sleeves, standard device backboxes, service entrance conduits, telecommunications grounding system, electrical power circuits for technology devices and equipment.

D. Work within this division includes furnishing, installing, terminating, testing, and warranty work for the systems and equipment described herein.

1.3 RELATED DOCUMENTS

A. The General Conditions and other Contract Documents as set forth in the foregoing pages are hereby incorporated into and become a part of the specifications for work under this title, insofar as they apply hereto.

B. All Specifications under this Division Title are directed to and are the responsibility of the appropriate Contractor. All Division 27 specifications are related to and applicable to this section.

C. The Communications/Technology Systems installation for this project has work that is to be provided by the General Contractor, Electrical Contractor and in some cases the Fire Alarm Contractor or their subcontractors for communications pathways, grounding, cable tray, etc. The Contractors shall refer to the project documents, specifications and drawings for items and services identified as provided by others. All other items and scope of work identified will be provided by the Division 27 contractor and

subcontractors. Refer to Division 26 and other applicable sections for additional requirements and other related items.

1.4 CONTRACT DOCUMENTS

A. The drawings accompanying these specifications are complementary each to the other and what is called for by one shall be as if called for by both. When a discrepancy exists between the Drawings and Specifications, whichever has a greater cost in value must be included for bidding purposes. Questions should be submitted prior to bidding for any such discrepancies in order to achieve the correct costs within the bid.

B. Consult all Contract Drawings that may affect the location of equipment, and cabling and make minor adjustments in location to secure coordination.

C. Coordinate layout of work with other trades. Make minor adjustments in location required for coordination.

D. All changes, with the exception of minor adjustments, shall be submitted to the Construction Manager and/or Architect for approval before proceeding with the work.

E. The location of outlets and devices shown on the drawings are approximate, and the Architect shall have the right to relocate any outlets before they are installed without additional cost. All work must be coordinated between trades to avoid conflict.

1.5 SUBMITTALS

A. Submit all items in accordance with the requirements described below and with Division 01, General Requirements. In addition, include all submittal requirements listed within each Division 27 specification section.

B. All Technology Product Data and Shop Drawings must be submitted together, as one complete submittal based upon the specification section being submitted. Submit the Section in its entirety; individual product or partial section submittals will result in the summary rejection of the submittal.

C. Provide additional sequence of operations with submittal to give an explanation of the systems operational flow for the specific manufacturer product being utilized in accordance with these specifications.

D. Indicate a document submittal reference tag within all shop drawing submittals with required; points of integration, connectivity, or power (other than normal building receptacles) to show that the point of connection has been coordinated and included between each submittal section. This would include but not be limited to the following items:

1. LAN connections for Security Systems, Video Dist. Equip., etc.
2. Telephone Equipment connections for Security Systems, etc.
3. Inter-connections between building Communication Systems, etc.
4. Technology outlet wiring, etc.

E. Product Data: Submit to the Construction Manager for review, Manufacturer's Product Data Sheets including but not limited to all the items specified in Division 27, and/or indicated on the Drawings.

1. Thoroughly review each submittal and indicate the exact item to be furnished within a table of contents for the submittal and on the product data sheet. Each submittal shall be stamped with the Contractor's approval before submitting to the Construction Manager.
2. Engineer's review of Manufacturer's Product Data shall not relieve the Contractor from responsibility for errors or omissions in Manufacturer's Specifications, or allow deviation from the requirements identified within the Drawings or Specifications.
3. Each Specification section shall be a separate submittal package.
4. Provide an Index sheet with each submittal package. The Index sheet should list each submittal item and the corresponding Specification Section and Paragraph requirement for which it is being submitted.
5. Submittals shall include all approved contract document changes at the time of the submittal.

F. Shop Drawings: Create and submit to the Construction Manager for review, Shop Drawings including but not limited to all items specified in Division 27 and/or indicated on the Drawings. Shop Drawings must be specific to the application and integration of the product type, manufacturer component, and system type to be used.

1. Thoroughly review each submittal and indicate details on all equipment assemblies with dimensions, weights, and required clearances, method of field assembly, components, and location of each field connection to allow review of complete systems to be constructed. Each item to be provided and as submitted within the product data section should be indicated within each system diagram as applicable. Each submittal shall be stamped with the Contractor's approval before submitting to the Construction Manager.
2. Include dimensioned floor plans with all device locations, include elevation views of components and include a riser diagram showing flow, connections and integration of system components.
3. Provide equipment cabinet/rack elevations showing the placement of the submitted equipment necessary to comply with the project requirements as specified including allowances for all spare components and capacities.
4. Engineer's review of Manufacturer's Drawings or Schedules shall not relieve the Contractor from responsibility for errors or omissions in Manufacturer's Drawings or Schedules, or allow deviation from the Drawings or Specifications.
5. Each Specification section shall be separate submittals but a complete submittal for the entire Specification section.
6. Shop drawings are to be completed showing specific manufacturer components and parts with referencing part description or part number to product data submittal.

G. Maintenance/Training: Include within Submittals and final Operation and Maintenance manuals for Division 27 Specification sections, a list of the following for use by Owner and Construction Manager.

1. Description of On-site maintenance, System adjustments, or other visits as indicated to be included per the Specifications for each system to be provided for

a period after completion. This shall include how many visits, and scope of what should be included.

2. Description of Training to be performed and the number of hours included for this training as indicated within the Specifications.
3. Engineer's review shall not relieve the Contractor from responsibility for error or omissions in manufacturer procedures and/or deviation from the Drawings or the Specifications.

H. Quality Assurance: Include within the submittals any and all requested documentation specified within each specification section including but not limited to Manufacturer Certification, Industry Certification, Calibration Certificates, and Experience Qualifications for companies, individuals, or as otherwise specified. Submittals for any section may be rejected if Quality Assurance has not been met.

I. Other: Include any and all other requested information or samples as specified within each individual specification section.

1.6 JOB-SITE COPY OF DOCUMENTS

A. Maintain at the site, one copy of all Contract Documents including Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders and other modifications, in good order. The Drawings shall be marked to record all changes made during construction especially deviations made necessary to incorporate equipment different from base equipment specified. These shall be available to the Construction Manager, Engineer, or Architect. These Drawings marked to record all changes made during construction shall be delivered to the Construction Manager for the Owner upon completion of the work.

B. Coordinate all modifications and changes, to the Drawings and contract work affecting the labeling schemes or connectivity of systems, with the parties involved having interface and use of the systems changed.

C. A copy of documents with all modifications to each system is to be submitted to the owner at the time coordinated prior to use by the owner.

1.7 AS-BUILT / O&M / TRAINING DOCUMENTS

A. As-Built Drawings: At the completion of the job, before final payment is made, the Contractor shall submit "As-Built" Drawings. As-builts shall include the following:

1. All Data, Voice, Video, Sound, PA, Surveillance, Access Control, Clocks, Intrusion Alarm cable labeling of communications outlets, devices, and circuits for any series of devices. Each identifier must be shown with a symbol or other graphical representation with the building floor plan background as it would pertain to each system provided.
2. Equipment rack and/or cabinet elevations indicating all rack/cabinet, equipment, patch panel, cabling, etc. and labeling.

3. Completed revised shop drawings showing completed system diagrams, connections, and equipment or otherwise, including any changes made during construction.

B. Maintenance Data and O&Ms: For equipment to include in maintenance manuals specified in Division 01, General Requirements, and within each Specification section.

1. Include record of Owners equipment-programming option decisions. Include copies of all coordination meeting notes.
2. Copies of each approved submittal
3. Test Reports
4. Cable Schedules
5. Copy of Record Drawings
6. Instruction Manuals
7. Maintenance Manuals
8. Manufacturer Warranties
9. Training documentation and videos

C. Electronic files will be made available upon written request from the prime contractor.

1.8 COORDINATION

A. Coordinate arrangement, mounting, and support of technology systems and equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for technology systems that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."

D. Coordinate sleeve selection and application with selection and application of firestop as specified.

E. Coordinate connectivity requirements for patch cords, power and UPS connections, and the connection of service entrance equipment provided by others.

F. Where Technology/Electrical/Casework coordination drawings are required by the Construction Manager, the Technology Contractor shall initially prepare and be responsible for 1/8” scale coordination drawings that incorporate all fixed technology outlets and equipment as well as wall/floor outlets coordinated with walls and fixed casework. The Electrical Contractor shall then incorporate their wall/floor outlets

coordinated with the technology equipment and outlets as well as fixed casework and wall mounted devices. These drawings shall be reproduced and distributed to all Contractors for their input and revisions. Assure that all contractors work together to obtain finish 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 Construction Manager.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials shall be new and undeteriorated and of a quality not less than the basis of design or minimum specified.

B. Materials and equipment for which there are Underwriters' Laboratories Standard requirements, listing and labels, shall have listing of Underwriters' Laboratories and be so labeled.

2.2 QUANTITIES

A. Items may be referred to as singular or plural on the Drawings and in the Specifications. Minimum quantities must be provided based upon those stated in the Specifications or shown on the Drawings. The Contractor is responsible for determining and providing quantities of each item required, including any spare items identified, providing a complete working solution for all locations shown, detailed, listed, or otherwise called for in the Specifications and Drawings.

B. Equipment rack/cabinet elevations are provided as illustrations to indicate the intended placement and/or association of equipment within the equipment racks/cabinets. Equipment quantities should not be determined by the illustrations provided but rather by the project requirements. Within the shop drawings, provide rack/cabinet elevations showing the required quantity of devices being supplied and there placement.

PART 3 - EXECUTION

3.1 INSTALLATION

A. For any Division 27 system or equipment that is not capable of final testing and training according to the specifications, prior to the system start of operation and use by the owner, provide a minimum of an additional 2 hours of training overview for the staff and 1 hour of administration training on all equipment and system operations prior to the start of operation and use by the owner. Complete all specified testing and training as required at a later time when applicable.

B. Provide all necessary hangers, supports, straps, and other similar appurtenances not indicated on the Drawings but which are required for a complete and properly installed

system consistent with Industry Standards and the Architectural treatment of the building.

C. Provide all necessary programming and adjustments for system device software and hardware settings to provide system and device functionality as required by these project documents and the manufacturer's specifications.

D. Provide all necessary system licensing required by products and services provided within this project's scope of work.

E. The Contractor shall inform him/herself fully regarding peculiarities and limitations of space available for installation of materials and apparatus under this contract, and see that all equipment necessary to be reached from time to time for operation and maintenance are made easily accessible. It is the contractor's responsibility to inform the engineer of any restrictions found to limit or affect the installation of system components as required by these contract documents.

F. All devices shall be installed as directed within the contract documents or as recommended by the manufacturer.

END OF SECTION 27 0500

SECTION 27 0502 - LOW VOLTAGE SYSYTEM ROUGH-IN

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes telecommunication service conduits, grounding system, backboards, and rough-in for conduit and boxes.

1.3 DEFINITIONS

A. ARC: Aluminum Rigid Conduit.

B. GRC: Galvanized Rigid Conduit.

C. IMC: Intermediate Metal Conduit.

D. RTRC: Reinforced Thermosetting Resin Conduit.

1.4 SUBMITTALS

A. Product Data: Catalog cuts for raceways and fittings, ground bars, handholes, and hinged-cover enclosures.

1.5 COORDINATION

A. Coordinate arrangement, mounting, and support of communications equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting pathways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by UL or other testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 GROUNDING SYSTEM

A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems." for grounding conductors and connectors.

B. The telecommunications room shall be equipped with a Telecommunications Main grounding Busbar.

C. Telecommunications Main Bus Bar:

1. Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
2. Ground Bus Bar: Copper, minimum 20 inches long by 1/4 inch thick by 4 inches wide with 9/32-inch holes spaced 1-1/8 inches apart.
3. Stand-Off Insulators: Comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

D. Comply with ANSI-J-STD-607-A.

2.2 CONDUIT AND BOXES

A. Conduit for voice data wall outlets shall be a minimum of 1” unless shown otherwise; conduits for security cabling shall be a minimum of 3/4” unless shown otherwise.

B. Outlet boxes shall be 4-11/16 inches square minimum, unless otherwise indicated in the drawings, with appropriately sized plaster rings.

2.3 POLYMER-CONCRETE HANDHOLES

A. Description: Molded of sand and aggregate; bound together with polymer resin; and reinforced with steel, fiberglass, or a combination of the two.

B. General Requirements for Polymer Concrete Handholes:

1. Boxes and handholes for use in underground systems shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
3. Comply with TIA-569-D.

C. Configuration: Designed for flush burial with open bottom unless otherwise indicated.

D. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.

1. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
2. Cover Legend: Molded lettering, "COMMUNICATIONS".

E. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

F. Handholes 12 Inches Wide by 24 Inches and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.4 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Tests of materials shall be performed by an independent testing agency.
2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

A. Outdoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC
2. Concealed Conduit, Aboveground: GRC.

3. Underground Conduit: Type EPC-80-PVC.
4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply pathway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC. Pathway locations include the following:
   a. Loading dock.
   b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
   c. Mechanical rooms.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT
5. Damp or Wet Locations: GRC.
6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel units in institutional and commercial kitchens and damp or wet locations.

C. Pathway Fittings: Compatible with pathways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use set-screw, steel fittings. Comply with NEMA FB 2.10.

D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

E. Install surface pathways only where indicated on Drawings.

F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 6 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

1. Bond the shield of shielded cable to the grounding bus bar in communications rooms and spaces.

3.3 INSTALLATION

A. Comply with the following standards for installation requirements except where requirements on Drawings or in this Section are stricter:

1. NECA 1.
2. NECA/BICSI 568.
3. TIA-569-D.
4. NECA 101
5. NECA 102.
6. NECA 105.
7. NECA 111.

B. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

C. Comply with requirements in Section 07 8413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.

F. Conceal rigid conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

G. Support conduit within 12 inches of enclosures to which attached.

H. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for pathways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

J. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

K. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

L. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus one additional quarter-turn.

M. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure, to assure a continuous ground path.

N. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

O. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Secure pull wire, so it cannot fall into conduit. Cap pathways designated as spare alongside pathways in use.

P. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

Q. Expansion-Joint Fittings:

1. Install in each run of aboveground RMC and EMT that is located where environmental temperature change may exceed 100 deg F, and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
   c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
   d. Attics: 135 deg F temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

R. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

S. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

T. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.

U. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

V. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

W. Set metal floor boxes level and flush with finished floor surface.

X. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.4 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 2000 "Earth Moving" for pipe of less than 6 in nominal diameter.
2. Install backfill as specified in Section 31 2000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 31 2000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
   a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete around conduit for a minimum of 12 inches on each side of the coupling.
   b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits, but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 27 0553 "Identification for Communications Systems."

3.5 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

E. Field cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 8413 "Penetration Firestopping."

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 27 0502

SECTION 27 0527 - TECHNOLOGY PULL, JUNCTION AND OUTLET BACKBOXES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Outlet boxes shall be provided for all technology devices, equipment connections, special systems and as otherwise required.

B. Pull and junction boxes shall be provided in all raceway systems where required to avoid excessive bends to facilitate wire pulling and allow access to the wiring.

1.2 QUALITY ASSURANCE

A. Outlet Boxes and Junction Boxes shall be U.L. listed and labeled.

B. NFPA 70 – National Electric Code

C. Nema OS 2 and UL 514A.

1.3 SUBMITTALS

A. Submittals shall comply with section 27 0500 and the Division 01 General and Supplementary conditions.

1.4 MANUFACTURERS

A. Outlet, junction and pull boxes: Refer to the Division 26 specifications. All boxes shall be U.L. listed for the intended use products.

B. Underground Enclosures: Carson, Hoffman, Quazite, Pencell, Synertech

PART 2 - PRODUCTS

2.1 OUTLET BOXES

A. Interior Outlet Boxes: Provide galvanized sheet steel boxes, of types, shapes and sizes, to suit each respective location and installation. Technology outlet boxes in masonry walls shall be flush 2-gang (3-25/32" x 3-25/32" x 3-1/2" deep). Technology outlet boxes in plaster walls shall be flush 2-gang box (4-11/16” x 4-11/16” x 2-1/8” deep) with either single-gang plaster rings as specified on the technology sheets.

B. Outlet Boxes shall be of sufficient size to provide free space for all conductors enclosed in the box. Boxes shall not be less than the minimum size required by NEC Article 370 for the number and size of conductors contained within unless otherwise specified.

C. Exterior Outlet Boxes: Provide corrosion-resistant cast-metal weatherproof outlet wiring boxes, of types, shapes and sizes to suit the application. Boxes to have threaded conduit hubs and coverplates with gaskets and corrosion-resistant fasteners.

D. Flush device boxes in masonry walls shall be masonry boxes designed for the purpose and equal to the typical standard box type called for on the drawings or at minimum a 4-inch square box with raised covers designed for masonry.

E. Surface device boxes for exposed conduit work and located in potentially damp areas are to be FS series cast boxes.

F. Accessories: Provide accessories as required for each installation, including mounting brackets, extension rings, fixture studs, cable clamps and metal straps for supporting boxes.

G. Boxes shall have a minimum depth of 2-1/8”.

2.2 PULL AND JUNCTION BOXES

A. Pull and Junction Boxes: Provide galvanized code-gauge sheet steel Pull and Junction Boxes, with screw-on cover of type, shape and size, to suit each respective location and installation.

B. Concealed Pull or Junction Boxes shall be flush in finished walls, provided with flush type covers, painted and secured with flat head screws. Surface junction boxes in utility areas shall be provided without knockouts, have close fitting screw covers and be finished in medium grey enamel.

C. Boxes exposed to the weather shall be weatherproof type as required by NEC.

D. Boxes used for above ceiling transition points shall be sealed as required for plenum applications.

E. Pull or Junction Boxes shall provide adequate space and dimensions for the installation of conductors in accordance with NEC Article 370.

2.3 UNDERGROUND COMMUNICATIONS ENCLOSURE

A. For use as an underground hand hole / pull box enclosure designed to meet or exceed the tier 15 loading per forth in the ANSI/SCTE 77 specifications. Opening and size shall minimally match that which is called for on drawings and minimally required by manufacturer based upon the number of conduits it is to support. Box must have a heavy duty cover meeting the loading required for the box. Cover shall be secured with stainless steel bolts and washers. Box is to be an open bottom type, with manufacturer recommended gravel fill within and around box.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All interior outlet backboxes, pull and junction boxes shall be rigidly supported from building structure independent of the conduit system. Boxes cast into masonry or concrete are considered to be rigidly supported. Framing members of suspended ceiling systems shall not be permitted as a support.

B. Pull and Junction Boxes shall be located in utility areas or above accessible ceiling system wherever possible. Boxes located in other areas shall be brought to the attention of the Architect/Engineer prior to installation.

C. Boxes not otherwise accessible in ceilings and walls shall be made accessible by providing an 18-inch x 18-inch or larger hinged door access panel. Access panels shall be furnished and installed by this Contractor but approved by the Architect.

D. All boxes are to be installed plumb and square within walls and so that wall plates shall fit flush against walls. Any locations that become damaged during construction must be fixed prior to completion.

END OF SECTION 27 0527

SECTION 27 0528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide a technology conduit system as shown on the drawings and called for herein. The raceway system shall meet the requirements of Division 26.

PART 2 - PART 2 – PRODUCTS (not used)

PART 3 - PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. A.Generally, all conduits shall be concealed and installed perpendicular to walls and floor. Exposed conduits will be permitted only in electrical and mechanical rooms, and in similar unfinished spaces, overhead in areas without dropped ceilings. Conduit shall be adequately supported from elements of the building using conduit clamps and shall not rest on, nor be supported from suspended ceilings. Boxes shall be fastened to structure independently from conduit system.

B. Install bushings on all conduit ends. Bushings smaller than 1-1/2 inches are to be metal or plastic with formed radius to prevent insulation damage. In lieu of bushings smaller than 1-1/2 inches, insulated throat type conduit fittings may be used. Bushings 1-1/2 inches and larger shall be insulating type constructed of metal insert for threads and bakelite plastic, molded to the metal insert as manufactured by O.Z./Gedney, Thomas and Betts, American Electric or Appleton.

C. Provide #12 AWG copper pull wire in all empty conduits. Provide pitch pockets for conduits through the roof.

D. Maintain minimum clearances of 6 inches from parallel hot water piping and 24 inches from boiler breaching.

E. Provide service conduits underground into the building and terminate at the main telephone backboard. Encase conduits in concrete under paved areas or as otherwise required.

F. Install technology outlet boxes and conduits where indicated.

G. Provide a #12 pull wire in all empty conduits.

END OF SECTION 27 0528

SECTION 27 0553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes identification of cabling infrastructure, including cables, patch panels, faceplates, cross-connects, and equipment cabinets/racks for the telecommunications grounding/bonding, data, voice, video, audio and security detection and alarm systems. All materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.

B. All final labeling schemes for the UTP faceplates and patch panels shall be coordinated with the Owner to comply with any existing label schemes. If an existing label scheme does not exist, all labeling shall comply with the BICSI TDMM guidelines and as outlines within these specifications.

1.3 SUBMITTALS

A. Submittals shall comply with section 27 0500 and the Division 01 General and Supplementary conditions.

1.4 QUALITY ASSURANCE

A. Comply with ANSI C2.

B. Comply with NFPA 70.

C. Comply with ANSI A13.1 and NFPA 70 for color-coding.

D. Comply with Underwriters Laboratory 969 for label performance.

PART 2 - PRODUCTS

2.1 RACEWAY AND CABLE LABELS

A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Cable Labels: Self-laminating laser printable labels with a toner-receptive print area. The clear / translucent polyester film is coated with a permanent UV-resistant pressure sensitive adhesive. The wrap around label shall utilize laser printed alphanumeric cable designations. The substrate shall be approved for indoor/outdoor use with occasional exposure to lubricating oil and water.

2.2 PATCH PANEL AND FACEPLATE LABELS

A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Component Labels: RoHS compliant top coated white polyester film with a pressure sensitive adhesive. This material is halogen free. The label shall utilize inkjet and laser printed alphanumeric cable designations. The substrate shall be approved for indoor use. Size: .250” H x .750”L.

2.3 NAMEPLATES AND SIGNS

A. Engraved Plastic Nameplates and Signs: Engraving stock, melamine plastic laminate, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.

B. Interior Use: Preprinted baked-enamel or aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for the application. 1/4-inch (6.4-mm) grommets in corners for mounting.

C. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for the application. 1/4-inch (6.4-mm) grommets in corners for mounting.

D. Fasteners for Nameplates and Signs: Self-tapping, stainless steel screws or No. 10/32, stainless-steel machine screws with nuts and flat and lock washers.

2.4 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Tags: Heavy duty 13 pt. manila tags with a reinforced 1/4" paper eyelet to resist tearing. Tag shall be placed in a visible location and clearly marked as required.

1. Minimum Width: 2-1/8 inch.
2. Minimum Length: 4-1/4 inch.
3. Pre-strung
4. Color: Manila

2.5 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers: Thomas & Betts, Zip Tape, Seton, Brady, Uline or Dymo.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Equipment Cabinets/Racks: Label each cabinet and/or rack within each technology room, XXX-YY, with “XXX” being the closet designation and with “YY” being the cabinet or rack designation. Label the equipment racks in numeric order starting at the left most rack and progressing to the right if applicable. Example: TR2A-R1

B. Patch Panels: Label as “PP1”, “PP2”, etc, with “PP1” being the top patch panel on the rack and number remaining patch panels sequentially down the rack.

C. Patch Panel Ports: Label each port with the room designation, faceplate designation, and port number on each patch panel. Example: RM126-1-3, which would correspond to the room number 126, faceplate 1, port 3.

D. Cables: Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated. Label cables at each end with the closet designation, rack designation, patch panel designation, and port number at patch panel. Example: MDF-R1-PP3-37, which would correspond to Main Distribution Frame, equipment rack 1, patch panel 3, port 37.

E. Faceplates: Label each port on each faceplate and elsewhere as indicated. Label ports with the tech room designation, rack designation, patch panel designation, and port number at the patch panel. Example: MDF-R1-PP3-37, which would correspond to Main Distribution Frame, equipment rack 1, patch panel 3, port 37.

F. Workstation: Label cables within outlet boxes & neatly typed on the integral label in the faceplate.

G. Distribution Racks and Frames: Label each unit and field within that unit.

H. Within Connector Fields, in Wiring Closets and Equipment Rooms: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both communication and data-processing equipment, use a different color for jacks and plugs of each service.

I. Cables, General: Label each cable within 3 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

J. Cable Schedule: Post in prominent location in each wiring closet and equipment room. List incoming and outgoing cables and their designations, origins, and destinations (with the actual room numbers which shall be coordinated with the Owner through the

Architect). Protect with rigid frame and clear plastic cover. Provide electronic copy of final comprehensive schedules for Project, in software and format selected by Owner.

K. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

L. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.

M. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.

N. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high lettering on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:

1. Telecommunications closets/rooms.
2. Equipment racks.
3. Patch Panels.
4. Electronics

3.2 AS-BUILTS

A. All labeling information shall be recorded on the as-built documentation and all test documents shall reflect the appropriate labeling scheme.

END OF SECTION 27 0553

SECTION 27 1100 - COMMUNICATIONS EQUIPMENT AND CONNECTIVITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section outlines the requirements for a Data, Telephony and IP Video horizontal transport system to support a 10/100/1000 Mbps full duplex transmission Ethernet network over 4-pair, Category 6 copper UTP cabling.

B. This structured cabling system will also include a Category 6 cable and connecting hardware to support all wireless access points.

C. In addition, high pair count copper cable, and other various cable types will be required for system connections. This structured cabling system shall be a certified solution by the cabling manufacturers and installing contractors.

D. This section shall include, but not limited to the following;

E. Mounting Elements

1. Unshielded Twisted-Pair cable
2. Coaxial cable.
3. Shielded pair cable
4. Patch, Station, & Cross Connect Cords
5. Jacks and Faceplates
6. Termination and Patch panels
7. Equipment room fittings
8. Equipment Racks and Enclosures
9. Wire Management
10. Lightning Protection
11. Grounding
12. Testing procedures

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. HDMI: High Definition Multimedia Interface

C. IDC: Insulation displacement connector.

D. LAN: Local area network.

E. UTP: Unshielded twisted pair.

F. CAT 6: Category 6 Cabling.

G. FO: Fiber Optic

H. Patch Cord: A cable with factory terminated connectors on both ends used to join telecommunications circuits/links at the cross-connect

I. Station Cord: A cable with factory terminated connectors on both ends used to join the communications outlet with the work area equipment.

J. Speaker Cabling: Jacketed, untinned, solid-copper conductor, minimum of 16 AWG.

K. Plenum Cabling: Listed and labeled for installation within plenum air space.

1.4 SUBMITTALS

A. Submittals shall comply with section 27 0500 and the Division 01 General and Supplementary conditions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. An installer with a minimum of 5 years experience in data network cabling. Provide a list of projects completed of similar size and type.
2. A staff project manager to serve who is a Registered Communication Distribution Designer (RCDD) certified by the Building Industry Consulting Service International (BICSI).
3. A BICSI certified technician level installer who will be the on-site installer.
4. Certified by the equipment manufacturers to provide a certified installation with a minimum of a 20 or 25-year warranty for voice and data infrastructure.

B. With bid and submittals, the contractor shall provide the certificate from the equipment manufacturers showing that the contractor is a certified installer, a copy of the RCDD certificate of the staff project manager, and a copy of the BICSI technician level installer certificate of the on-site lead installer.

C. Comply with EIA/TIA 568, 569, and BICSI Standards.

D. Comply with NFPA 70.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. Source Limitations: Obtain all cable of each type through one source from a single manufacturer.

G. Source Limitations: Obtain all jacks, faceplates, patch panels, and patch & station cords of each type through one source from a single manufacturer.

1.6 COORDINATION

A. Coordinate Work of this Section with telephone switch, telephone instruments, workstations, LAN equipment suppliers, and all other auxiliary connections. Coordinate service entrance arrangement with local exchange carrier.

1. Meet jointly with representatives of above organizations and Owner's representatives to exchange information and agree on details of equipment arrangements and installation interfaces.
2. Record agreements reached in meetings and distribute records to other participants.
3. Adjust arrangements and locations of distribution frames, patch panels, and cross connects in equipment rooms and wiring closets to accommodate and optimize arrangement and space requirements of telephone switch, LAN equipment, and video distribution equipment.

B. Coordinate all modifications and changes to Record Drawings. See section 27 0500 for more information.

1.7 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. After Contract Completion, a warranty shall be furnished for all components, parts, and assemblies against defects in materials and workmanship. A certified, factory-trained representative of the equipment manufacturer shall provide warranty services.

1. Warranty Period for Communications Connectivity (including all copper and fiber): Manufacturer's standard, but not less than 20 to 25 years from date of Contract Completion and a performance and applications assurance program up to 250MHz.
2. Include the final warranty certificates for the project with the final O&M Manuals.

1.8 STANDARDS

A. All equipment shall meet the applicable requirements of UL and shielding requirements of the Federal Communications Commission.

B. Wire and cable shall meet the applicable requirements of NEC and local applicable codes.

C. Comply with applicable portions of NEMA-250 standards (et. al.) pertaining to electrical and/or communication equipment and enclosures.

D. All new material and equipment shall meet the requirements of the following standards:

1. Electronic Industries Assoc./Telecommunications Industry Assoc. (EIA/TIA):
   a. EIA/TIA 568B.1, 2, and 3 Telecommunications Cabling Standard
   b. EIA/TIA 569 Telecommunication Pathways and Spaces
   c. EIA/TIA 606 Administration of Infrastructure
   d. EIA/TIA 607 Grounding and Bonding

E. All new material and equipment shall comply with accepted standards of workmanship as recognized by:

1. Building Industry Consulting Services International (BICSI)
2. Telecommunications Distribution Methods Manual (TDMM), (11th edition or latest version).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, the approved manufacturers are listed following the part description; see specific sections for basis of design and specific manufacturer approvals.

2.2 SYSTEM REQUIREMENTS

A. General: Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance.

B. Expansion Capability: Unless otherwise indicated, provide positions in racks, enclosures, and on wall boards for additional patch panels, cross connects, and terminal strips, to accommodate 10 percent future increase in active workstations.

2.3 MOUNTING ELEMENTS

A. Raceways and Boxes: See Sections 27 05 27 and 27 05 28.

B. Backboards: 3/4-inch thick, 4’ by 8’ interior-grade plywood, with two coats of fire retardant gray paint.

C. J-Hooks: Sized to accommodate all cables (no more than 40% fill) and be used within a plenum ceiling space.

D. Cable Ties: All UTP cables shall be secured with UL-listed plenum rated hook-and-loop style (velcro) cable ties only. Plastic or nylon cable ties shall be permitted for the remaining low voltage cables only.

2.4 UNSHIELDED TWISTED-PAIR CABLES

A. Category 6 UTP Cables:

1. Listed as complying with Category 6 of EIA/TIA-568-A.
2. Conductors: Solid copper.
3. UTP Cable: Comply with EIA/TIA-568-A. Four thermoplastic-insulated, individually twisted pairs of conductors, No. 24 AWG, color-coded, enclosed in a jacket.
4. Cable rating: Plenum - listed for use in air-handling spaces.
5. Cables shall participate in independently verified programs to ensure superior performance.
6. Color Coding: Color as indicated on the plans.
7. Approved Manufacturer: Commscope, Belden, Mohawk, Berk-Tek

2.5 COAXIAL CABLES

A. Coaxial Horizontal Cable:

1. Plenum rated RG-6/U
2. Cellular-polyethylene dielectric
3. Center conductor: No. 18 AWG solid copper-clad steel conductor
4. Cable Rating: CMP
5. Approved Manufacturers: Commscope, Belden, Berk-Tek

2.6 PATCH, STATION, & CROSS CONNECT CABLES

A. UTP Patch Cables

1. UTP Patch and Station Cables
   a. UTP Patch Cable: Category 6 four-pair patch cables in minimum of 3-foot lengths, factory terminated with RJ-45 plug at each end.
   b. Provide a total number of patch cords to connect every patch panel jack to every switch port. Provide 50% of the total in 3-foot length and 50% in 6-foot length.
   c. The above lengths and quantities are best estimate. Install minimal but appropriate length of patch cable for cross connection within and between cabinets and racks in the same room.
   d. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performances as required. Patch cords shall have latch guards to protect against snagging
   e. UTP Station Cables: Category 6 four-pair cables in minimum of 9-foot lengths, factory terminated with RJ-45 plug at each end. Provide one blue station cable for every outlet location not designated as voice. Provide

appropriate larger size as needed to make all connections to equipment. Coordinate with owner for any additional sizes needed.

f. All Patch and Station cables must match the performance of the horizontal UTP cable specified in this section.

2. UTP Cross Connect Cables: Category 6 four-pair cables, factory terminated with RJ-45 plug at each end. Provide one cross connect cord for every cross connect port needed.
3. All UTP patch cables shall be manufactured by either the Connectivity or Cable manufacturer approved above and match or exceed the performance of the system specified, to provide a complete end to end solution.

2.7 WORKSTATION MODULES, FACEPLATES, CONNECTORS

A. Workstation Faceplates: Single gang faceplate frame capable of accepting 4 module inserts.

1. Faceplate: Stainless Steel
2. Mounting: Flush, unless otherwise indicated.
3. Labeling: Shall have integral label with label cover.
4. Jack Spaces: As indicated on the drawings with any necessary blanks.
5. Provide blanks matching faceplate color for all unused ports
6. Provide modular insert frames as needed for all components within each faceplate.
7. Basis of Design: CommScope UNF-D-4P-IV

B. Category 6 Jack Module:

1. TIA/EIA-568-B.2-1 Category 6 standards
2. RJ45, 8-position, 8-wire module
3. T568B wiring scheme
4. Integral IDC terminals
5. Basis of Design: CommScope UNJ600
6. Color Scheme: Cables and jacks, both at the faceplate and the patch panel, shall use the following color scheme.
   a. Data – Blue
   b. Voice – Ivory

2.8 FIBER OPTIC HARDWARE

A. Fiber Enclosure: Modular panels housing multiple-numbered duplex cable connectors.

1. Permanent Connection: Connect one end of each SC connector module to the installed cable fibers SC connectors.
2. Number of Connectors per Field: One for each fiber strand, with appropriate number of fields or additional fields based upon cable size, and separate fields for each cable type, plus spares and blank positions adequate to satisfy specified expansion criteria.
3. Coupler Panel Type: Duplex SC
4. Mounting: Rack.
5. Labeling: Integral space for type labeling of each port.

6. Fiber Mgmt: Enclosure shall include appropriate tie off for cable strain relief and jacket, grounding (if applicable), and fiber storage within housing.
7. Fiber Cabinet: Corning model CCH-04U and CCH-01U Closet Connector Housing with Corning CCH-CP12-59 closet connector panels and Corning model 95-200-42 SC adapters.

B. Fiber Splice Housing: Wall mountable splice housing provides storage and protection for fiber splices in individually accessible splice trays.

1. Front provides work space for fusion splicer.
2. Multiple cable entry / exit locations
3. Strain-relief bracket
4. Provide grounding kit
5. Fiber Splice Housing: Corning WSH-16SPT with Corning M67-048-C splice trays.

C. Hardware includes rack mountable fiber optic enclosures (tray or cabinet) shall be metal with all doors, adapters, mounting plates, fiber management to be a complete system.

D. Must meet all applicable standards including TIA/EIA 568-B and be UL Listed.

E. Manufacturers: Subject to compliance with requirements, provide products by one of the same manufacturers of the fiber or the connectivity manufacturer.

2.9 TERMINATION BLOCKS & PATCH PANELS

A. Copper Patch Panel: 48 Port and/or 24 Port Modular patch panels with RJ45, 8 position 8 wire ports. For use on all horizontal UTP cables as applicable on the drawings.

1. Mounts to standard 19” EIA racks
2. Accept UTP modules for 6 cabling
3. Labeling: Integral space for type labeling of each port in a label holder integral or adhesively attached to the patch panel.
4. Basis of Design: CommScope UNP-6-DM-1U-24

B. 110 Punch Blocks:

1. Includes required quantity of bases, connecting blocks, label holders, and labels for all pairs to be terminated.
2. Mount with a minimum of 4 screws
3. Provide for demarcation extension on plywood backboard
4. Basis of Design: Siemon S210AB2-192FT

2.10 EQUIPMENT RACKS & ENCLOSURES

A. Equipment Racks: Freestanding modular-steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.

1. Black powder coat finish
2. 12-24 holes in EIA universal spacing.

3. Size: 19 inches wide by 84 inches high.
4. Mounting rails shall be compatible with standard 19 inches industry components
5. Rack shall be capable of a full usable 45 RMS capacity.
6. Provide a grounding bar to be connected to the building ground system.
7. Provide for use for all communications cabling and other technology related services.
8. Provide with vertical management on both sides as specified within this section
9. Approved Manufacturer: Siemon RS3 with RS3-07 vertical cable management.

2.11 WIRE MANAGEMENT

A. Horizontal Rack/Enclosure mountable wire management:

1. Shall be a sturdy plastic construction for access as indicated on the drawings.
2. Mounts to 19” racks.
3. Minimum 4” depth on each side.
4. Integral bend radius control throughout all pathways.
5. Removable front cover hinges 180 degrees up or down.
6. Provide as shown on drawings
7. Manufacturers: Siemon RS3-RWM-2DS

2.12 ADDITIONAL EQUIPMENT

A. Shelves:

1. Mountable to 19” rack rails
2. Load rating up to 150lbs
3. Provide as shown on drawings
4. Basis of Design: Siemon CABSHELFV 2U

B. Power Strips: Comply with UL 1363.

1. Rack mounting, vertically. (2) strips per rack.
2. (16) 15-A, 120-V ac, NEMA WD 6, Configuration 5-15R receptacles.
3. LED indicator lights for power and protection status.
4. Circuit Breaker and Thermal Fusing where protection is lost, circuit opens and cannot be reset.
5. Cord connected with 15-foot line cord.
6. Rocker-type on-off switch, illuminated when in on position.

2.13 WARNING SIGNS

A. All Cable Ladder shall be labeled with the following. Labels shall be placed in a location viewable from the floor below. Lettering: 1-1/2-inch high, black letters on yellow background with legend "WARNING! NOT TO BE USED AS WALKWAY, LADDER, OR SUPPORT FOR LADDERS OR PERSONNEL."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine pathway elements intended for cable. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Wiring Method: Install UTP horizontal cabling and UTP backbone cabling within the raceway and cable tray except within racks and enclosures, and except within accessible ceiling spaces utilizing an approved means of support. Use UL-listed, Plenum rated Hook-n-loop style (velcro) cable ties in environmental air spaces. Conceal raceway or conduit and cabling in all areas except where approved by the Architect. In accessible ceilings, use appropriately sized J-hooks to support the cabling every 48"- 60” back to the cable tray.

B. Install cable using techniques, practices, and methods that are consistent with Category 6 rating of components and that ensure Category 6 performance of completed and linked signal paths, end to end. Any cables that are kinked or have a broken cable sheath or damaged during installation must be replaced.

C. Provide all cables per the construction documents. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

D. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.

E. In the telecommunications equipment rooms, install a 6-foot- long service loop on each cable.

F. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools. Do not bend cable while handling or installing to smaller radii than minimums recommended by manufacturer.

G. Pull cables without exceeding cable manufacturer's recommended pulling tensions.

H. Pull cables simultaneously if more than one is being installed in the same raceway.

I. Use pulling compound or lubricant if necessary. Use compounds that will not damage conductor or insulation.

J. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips, which will not damage media or raceway.

K. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours where possible if exposed cabling is acceptable.

L. Secure and support cable at intervals not exceeding 60 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

M. Provide quantity of telecom racks, power strips, and associated shelves as shown on the drawings in the technology room (TR).

N. Wiring within Cabling Closets and Enclosures: Provide adequate length of conductors in order to move equipment racks or enclosures 48” in any direction without damaging cable, termination panels, or degrading cable performance. Use lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.

O. Label all UTP and fiber optic cable ports on patch panels and coverplates as required by these documents. Coordinate label schemes and configurations with the Owner and the Technology Designer prior to installation. Provide the labeling schedule as required.

P. Do not lay UTP cables unprotected on the floor at any time. If cables must be left on any floor, provide protection for cables so that they can’t be walked on or have any materials or equipment placed or rolled on top.

Q. Support the cables at all times during installation. Do not allow cables to hang from cable trays or conduit pathways without adequate support to relieve tension on the cables.

R. Make terminations at indicated outlets, terminals, and cross-connect and patch panels.

S. Separation of Wires: Comply with BICSI TDMM and EIA/TIA-569-A rules for separating unshielded copper communication cables from potential EMI sources, including electrical power lines and equipment. Cable separation from power wiring

1. Between the cabling system and any fluorescent, neon, incandescent, or high intensity discharge lamp fixtures, the minimum distance shall be 5 inches.
2. Cable may be installed closer to lighting and convenience outlet power cable (single phase, 120V, 20A maximum), in metal cable channels for limited distances if the provided compliance with the following:
   a. Coincident (parallel) runs of no more than 15 feet are permissible if a 1 inch separation between the power cable and the cabling system cable is maintained by separators or suitable retention.
3. Cable may not be installed any closer than 12 inches from any 480V circuits, transformers, and panels.
4. Comply with TIA/EIA-568-B.2.
5. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

T. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

U. The category 6 modular jack wiring Pin/Pair assignment shall match the EIA-568-B as follows:

1. Pair 1: Pin 4, blue; Pin 5, white-blue
2. Pair 2: Pin 1, white-orange; Pin 2, orange
3. Pair 3: Pin 3, white-green; Pin 6, green
4. Pair 4: Pin 7, white-brown; Pin 8, brown

3.3 GROUNDING

A. Provide grounding and bonding to the main grounding electrode in accordance with J-STD-607-A standard.

B. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

C. Bond shields and drain conductors to ground at only one point in each circuit.

D. Telecommunications Main Ground Busbar: Mounted on wall near cable entrance facility or building Telecommunications Room

3.4 INSTALLATION IN EQUIPMENT ROOMS AND WIRING CLOSETS

A. Plywood backboards shall be provided and installed as shown on drawings by the Division 26 contractor.

B. Group connecting hardware for cables into separate logical fields consisting of a maximum of 24 cables.

C. Use patch panels to terminate cables entering the space, unless otherwise indicated.

D. Mount all equipment on backboards level and coordinate final position with all backboard mounted devices.

3.5 FIELD QUALITY CONTROL

A. Testing: Test each signal path for end-to-end performance from each end of all pairs installed after all labeling has been completed. Testing shall be done with the owner and/or engineer present for a portion of the entire testing. Remove temporary connections when tests have been satisfactorily completed. All tests must be included within O&M Manuals.

1. Copper Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use Class 2 bidirectional Category 6 tester. Test for faulty connectors, splices, and terminations. Test according to EIA/TIA-TSB 67, "Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems." Channel performance for UTP cables must meet minimum criteria of EIA/TIA-568-A.

B. The work performed on this project will be in conformance with the current edition of the National Electric Code, and the current version of the TIA-EIA guidelines. All horizontal cabling and fiber backbone cabling products shall be independently verified for performance in a four connection channel configuration to the following measurements. This shall include cabling, jacks, patch panels, patch cords and other cross connects.

C. Correct malfunctioning cables and connectivity at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new and retest.

3.6 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION 27 1100

SECTION 27 1523 - COMMUNICATIONS OPTICAL FIBER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. 62.5/125-micrometer, multimode, optical fiber cable (OM1).
2. 50/125 micrometer, multimode, optical fiber cable (OM2).
3. 850 nanometer laser-optimized 50/125 micrometer multimode optical fiber cable (OM3).
4. 850 nanometer laser-optimized 50/125 micrometer multimode optical fiber cable (OM4).
5. Optical fiber cable hardware.
6. Cross-connects and patch panels.
7. Grounding.
8. Identification products.

1.2 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

C. RCDD: Registered Communications Distribution Designer.

1.3 OPTICAL FIBER HORIZONTAL CABLING DESCRIPTION

A. Optical fiber horizontal cabling system is to provide interconnections between Distributor A, Distributor B, or Distributor C and the equipment outlet, otherwise known as "Cabling Subsystem 1" in the telecommunications cabling system structure. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.

1. TIA-568-C.1 requires that a minimum of two equipment outlets be installed for each work area.
2. Horizontal cabling is to contain no more than one transition point or consolidation point between the horizontal cross-connect and the equipment outlet.
3. Bridged taps and splices are not to be installed in the horizontal cabling.

B. A work area is approximately 100 sq. ft., and includes the components that extend from the equipment outlets to the equipment.

C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

1.4 ACTION SUBMITTALS

A. Shop Drawings: Reviewed and stamped by RCDD.

1. System Labeling Schedules:
   a. Electronic copy of labeling schedules, in software and format selected by Owner.
   b. Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
2. Cabling administration Drawings and printouts.
3. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment, including the following:
   a. Telecommunications rooms plans and elevations.
   b. Telecommunications pathways.
   c. Telecommunications system access points.
   d. Telecommunications grounding system.
   e. Telecommunications conductor drop locations.
   f. Typical telecommunications details.
   g. Mechanical, electrical, and plumbing systems.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installation supervisor, and field inspector.

1.6 CLOSEOUT SUBMITTALS

1.7 MAINTENANCE MATERIAL SUBMITTALS

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings and Cabling Administration Drawings , Cabling Administration Drawings, and field testing program development by an RCDD Technician.
2. Installation Supervision: Installation is to be under the direct supervision of Technician Level 2 Installer, who is to be present at all times when Work of this Section is performed at Project site.
3. Testing Supervisor: Currently certified by BICSI as an RCDD Technician.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.

1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical fiber flashlight or optical loss test set .
2. Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.11 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications equipment and service suppliers.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Horizontal cabling system is to comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.

B. Telecommunications Pathways and Spaces: Comply with TIA-569-D.

C. Grounding: Comply with TIA-607-B.

2.2 62.5/125-MICROMETER, MULTIMODE, OPTICAL FIBER CABLE (OM1)

A. Description: Multimode, 62.5/125-micrometer, 4 -fiber, nonconductive, tight buffer, optical fiber cable.

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

1. Belden Inc.
2. Berk-Tek, a Leviton Company.
3. CommScope, Inc.
4. Corning Optical Communications; Corning Incorporated.
5. General Cable; Prysmian Group North America.

6. Hitachi Cable America Inc.
7. Mohawk; a division of Belden Networking, Inc.
8. Prysmian Cables and Systems; Prysmian Group North America.
9. Superior Essex Inc.; subsidiary of LS Corp.

C. Standards:

1. Comply with ICEA S-83-596 for mechanical properties.
2. Comply with TIA-568-C.3 for performance specifications.
3. Comply with TIA-492AAAA for detailed specifications.

D. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.

E. Minimum Overfilled Modal Bandwidth-length Product: 200 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

F. Jacket:

1. Jacket Color: Orange .
2. Cable cordage jacket, fiber, unit, and group color is to be according to TIA-598-D.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.

G. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:

1. Plenum Rated, Nonconductive:
   a. Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFNP or Type OFNR in metallic conduit.

2.3 50/125 MICROMETER, MULTIMODE, OPTICAL FIBER CABLE (OM2)

A. Description: Multimode, 50/125-micrometer, 4 -fiber, nonconductive , tight buffer, optical fiber cable.

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

1. AMP NETCONNECT; a TE Connectivity Ltd. company.
2. Belden Inc.
3. Berk-Tek, a Leviton Company.
4. CommScope, Inc.
5. Corning Optical Communications; Corning Incorporated.
6. General Cable; Prysmian Group North America.
7. Hitachi Cable America Inc.
8. Superior Essex Inc.; subsidiary of LS Corp.

C. Standards:

1. Comply with ICEA S-83-596 for mechanical properties.

2. Comply with TIA-568-C.3 for performance specifications.
3. Comply with TIA-492AAAB for detailed specifications.

D. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.

E. Minimum Overfilled Modal Bandwidth-length Product: 500 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

F. Jacket:

1. Jacket Color: Orange .
2. Cable cordage jacket, fiber, unit, and group color are to be according to TIA-598-D.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.

G. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:

1. Plenum Rated, Nonconductive:
   a. Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFNP or Type OFNR in metallic conduit.

2.4 850 NANOMETER LASER-OPTIMIZED, 50/125 MICROMETER, MULTIMODE OPTICAL FIBER CABLE (OM3)

A. Description: Multimode, 50/125-micrometer, 4 -fiber, nonconductive , tight buffer, optical fiber cable.

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

1. AMP NETCONNECT; a TE Connectivity Ltd. company.
2. Belden Inc.
3. CommScope, Inc.
4. Corning Optical Communications; Corning Incorporated.
5. Hitachi Cable America Inc.
6. TE Connectivity Ltd.

C. Standards:

1. Comply with ICEA S-83-596 for mechanical properties.
2. Comply with TIA-568-C.3 for performance specifications.
3. Comply with TIA-492AAAC for detailed specifications.

D. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.

E. Minimum Overfilled Modal Bandwidth-length Product: 1500 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

F. Minimum Effective Modal Bandwidth-length Product: 2000 MHz-km at 850 nm.

G. Jacket:

1. Jacket Color: Aqua .
2. Cable cordage jacket, fiber, unit, and group color are to be according to TIA-598-D.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.

H. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:

1. Plenum Rated, Nonconductive:
   a. Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFNP or Type OFNR in metallic conduit.

2.5 850 NANOMETER LASER-OPTIMIZED, 50/125 MICROMETER, MULTIMODE OPTICAL FIBER CABLE (OM4)

A. Description: Multimode, 50/125-micrometer, 4 -fiber, nonconductive tight buffer, optical fiber cable.

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

1. Belden Inc.
2. CommScope, Inc.
3. Corning Optical Communications; Corning Incorporated.
4. Hitachi Cable America Inc.
5. Mohawk; a division of Belden Networking, Inc.
6. Superior Essex Inc.; subsidiary of LS Corp.
7. TE Connectivity Ltd.

C. Standards:

1. Comply with ICEA S-83-596 for mechanical properties.
2. Comply with TIA-568-C.3 for performance specifications.
3. Comply with TIA-492AAAD for detailed specifications.

D. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.

E. Minimum Overfilled Modal Bandwidth-length Product: 3500 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

F. Minimum Effective Modal Bandwidth-length Product: 4700 MHz-km at 850 nm.

G. Jacket:

1. Jacket Color: Aqua .

2. Cable cordage jacket, fiber, unit, and group color are to be according to TIA-598-D.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.

H. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:

1. Plenum Rated, Nonconductive:
   a. Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFN, Type OFNG, Type OFNP, or Type OFNR in metallic conduit.

2.6 OPTICAL FIBER CABLE HARDWARE

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

1. American Technology Systems Industries, Inc.
2. Belden Inc.
3. Berk-Tek, a Leviton Company.
4. CommScope, Inc.
5. Corning Optical Communications; Corning Incorporated.
6. Dynacom Corporation.
7. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
8. Molex Premise Networks.
9. Optical Cable Corporation (OCC).
10. Siemon Co. (The).
11. Stewart Connector, a Bel group company; Bel Fuse Inc.

B. Standards:

1. Comply with Fiber Optic Connector Intermateability Standard (FOCIS) specifications of the TIA-604 series.
2. Comply with TIA-568-C.3.

C. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.

1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.

D. Patch Cords: Factory-made, single-fiber cables in 36-inch lengths.

E. Connector Type: Type SC complying with TIA-604-3-B, Type ST complying with TIA-604-2-B, Type LC complying with TIA-604-10-B, Type MT-RJ complying with TIA-604-12, Type MPO complying with TIA-604-5-D, connectors.

F. Plugs and Plug Assemblies:

1. Male; color-coded modular telecommunications connector designed for termination of a single optical fiber cable.
2. Insertion loss not more than 0.25 dB.
3. Marked to indicate transmission performance.

G. Jacks and Jack Assemblies:

1. Female; quick-connect, simplex and duplex; fixed telecommunications connector designed for termination of a single optical fiber cable.
2. Insertion loss not more than 0.25 dB.
3. Marked to indicate transmission performance.
4. Designed to snap-in to a patch panel or faceplate.

H. Faceplate:

1. Two/Four/Six-port, vertical single-gang faceplates designed to mount to single-gang wall boxes.
2. Metal Faceplate: Stainless steel or Brass, complying with requirements in Section 26 2726 "Wiring Devices."
3. For use with snap-in jacks accommodating any combination of twisted pair, optical fiber, and coaxial work area cords.
   a. Flush mounting jacks, positioning the cord at a 45-degree angle.

2.7 GROUNDING

A. Comply with requirements in Section 26 0526 "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.

B. Comply with TIA-607-B.

2.8 IDENTIFICATION PRODUCTS

A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 INSTALLATION OF OPTICAL FIBER BACKBONE CABLES

A. Comply with NECA 1, NECA 301 and NECA/BICSI 568.

B. General Requirements for Optical Fiber Cabling Installation:

1. Comply with TIA-568-C.1 and TIA-568-C.3.
2. Comply with BICSI ITSIMM, Ch. 6, "Cable Termination Practices."
3. Terminate all cables; no cable is to contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
6. Bundle, lace, and train cable to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps are not to be used for heating.
9. In the communications equipment room, provide a 10-foot long service loop on each end of cable.
10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
11. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Cable is not to be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Installation of Cable Routed Exposed under Raised Floors:

1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Form cable **6 feet** long or more into coils not less than **12 inches** in diameter below each feed point.

E. Group connecting hardware for cables into separate logical fields.

3.3 FIRESTOPPING

A. Comply with requirements in Section 07 8413 "Penetration Firestopping."

B. Comply with TIA-569-D, Annex A, "Firestopping."

C. Comply with BICSI ITSIMM, "Firestopping" Chapter.

3.4 INSTALLATION OF GROUNDING

A. Install grounding according to BICSI ITSIMM, "Grounding (Earthing), Bonding, and Electrical Protection" Chapter.

B. Comply with TIA-607-B and NECA/BICSI-607.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.5 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA-606-B. Comply with requirements for identification specified in Section 26 0553 "Identification for Electrical Systems."

1. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.

B. Paint and label colors for equipment identification are to comply with TIA-606-B for Class 2 Class 3 Class 4 level of administration including optional identification requirements of this standard.

C. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, horizontal pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.

E. Cable and Wire Identification:

1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
4. Label each unit and field within distribution racks and frames.

5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

F. Labels are to be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606-B, for the following:

1. Flexible vinyl or polyester that flexes as cables are bent.

END OF SECTION 27

END OF SECTION 27 1523

SECTION 28 1000 - ACCESS CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access control system.

B. Related Requirements:

1. Section 26 0011 "Facility Performance Requirements for Electrical" specifies seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
2. Section 28 0010 "Supplemental Requirements for Electronic Safety and Security" specifies additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
3. Section 01 3100 "Project Management and Coordination specifies preinstallation conference procedures.
4. Section 08 7100 "Door Hardware" specifies the following:
   a. Electric strike(s).
   b. Electromagnetic lock(s).
   c. Delayed-egress electromagnetic lock(s).
   d. Electromechanical lock(s).
   e. Self-contained electronic lock(s).
   f. Exit lock(s) and alarm(s).
   g. Auxiliary electrified door hardware.
5. Section 08 7113 "Power Door Operators" specifies the following:
   a. Door operator controls.
   b. Panic exit device(s).
   c. Electric strike(s).
   d. Auxiliary electrified door hardware.
6. Section 28 1300 "Access Control Software and Database Management" specifies the following:
   a. Access control system unit operating system software.
   b. Access control system unit antivirus and security protection software.
   c. Visitor management database software.
   d. Mobile credential validation database software.
   e. Access control system supplementary computer equipment operating system software.
   f. Access control system supplementary computer equipment antivirus and security protection software.
   g. Credential card personalization software.
   h. Credential card printer and encoder software.
7. Section 28 1400 "Access Control System Hardware" specifies the following:
   a. Access control system server(s).

b. Access control system DGP(s).
c. Access control system door controller(s).
d. Access control system input/output interface(s).
e. Access control system power supply and battery charger(s).
f. Access control system [terminal(s)] [workstation(s)].
g. Access control system printer(s) and encoder(s).

8. Section 28 1500 "Integrated Access Control Hardware Devices" specifies the following:
   a. Swipe card reader(s).
   b. Proximity reader(s) for card, fob, or smartphone.
   c. Door lock keypad(s).
   d. Scramble keypad(s).
   e. Combination card reader(s) and keypad(s).
   f. Access control cards.
   g. Electrically controlled single-point latch(es).
   h. Electrically controlled three-point latch(es).
   i. Type 1 high-security electronic lock(s).
   j. Type 1F high-security combination lock(s).
   k. REX motion sensor(s).
   l. REX push-button(s).
   m. Magnetic lock hardware with special locking arrangement for fire-rated door(s).
   n. Panic hardware with special locking arrangement for fire-rated door(s).
   o. NFC access control device(s).
   p. Electronic key management system unit(s).
9. Section 28 1511 "Integrated Credential Readers and Entry Management" specifies the following:
   a. Swipe card reader(s).
   b. Chip card reader(s).
   c. Proximity reader(s) for card, fob, or smartphone.
   d. Proximity card reader(s) for hazardous (classified) location.
   e. Door lock keypad(s).
   f. LCD alarm keypad(s).
   g. Scramble keypad(s).
   h. Single finger scanner(s).
   i. Palm scanner(s).
   j. Iris scanner(s).
   k. Facial scanner(s).
   l. Combination card reader(s) and keypad(s).
   m. Combination card reader(s)/keypad(s) and biometrics scanner(s).
10. Section 28 1513 "Access Control Credentials" specifies the following:
    a. Access control cards.
    b. Wireless key fobs.
11. Section 28 1515 "Electrified Locking Devices and Accessories" specifies the following:
    a. Electrically controlled single-point latch(es).
    b. Electrically controlled two-point latch(es).
    c. Electrically controlled three-point latch(es).
    d. Type 1 high-security electronic lock(s).
    e. Type 1F high-security combination lock(s).
    f. Type 2 high-security combination lock(s).

g. REX motion sensor(s).
h. REX push-button(s).

12. Section 28 1517 "Egress Management Devices" specifies the following:
    a. Magnetic lock hardware with special locking arrangement.
    b. Panic hardware with special locking arrangement.
13. Section 28 1519 "Access Control Remote Devices" specifies the following:
    a. NFC access control device(s).
    b. Bluetooth communications access control device(s).
    c. Wireless communications access control device(s).
14. Section 28 1521 "Telephone Entry Systems" specifies the following:
    a. Analog audio telephone entry system(s).
    b. Digital audio-video telephone entry system(s).
15. Section 28 1523 "Intercom Entry Systems" specifies the following:
    a. Digital audio intercom entry system(s).
    b. Digital audio-video intercom entry system(s).
16. Section 28 1525 "Electronic Key Management Systems" specifies the following:
    a. Electronic key management system unit(s).
    b. Mechanical key management system unit(s).
17. Section 28 1527 "Access Control Electronic Turnstiles and Mobility Systems" specifies turnstile operator(s) with access control devices.

1.2 DEFINITIONS

A. DGP: Data gathering panel.

B. NFC: Near field communications.

C. REX: Request-to-exit.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

B. Preinstallation Coordination Meeting(s): For access control. Conduct meeting(s) as videoconference or at Project site before construction activity.

1. Attendees: Installers, fabricators, representatives of manufacturers, and administrants for field tests and inspections. Notify Architect **,** Construction Manager , and Owner's Commissioning Authority of scheduled meeting dates.

1.4 ACTION SUBMITTALS

A. Shop Drawings:

1. Project general notes.
2. Head-end hardware, equipment, and device locations.
3. Block diagram and cable/conduit routing illustrating end-to-end system wiring.
4. End-to-end system communications details.

5. Secondary power calculations

B. Field quality-control reports.

1.5 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:

1. Installation instructions for access control system door controllers.
2. Manufacturer's recommended tests and inspections for egress management devices.
3. Manufacturer's recommended tests and inspections for access control remote devices.
4. Manufacturer's recommended tests and inspections for telephone entry systems.

B. Warranty documentation.

1.7 REGULATORY AGENCY APPROVALS

A. Submittals for access control system requiring approval by authorities having jurisdiction must be signed and sealed by qualified life safety professional engineer responsible for their preparation. Obtain approval by authorities having jurisdiction prior to submitting for action by Architect.

B. Submittals for access control system require action by Architect prior to submitting for approval by authorities having jurisdiction.

1.8 WARRANTY FOR ACCESS CONTROL SYSTEM

A. Special Installer Extended Warranty: Installer warrants that fabricated and installed access control system performs in accordance with specified requirements and agrees to repair or replace components that fail to perform as specified within extended-warranty period.

1. Extended-Warranty Period two years from date of Substantial Completion; full coverage for labor, materials, and equipment.

B. Special Manufacturer Extended Warranty: Manufacturer warrants that components of access control system perform in accordance with specified requirements and agrees to provide repair or replacement of components that fail to perform as specified within extended-warranty period.

1. Initial Extended-Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.
2. Follow-On Extended-Warranty Period five years from date of Substantial Completion; full coverage for components that failed because of transient voltage surgesonly, free on board origin, freight prepaid.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION OF ACCESS CONTROL SYSTEM

A. Description: Access control system provides a means of regulating or controlling physical entry into an area, or access to or use of a device by electrical, electronic, and/or mechanical means. Manual access control system includespushbutton at entry and exit points to energize the door operator, primarirly for handicap assistance.

B. Performance Criteria:

1. Regulatory Requirements:
   a. Components listed and labeled in accordance with NFPA 70 and NFPA 72, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
   b. Comply with NFPA 1, NFPA 730, NFPA 731, and ICC IBC.
   c. Certification: Provide certificate, authorized under UL Certification Service, that access control system installation complies with installation requirements of UL CCN ALOV.
2. Listing Criteria: UL CCN ALOV and UL CCN ALVY; including UL 294.
3. Consult Architect for resolution of conflicting requirements.

C. Selection of Access Control System Components:

1. Source Limitations: Obtain components for access control system from sources approved by **manufacturer** warranting performance of entire system.

D. Special Techniques:

1. Comply with manufacturer's published instructions.
2. Mounting Heights: Mount field devices in accessible locations in accordance with United States Access Board ADA-ABA Accessibility Guidelines standards.

E. Interfaces with Other Work:

1. Coordinate installation of new access control system components with existing conditions.
2. Coordinate with **applicable Division 08 Sections** for interfacing access control system devices with door hardware.

3. Coordinate with [**Section 23 0923 "Direct Digital Control (DDC) System for HVAC"**] [**Section 23 0993.11 "Sequence of Operations for HVAC DDC"**] for interfacing access control system with temperature controls to turn HVAC system on and off.
4. Coordinate with [**Section 26 0923 "Lighting Control Devices"**] [**Section 26 0943.16 "Addressable Luminaire Lighting Controls"**] [**Section 26 0943.23 "Relay-Based Lighting Controls"**] for interfacing access control system with lighting controls.
5. Coordinate with Section 28 4700 "Mass Notification" for unlocking secured doors that are in exit ways, with or without delay.
6. Coordinate with Section 28 5211 "Detention Monitoring and Control Systems" for interfacing access control system with detention monitoring and controls.
7. Coordinate with Section 32 3113 "Chain Link Fences and Gates" for interfacing access control system with fence and gate controls.

F. Systems Integration:

1. Coordinate with [**Section 28 3100 "Intrusion Detection"**] [**Section 28 3121 "Area and Perimeter Intrusion Detection"**] for integrating access control system with intrusion detection system.
2. Coordinate with Section 28 2000 "Video Surveillance" for integrating access control system with video surveillance controls.

3.2 FIELD QUALITY CONTROL OF ACCESS CONTROL SYSTEM COMPONENTS

A. Field tests and inspections must be witnessed by Architect authorities having jurisdiction

B. Tests and Inspections:

1. Perform manufacturer's recommended tests and inspections for access control system components.
2. Perform tests and inspections for power supplies, batteries, and other standby power provisions.
3. Engage factory-authorized service representative to test end-to-end system connection and functionality.
4. Verify monitoring of access control system status and diagnostics information.

C. Nonconforming Work:

1. Access control equipment will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Collect, assemble, and submit test and inspection reports.

E. Manufacturer Services:

1. Engage factory-authorized service representative to supervise field tests and inspections.

3.3 SYSTEM STARTUP

A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's published instructions.

3.4 ADJUSTING

A. Control Sensor Adjustments: Adjust control devices to suit actual occupied conditions.

1. For proximity motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.

3.5 PROTECTION

A. After installation, protect access control system components from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

3.6 MAINTENANCE

A. Control Sensor Readjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in readjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

END OF SECTION 28 1000

SECTION 31 1000 - SITE CLEARING

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Stripping and stockpiling topsoil.
3. Removing above- and below-grade site improvements.
4. Disconnecting, capping or sealing, and removing site utilities.

B. Related Sections:

1. Division 01 Section "Temporary Facilities and Controls".
2. Division 02 Section "Selective Structure Demolition".

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or video.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 PROJECT CONDITIONS

A. Traffic: Install barricades to cut off access to the public.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises.

C. Utility Locator Service: Notify Ohio Utility Protection Services for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and tree-protection measures are in place.

E. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Erection of sheds or structures.
4. Impoundment of water.
5. Excavation or other digging unless otherwise indicated.
6. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

G. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

A. Install sedimentation and erosion control measures before commencing site clearing.

B. Protect and maintain benchmarks and survey control points from disturbance during construction.

C. Locate and clearly identify trees, shrubs, and other vegetation to remain. Flag each tree trunk at 54 inches above the ground.

D. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition.

3.2 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site.

B. Repair or replace trees, shrubs, and other indicated to remain or be relocated that are damaged by construction operations.

3.3 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities to be removed.

1. Arrange with utility companies to shut off indicated utilities.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions (and then only after arranging to provide temporary utility services):

1. Notify Owner not less than three days in advance of proposed utility interruptions.

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation to remain or to be relocated.
2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
3. Use only hand methods for grubbing within protection zones.
4. Chip removed tree branches and haul off site.

B. For areas outside of proposed grading limits, fill depressions caused by clearing and grubbing operations with satisfactory soil material.

1. Place fill material in horizontal layers not exceeding a loose depth of 6 inches, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to 72 inches.
2. Do not stockpile topsoil within protection zones.
3. Stockpile surplus topsoil to allow for respreading deeper topsoil or hauling off site.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements to facilitate new construction.

B. Remove slabs, paving, curbs, and gutters.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 1000

SECTION 31 2000 - EARTH MOVING

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Preparing subgrades for walks, pavements, turf and grasses, and plants.
2. Excavating and backfilling for buildings and structures.
3. Subgrades and base course for walks and pavements.
4. Subgrades and base course for asphalt paving.
5. Base course for utility yard.
6. Subsurface drainage backfill for walls and trenches.
7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Sections:

1. Division 01 Section “Unit Prices”.
2. Division 01 Section "Temporary Facilities and Controls".
3. Division 03 Section "Cast-in-Place Concrete".
4. Division 31 Section "Site Clearing".
5. Division 31 Section "Dewatering".
6. Division 32 Section "Turf and Grasses".
7. Division 32 Section "Plants".

1.3 DEFINITIONS

A. Backfill: Soil material or engineered material used to fill an excavation.

1. Initial Backfill: Backfill placed 12 inches over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subgrade course and walks and pavements.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer that minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations.

1. Unauthorized Excavation: Excavation below subgrade elevations or beyond proposed lines and dimensions. Unauthorized excavation, as well as remedial work, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 1 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/inch when tested by a geotechnical testing agency, according to ASTM D 1586.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below base, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Controlled low-strength material, including design mixture.

B. Samples for Verification: For the following products, in sizes indicated below:

1. Warning Tape: 12 inches long; of each color.

C. Material Test Reports: For each soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D 2487.
2. Gradation report for each granular material.

1.5 PROJECT CONDITIONS

A. Traffic: Install barricades to cut off access to the public.

B. Utility Locator Service: Notify Ohio Utility Protection Services for area where Project is located before beginning earth moving operations.

C. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, are in place.

D. Do not commence earth moving operations until plant-protection measures are in place.

E. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Erection of sheds or structures.
4. Impoundment of water.
5. Excavation or other digging.
6. Attachment of signs to or wrapping materials around trees or plants.

F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 4 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; conforming to ODOT Item 304.

E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; conforming to ODOT Item 310.

F. Drainage Course: Narrowly graded mixture of washed stone, or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 56 or 57.

G. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.

H. Sand: ASTM C 33; fine aggregate.

I. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with ODOT 712.09 Type A.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with ODOT 712.09 Type D.

2.3 CONTROLLED LOW-STRENGTH MATERIAL

A. Controlled Low-Strength Material: Self-compacting, flowable concrete material conforming to ODOT Item 613.

2.4 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install sedimentation and erosion control measures before commencing site grading.

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

D. Excavations and Embankments shall conform to the requirements of ODOT Item 203.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate within a tolerance of plus or minus 1 inch. Extend excavations from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to proposed grades to leave solid base to receive other work.
2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to proposed, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to proposed elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to proposed depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit 4 inches or larger in nominal diameter, provide flat bottomed trench to allow for bedding material to be placed.
2. For flat-bottomed, multiple-duct conduit units, excavate trench bottoms and support conduit on an undisturbed subgrade.
3. Excavate trenches 6 inches deeper than proposed elevation in rock or other unyielding bearing material to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to proposed elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.8 SUBGRADE INSPECTION

A. If unsatisfactory soils are present, continue excavation and replace with satisfactory compacted backfill or fill material.

B. Proof-roll subgrade below the pavements per ODOT Item 204 to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Unauthorized excavations are prohibited and remedial work shall be without compensation.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill per the requirements of ODOT Item 603.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

C. Place and compact bedding course on trench bottoms. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

D. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.

E. Trenches under Drives: Provide compacted fill to subgrade elevation. If the top of pipe is less than 12 inches below subgrade elevation provide low strength mortar from top of pipe to subgrade elevation.

F. Backfill voids with satisfactory soil while removing shoring and bracing.

G. Place and compact initial backfill of drainage fill, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

2. Place and compact final backfill of satisfactory soil to final subgrade elevation.
3. Install warning tape directly above utilities, 12 inches above the top of the utility.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to proposed elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use satisfactory soil material.
4. Under footings and foundations, use satisfactory soil material.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to proposed elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight:

1. Under structures, building slabs, steps, compact fill soil material at 98 percent.
2. Under walkways, and pavements compact fill soil material at 95 percent.
3. Under turf or unpaved areas, compact fill soil material at 90 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 90 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to proposed elevations.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to proposed elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch of proposed grades and within 10 percent of proposed slopes.
2. Walks: Plus or minus 1 inch of proposed grades and within 5 percent of proposed slopes.
3. Pavements: Plus or minus 1/2 inch of proposed grades and within 5 percent of proposed slopes. Surface of pavement to comply with guidelines set forth in ODOT Item 401.

3.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place base course under pavements and walks as follows:

1. Place base course material over subbase course under concrete pavement.
2. Shape base course to proposed elevations and slopes.
3. Place base course according to ODOT Item 304.

3.18 FIELD QUALITY CONTROL

A. Special Inspections: Architect will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material and maximum lift thickness comply with requirements.
3. Determine that in-place density of compacted fill complies with requirements.

B. Testing Agency: Architect will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials; recompact and retest until specified compaction is obtained.

3.19 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing, and eliminate evidence of restoration to greatest extent possible.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile and spread to proposed elevations.

1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 2000

SECTION 31 2200 - GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes the following:

1. Removal of topsoil.
2. Specification of grading is dependent upon soil conditions at specific project site (See grading plan).
3. Rough grading the site for site structures and building pads.
4. Finish grading .

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 31 2323 - Fill: Filling and compaction.

1.2 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for general requirements relating to unit prices for this work.

B. Topsoil:

1. Includes: Excavating existing topsoil, stockpiling, scarifying substrate surface, placing where required, and compacting.

1.3 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Topsoil excavated on-site.

1. Graded.
2. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.

B. Other Fill Materials: See Section 31 2323

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities. Hire a third party utility locator to identify all underground utilities prior to start of construction activities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

E. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.

F. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

3.3 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. When excavating through roots, perform work by hand and cut roots with sharp axe.

E. See Section 31 2323 for filling procedures.

F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.4 SOIL REMOVAL

A. Stockpile topsoil to be re-used on site; remove remainder from site.

B. Stockpile subsoil to be re-used on site; remove remainder from site.

C. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.5 FINISH GRADING

A. Before Finish Grading:

1. Verify building and trench backfilling have been tested and inspected.
2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.

D. Place topsoil in areas indicated.

E. Place topsoil during dry weather.

F. Remove roots, weeds, rocks, and foreign material while spreading.

G. Near plants spread topsoil manually to prevent damage.

H. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

I. Lightly compact placed topsoil.

3.6 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.

B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

3.7 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Trees to Remain: If damaged due to this work, trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Architect as to remedy.

C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.8 FIELD QUALITY CONTROL

A. See Section 31 2323 for compaction density testing.

END OF SECTION 31 2200

SECTION 31 2316 - EXCAVATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

B. Excavating for slabs-on-grade, paving, and dewatering.

C. Trenching for utilities outside the building to utility main connections.

D. Dewatering.

1.2 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements

B. Section 31 2323 - Fill: Fill materials, filling, and compacting.

1.3 DEFINITIONS

A. Excavation: Removal of material encountered required for building volume below grade, footings, slab-on-grade, paving, utility trenches, etc.

B. Additional Excavation: Excavation below required excavation as required. Unauthorized Excavation: Excavation below required excavation or beyond required excavation without direction of the Architect/Engineer.

C. Unauthorized excavation and remedial work directed by the Architect/Engineer shall be without additional compensation.

1.4 QUALITY ASSURANCE

A. Code and Standards: Perform work complying with requirements of authorities having jurisdiction

B. Testing and Inspection: A qualified independent geotechnical engineering testing agency shall classify proposed on-site borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing..

1.5 PROJECT COORDINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Protect plants, lawns, and other features to remain.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic..

PART 2 - PRODUCTS "NOT USED"

PART 3 - EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2000 for additional requirements.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations and from flooding project site and surrounding area.

B. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings and soil changes detrimental to stability of subgrades and foundations.

1. Provide and maintain pumps, sumps, suction and discharge lines and other dewatering systems necessary to convey water away from excavations.

3.3 EXCAVATING

A. General

1. Excavate to accommodate construction operations.
2. Notify Owner of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
3. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.
4. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
5. Do not interfere with 45 degree bearing splay of foundations.
6. Cut utility trenches wide enough to allow inspection of installed utilities.
7. Hand trim excavations. Remove loose matter.
8. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323
9. Grade top perimeter of excavation to prevent surface water from draining into excavation.
10. Remove excavated material that is unsuitable for re-use from site.
11. Remove excess excavated material from site.

B. Excavation for walks and pavements:

1. Excavate surfaces under walks and pavements to indicated cross sections, elevations and grades.

C. Excavation for trenches:

1. Cut utility trenches wide enough to allow inspection of installed utilities.
2. Excavate trenches to indicated gradients, lines, depths and elevations. Beyond building perimeter keep bottoms of trenches sufficiently below grade to avoid freezing.
3. Excavate trenches to uniform width to provide working clearance on each side of pipe or conduit. Provide 12 inches clearance on each side
4. If bedding course is not called for, excavated and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints and barrels of pipes and for joints, fittings and bodies of conduits. Remove stones and sharp objects to avoid point loading.
    a. For pipe and conduits less than 6 inches in nominal diameter and flat bottom multi-duct conduit lines excavate to indicated depths and support pipe and conduit on an undisturbed subgrade

3.4 FIELD QUALITY CONTROL

A. Provide a test to verify required design bearing capacities at each strata of soil on which footings will be placed.

1. Provide a test for every 20 lineal feet of footing.
2. Verification and approval each footing at the strata of soil may be based on visual inspection and comparison between tests locations.
3. Provide a minimum of three (15) tests for each building

B. Provide a test to verify required design bearing capacities of soil on which slabs on grade will be placed.

1. Provide a minimum of one test for each 200 square feet of area.

C. Provide a test to verify required design bearing capacities at each strata of soil on which footings will be placed.

3.5 PROTECTION

A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Repair and re-establish grades to specified tolerances where completed surfaces become eroded, rutted, settled or lose compaction due to subsequent construction operations or weather conditions.

END OF SECTION 31 2316

SECTION 31 2317 - PIPED UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

A. Excavate trenches for utilities from 5 feet outside building to municipal utilities or as shown on Drawings.

B. Compacted bedding for utilities.

C. Backfilling and compaction.

1.3 RELATED SECTIONS

A. Section 01 4000, "Quality Requirements"

B. Section 31 0000, "Earthwork"

C. Section 33 1100, "Water Distribution"

1.4 REFERENCES

A. ANSI/ASTM Cl36- Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil? Aggregate Mixtures, Using 5.5 lb. (2.49 kg) Rammer and 12 inch (3.04.8 mm) Drop.

C. ANSI/ASTM D1556- Test Method for Density of Soil in Place by the Sand-Cone Method.

D. ANSIIASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil - Aggregate Mixtures using 10 lb. (4.54 kg.) Rammer and 18 inch (457 mm) Drop

E. ANSIIASTM D2922 - Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).

F. ANSIIASTM D3017 - Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.5 SUBMITTALS

A. Submit under provisions of Section 01 3300

1.6 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the Work are as shown on Drawings.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. As per ODOT Item 638 " Water mains and service branches"

2.2 BED MATERIALS

A. As per ODOT Item 638 " Water mains and service branches"

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify fill materials to be used are acceptable.

3.2 PROTECTION OF PERSONS AND PROPERTY

A. The Architect/ Engineer has designed a project which will be safe after full completion. The Architect/ Engineer has no expertise in, and takes no responsibility for, construction means and methods or job site safety during construction, which are exclusively the Contractor's responsibility. Processing and/or approving submittals made by the Contractor which may contain information related to construction methods or safety issues, or participation in meetings where such issues might be discussed, shall not be construed as voluntary assumption by the Engineer of any responsibility for safety procedures.

B. Earthwork:

1. Stability of temporary excavations:
   a. All excavations shall be in accordance with OSHA requirements.
   b. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
   c. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
2. Shoring:

a. Except as specified elsewhere, provide all shoring required for earthwork or required as a result of earthwork for safety of workers, existing structures, public or adjacent properties.
b. Provide materials for shoring and bracing in good serviceable condition.
c. Establish requirements for shoring and bracing to comply with local codes and authorities having jurisdiction.
d. Maintain shoring and bracing in excavations regardless of time period excavations will be open.

3.3 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Maintain and protect existing utilities remaining, which pass through work area. Repair damaged utilities to the satisfaction of the Owner of the utility and the A/E.

C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

D. Protect benchmarks, existing structures, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

E. Protect above and below grade utilities which are to remain.

3.4 EXCAVATION

A. Excavate subsoil and whatever material encountered including rock, required for storm sewers, sanitary sewers, water and gas piping. See rock definition in Earthwork Section.

B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection and as shown on details provided on Drawings.

C. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

D. Remove lumped subsoil, boulders, and rock greater than l/3 cu. yd. measured by volume.

E. Correct unauthorized excavation at no cost to Owner.

F. Correct areas over-excavated by error in accordance with Earthwork Section at no cost to Owner.

G. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

H. Cut out soft areas of subgrade not capable of insitu. compaction. Backfill with Type D fill and compact to density equal to or greater than requirements for subsequent backfill materials.

I. Dewatering: All excavation, construction and backfill of pipes or other facilities to be constructed under this Contract shall be constructed under dry conditions. The Contractor shall constantly maintain all excavations in a dewatered, workable condition,

and shall be responsible for installing, operating, maintaining and removing such dewatering systems as are required. The evaluation of the sufficiency of the condition shall be made by the Associate Engineer and his/her decision shall be binding upon the Contractor. If the Associate/Engineer determines that dewatering is inadequate, the Contractor shall modify his/her methods until such time as the Associate Engineer then agrees with the adequacy of the operating condition.

3.5 BEDDING

A. Support pipe and conduit during placement and compaction of bedding fill.

3.6 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

C. Granular Fill: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.

D. Soil Fill: Place and compact material in layers not exceeding 8 inches compacted depth.

E. Employ a placement method that does not disturb or damage conduit in trench.

F. Maintain optimum moisture content of backfill materials to attain required compaction density.

G. Leave fill material stockpile areas completely free of excess fill materials.

3.7 TOLERANCES

A. Top Surface of Backfilling: Under Paved Areas: Plus or minus 1 inch from required elevations.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division I.

B. Tests and analysis of fill material will be performed in accordance with ANSI/ASTM D698 and with Division I .

C. Compaction testing will be performed in accordance with ASTM D2922 and ASTM D3017 and with Division I.

D. If tests indicate Work does not meet specified requirements, remove work, replace, and retest at no cost to Owner.

E. Frequency of Tests: Every two lifts.

F. Hydrostatic Test as per ODOT Item 638.09.

G. Disinfection of completed water works as per ODOT Item 638.10.

3.9 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Division I.

3.10 SCHEDULE

A. Waterlines:

1. Bedding Fill: Provide 4 inches thick structural backfill for bedding according to ODOT Item 611.
2. Backfill material as per ODOT Item 611 in 8 inch lifts, compacted to 95%.

END OF SECTION 31 2317

SECTION 31 2319 - DEWATERING

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes construction dewatering.

B. Related Sections:

1. Division 01 Section “Temporary Facilities and Controls”
2. Division 31 Section "Earth Moving".

1.3 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
2. Prevent surface water from entering excavations by grading and dikes.
3. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
4. Remove dewatering system when completed.

1.4 SUBMITTALS

A. Informational Submittals:

1. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements that might be affected by dewatering operations, and to document the location and quantity of sub surface water.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal requirements listed in Section 31 1000 – Site Clearing.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions (and then only after arranging to provide temporary utility):

1. Notify Owner no fewer than three days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Owner's written permission.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Provide temporary grading to facilitate dewatering and control of surface water.

C. Monitor dewatering systems continuously.

D. Promptly repair damages to adjacent facilities caused by dewatering.

E. Protect and maintain temporary erosion and sedimentation controls during dewatering operations.

3.2 INSTALLATION

A. Install dewatering system utilizing wells and well points complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Use filters to prevent pumping of fine sands or silts from the subsurface.

B. Before excavating below ground-water level, place system into operation to lower water level. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer needed.

C. Lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed.

F. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

END OF SECTION 31 2319

SECTION 31 2323 - FILL

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes:

1. Filling, backfilling, and compacting for building volume below grade.
2. Backfilling and compacting for utilities outside the building to utility main connections.
3. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 03 3000 - Cast-in-Place Concrete.
3. Section 31 2200 - Grading: Removal and handling of soil to be re-used.

1.2 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

1.3 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses

B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))

D. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3))

F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

G. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

H. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data for Manufactured Fill.

C. Compaction Density Test Reports.

1.5 QUALITY ASSURANCE

A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

1.7 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. General Fill - Fill Type ODOT ITEM 703.16/A: Conforming to State of Ohio Highway Department standard.

B. Structural Fill - Fill Type ODOT ITEM 703.16/A: Conforming to State of Ohio Highway Department standard.

C. Concrete for Fill: Lean concrete.

2.2 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable, woven, ODOT Item 712.09, manufactured by Advance Drainage System, or ACF Environmental or Anita Plastic, Inc..

B. Vapor Retarder: 10 mil thick, polyethylene.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that survey bench marks and intended elevations for the Work are as indicated.

B. Identify required lines, levels, contours, and datum locations.

3.2 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.3 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

F. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

G. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

H. Correct areas that are over-excavated.

1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

I. Compaction Density Unless Otherwise Specified or Indicated:

1. Under paving, slabs-on-grade, and similar construction: 97 percent of maximum dry density.
2. At other locations: 95 percent of maximum dry density.
3. Reshape and re-compact fills subjected to vehicular traffic.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

END OF SECTION 31 2323

SECTION 31 2500 - EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

A. Temporary and permanent erosion and sediment control.

B. Comply with OEPA requirements and Stormwater Pollution Prevention Plan prepared for this project.

1.3 RELATED WORK

A. Section 31 1000 "Site Clearing"

B. Section 31 2000 "Earth Moving"

C. Section 31 2317 " Piped Utilities"

D. Section 32 9200 " Turfs and Grasses"

1.4 SUBMITTALS

A. Comply with requirements of Division 0 and 1. Submit material qualification tests and certificates of compliance as indicated.

B. All stormwater BMPs shall be inspected once every seven (7) days and within 24 hours of a 0.5 inch or greater rainfall. Inspection logs (included herein) shall be kept and shall be submitted to the Owner or Ohio EPA upon request.

PART 2 - PRODUCTS

2.1 Materials

A. Filter Barrier Geotextile: The geotextile shall be of either woven or nonwoven construction and consist of long chain polymeric filaments or fibers composed of polypropylene, polyethylene or polymide. The filament and fibers shall be oriented into a stable network whereby they retain their positions relative with each other. The geotextile

shall be ultraviolet stabilized and shall be inert to chemicals commonly found in soil. The geotextile shall meet or exceed physical properties of Supac 5NPUV or Supac G WMUV.

1. Grab Tensile Strength: 90 lb. minimum as measured per test method ASTM D 1682.
2. Mullen Burst Strength: 190 psi minimum as measured per test method ASTM D 3786.
3. Slurry Flow Rate: 0.3 gal./min./ft2 maximum.
4. Equivalent Opening Size: 40-80 as measured per test method US Std. Sieve CW-02215.
5. Ultraviolet Radiation Stability: 70% minimum as measured per test method ASTM D 4355.

B. Filter Barrier Stakes: 2" x 2" x 3'-0" wooden stakes.

C. Rock Channel Protection: Quarried stone meeting the requirements of ODOT Item 601.09 Rock Channel Protection, Type A, B, C, or D with filter.

D. Seed and Soil Supplements for Temporary Seeding: Provide seed mixture with 20% by weight of perennial ryegrass, 30% red fescue and 50% Kentucky Blue Grass. Provide pulverized agricultural limestone and commercial fertilizer, 10-20-20 or approved substitute.

E. Mulch: Unrotted straw free from weeds and course material or other approved product suitable for required application.

F. Jute Matting: Cloth or Plain weave, undyed and unbleached single jute yarn, 47 to 49 inches wide, averaging 1.15 to 1.26 lbs., per lin. yard loosely twisted construction of not less than 1.6 turns per inch, 78 warp ends per width of cloth and 41 weft ends per lin. yard, meeting the requirements of CC Item 671.

G. Commercial Matting Products: Erosionet, Holdgro, Weedcheck, Curlex or approved equal. Product must cover minimum of 30% of soil surface and meeting the requirements of ODOT Item 671. Erosion control matting must be “Snake friendly”.

PART 3 - EXECUTION

3.1 GENERAL

A. Provide temporary and permanent erosion and sediment control items as required by governing agency, as required by permit, as indicated on the plans, as noted in this Specification, and as noted in the Stormwater Pollution Prevention Plan.

3.2 INSTALLATION

A. Install temporary erosion and sediment control items prior to clearing and commencing earthwork or as soon as practical as sitework progresses.

B. Install required permanent erosion and sediment control items as soon as no damage or deterioration will result to those items due to construction activities.

3.3 TEMPORARY ACCESS ROAD AND CONTRACTOR USE AREA

A. Locate access road where indicated or as approved by Owner and local authority having jurisdiction over public roads in vicinity of site. Locate use areas where indicated or as convenient.

3.4 FILTER FABRIC BARRIERS

A. Construct where indicated or otherwise required by grading operations to reduce sediment content or runoff.

B. The height of a filter barrier shall be a minimum of 15 inches and shall not exceed 18 inches.

C. Filter barrier geotextile shall be purchased in a continuous roll and cut to the length of the barrier to avoid the use of joints

D. The stakes shall be spaced a maximum of 3 feet apart at the barrier location and driven securely into the ground (minimum of 8 inches).

E. A trench shall be excavated approximately 4 inches wide and 4 inches deep along the line of stakes and upslope from the barrier.

F. The filter material shall be stapled to the wooden stakes, and 8 inches of the fabric shall be extended into the trench. Heavy duty wire staples at least 1/2 inch long shall be used. Filter materials shall not be stapled to existing trees.

G. The trench shall be backfilled and the soil compacted over the filter material.

H. If a filter is to be constructed across a ditch line or swale, the barrier shall be of sufficient length to eliminate end flow, and the plan configuration shall resemble an arc or horseshoe with the ends oriented upslope.

I. Filter barrier shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized

J. Filter barrier shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately.

K. Should the fabric on the filter barrier become ineffective prior to the end of its need, the fabric shall be replaced promptly.

L. Sediment deposits should be removed after each rainfall. They shall be removed when deposits reach approximately one-half the height of the barrier.

M. Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed to conform with the existing grade, prepared, and seeded.

3.5 TEMPORARY FILL DIVERSION

A. The diversion shall be constructed at the top of the fill at the end of each work day as needed.

B. The diversion shall be located at least 2 feet inside the top edge of the fill.

C. The supporting ridge of the lower side shall be constructed with a uniform height along its entire length.

D. Since the practice is temporary and under most situations will be covered the next work day, the maintenance required should be low. If the practice is to remain in use for more than one day, an inspection will be made at the end of each work day and repairs made to the measure if needed. The Contractor should avoid the placement of any material over the structure while it is in use. Construction traffic should not be permitted to cross the diversion

3.6 TEMPORARY DIVERSION DIKE

A. Whenever feasible, the dike should be built before construction begins on the project.

B. The dike should be adequately compacted to prevent failure.

C. Temporary or permanent seeding and mulch shall be applied to the dike within fifteen (15) days of construction.

D. The dike should be located to minimize damages by construction operations and traffic.

E. The measure shall be inspected after every storm and repairs made to the dike, flow channel, and outlet, as necessary. Approximately once every week, whether a storm has occurred or not, the measure shall be inspected and repairs made if needed. Damages caused by construction traffic or other activity must be repaired before the end of each working day.

3.7 SEEDING

A. Incorporate lime and 10-20-20 fertilizer into soil prior to seeding. Apply lime at 900 lbs./1000 S.Y. Apply fertilizer at 200 lbs./1000 S.Y. Apply seed at 25 lbs./1000 S.Y. Within 48 hours after any given area is seeded, straw or hay shall be evenly placed over all seeded areas at the rate of approximately 2 tons per acre for straw, or 3 tons per acre for hay, when seeding is performed between the dates of March 15 and October 15, and the approximate rate of 3 tons per acre straw, or 4 1/2 tons per acre for hay, when seeding is performed between the dates of October 15 and March 15 of the succeeding year. Provide matting where required to establish seed growth.

B. Areas which fail to establish vegetative cover adequate to prevent rill erosion will be re-seeded as soon as such areas are identified.

3.8 MAINTENANCE

A. Maintain all erosion and sediment control items until final project acceptance. Repair breaches and replace deteriorated or missing items immediately after discovery.

B. All stormwater BMPs shall be inspected once every seven (7) days and within 24 hours of a 0.5 inch or greater rainfall. Inspection logs (included herein) shall be kept and shall be submitted to the Owner or Ohio EPA upon request.

C. Clean sedimentation basins and catch basins as required to maintain effectiveness or as otherwise directed.

D. Removal: Remove temporary erosion control items as directed and prior to Project close-out.

END OF SECTION 31 2500

SECTION 32 1123 - AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes:

1. Aggregate base course- ODOT Item 304.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 31 2323 - Fill: Compacted fill under base course.
3. Section 32 1313 - Concrete Paving: Finish concrete surface course.

1.2 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses

B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))

D. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3))

F. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

G. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

H. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

I. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.4 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When aggregate materials need to be stored on site, locate where directed by Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate Base _item 304, conforming to State of Ohio Highway Department standard.

2.2 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.

B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.2 INSTALLATION

A. Under Portland Cement Concrete Paving:

1. Place coarse aggregate in layers not exceeding 4 inches compacted layers to achieve the specified total thickness.
2. Compact to 95 percent of maximum dry density.

B. Place aggregate in maximum 4 inch layers and roller compact to specified density.

C. Level and contour surfaces to elevations and gradients indicated.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.3 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

3.4 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556/D1556M, ASTM D2167, or ASTM D6938.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.5 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION 32 1123

SECTION 32 1313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Work of this section includes:

1. Concrete sidewalks.

B. Related Requirements

1. Drawings and provisions of the Contract, Including General and Supplementary Conditions and Division 1 specification sections apply to this Section.
2. Section 03 1000 - Concrete Forming and Accessories.
3. Section 03 2000 - Concrete Reinforcing.
4. Section 03 3000 - Cast-in-Place Concrete.
5. Section 07 9200 - Joint Sealants: Sealing joints.
6. Section 32 1123 - Aggregate Base Courses: ODOT ITEM 304 base course.

1.2 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete

B. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete

C. ACI 305R - Hot Weather Concreting

D. ACI 306R - Cold Weather Concreting

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

G. ASTM C33/C33M - Standard Specification for Concrete Aggregates

H. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

I. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete

J. ASTM C150/C150M - Standard Specification for Portland Cement

K. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

L. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete

M. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

N. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete

O. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

P. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing

Q. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

R. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on joint filler, admixtures, and curing compound.

PART 2 - PRODUCTS

2.1 2.01 FORM MATERIALS

A. Form Materials: As specified in Section 03 3000

B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).

1. Thickness: 1/2 inch.

2.2 2.02 REINFORCEMENT

A. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.

2.3 2.03 CONCRETE MATERIALS

A. Obtain cementitious materials from same source throughout.

B. Concrete Materials: As specified in Section 03 3000

C. Fiber Reinforcement: Synthetic fibers shown to have long-term resistance to deterioration when in contact with alkalis and moisture; 1/2 inch length.

2.4 ACCESSORIES

A. Curing Compound: ASTM C309, Type 1, Class A.

B. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

2.5 CONCRETE MIX DESIGN

A. Fiber Reinforcement: Add to mix at rate of 3.0 pounds per cubic yard, or as recommended by manufacturer for specific project conditions.

B. Concrete Properties:

1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; 4000 psi.
2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
3. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
4. Water-Cement Ratio: Maximum 40 percent by weight.
5. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
6. Maximum Slump: 3 inches.
7. Maximum Aggregate Size: 3/4 inch.

2.6 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 - EXECUTION

3.1 SUBBASE

A. See Section 32 1123 for construction of base course for work of this Section.

3.2 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

3.3 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.4 REINFORCEMENT

A. Place reinforcement as indicated.

B. Interrupt reinforcement at contraction joints.

C. Place dowels to achieve pavement and curb alignment as detailed.

3.5 COLD AND HOT WEATHER CONCRETING

A. Follow recommendations of ACI 305R when concreting during hot weather.

B. Follow recommendations of ACI 306R when concreting during cold weather.

C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.6 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.

C. Apply surface retarder to all exposed surfaces in accordance with manufacturer's instructions.

3.7 JOINTS

A. Place 3/8 inch wide expansion joints at 20 foot intervals and to separate paving from vertical surfaces and other components and in pattern indicated.

1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.

B. Provide scored joints.

1. As detailed on drawings

3.8 FINISHING

A. Sidewalk Paving: Light broom, texture perpendicular to direction of travel.

B. Tooling: Use 1/4-inch radius edging tool to edge all outside edges and joints.

C. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.9 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

B. Maximum Variation From True Position: 1/4 inch.

3.10 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

1. Provide free access to concrete operations at project site and cooperate with appointed firm.

3.11 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

END OF SECTION 32 1313

SECTION 32 1373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.

B. Related Sections:

1. Division 32 Section "Concrete Paving".

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Verification: For each kind 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.

C. Pavement-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 color.

D. Product Certificates: For each type of joint sealant and accessory, from manufacturer.

1.4 PROJECT 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.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.

1. Products:
   a. Crafco Inc., an ERGON company; RoadSaver Silicone.
   b. Dow Corning Corporation; 888.
   c. Pecora Corporation; 301 NS.

2.2 JOINT-SEALANT BACKER MATERIALS

A. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, to control sealant depth and prevent bottom-side adhesion of sealant.

B. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2, to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints to receive joint sealants, with Installer present, for compliance with requirements for joint configuration and installation tolerances.

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.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193.

C. Install joint-sealant backings to support joint sealants during application and at position to produce cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.

3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants that comply with the following and at the same time backings are installed:

1. Place joint 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.

E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.
2. Use approved tooling agents that do not discolor sealants or adjacent surfaces.

3.4 CLEANING

A. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses.

3.5 PROTECTION

A. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

END OF SECTION 32 1373

SECTION 32 9113 - SOIL PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes planting soils specified by composition of the mixes.

B. Related Requirements:

1. Section 31 1000 "Site Clearing" for topsoil stripping and stockpiling.

1.2 DEFINITIONS

A. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.

B. Imported Soil: Soil that is transported to Project site for use.

C. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

F. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

G. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

H. USCC: U.S. Composting Council.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals: Use compost and / or composted manure from Ohio base and USCC certified source.

C. Samples: For each bulk-supplied material in sealed containers labeled with content, source, and date obtained; providing an accurate representation of composition, color, and texture.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. A. Utilize local Ohio manufacturers and sources of materials.

2.2 PLANTING SOILS SPECIFIED BY COMPOSITION

2.3 This article is organized around two types of soil sources used to produce planting soils: existing, on-site soil and imported soil. Manufactured planting soil produced off-site or on-site by an intensive blending process is also included as a type of planting-soil mix.

A. Planting-Soil Type 1: Imported, naturally formed soil from off-site sources and consisting of loam and silt loam soil friable according to USDA textures; and modified to produce viable planting soil.

1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.
2. Additional Properties of Imported Soil before Amending: Soil reaction of pH 6 to 7 and minimum of 6 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration
3. Unacceptable Properties: Clean soil of the following:
   a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine,

tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 5 percent by dry weight of the imported soil.

c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.

4. Amended Soil Composition: Blend imported, unamended soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

a. Ratio of Loose Compost to Soil: 1:4 by volume.

b. Ratio of Loose Sphagnum Peat to Soil: 10 percent by volume.

c. Weight of Commercial Fertilizer: 2 lbs. per 1000 sq. ft. per 6 inches of soil depth.

d. Weight of Slow-Release Fertilizer: 1 lbs. per 1000 sq. ft. per 6 inches of soil depth.

2.4 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:

1. Feedstock: May include composted animal waste.
2. Reaction: pH of 6 to 8.
3. Soluble-Salt Concentration: Less than 4 dS/m.
4. Moisture Content: 35 to 55 percent by weight.
5. Organic-Matter Content: 30 to 40 percent of dry weight.
6. Particle Size: Minimum of 98 percent passing through a 1-inch sieve.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 3.4 to 4.8, and a soluble-salt content measured by electrical conductivity of maximum 5 dS/m.

C. C. Wood Derivatives: Shredded and composted, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

D. D. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.5 FERTILIZERS

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 33 percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches and stockpile until amended.

B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

C. Unsuitable Materials: Clean soil to contain a maximum of [**8**] percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

D. Screening: Pass unamended soil through a 2-inch sieve to remove large materials.

3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 4 inches . Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C. Mixing: Spread unamended soil to total depth indicated on Drawings , but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.
   a. Mix other contractor recommended amendments with dry soil before mixing fertilizer.
   b. Mix fertilizer with planting soil no more than seven days before planting.
2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

D. Compaction: Compact each blended lift of planting soil to 75 percent of maximum Standard Proctor density according to ASTM D 698 and tested in-place except where a different compaction value is indicated on Drawings.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 PLACING MANUFACTURED PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply manufactured soil on-site in its final, blended condition. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 4 inches . Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C. Application: Spread planting soil to total depth of 4 inches , but not less than required to meet finish grades after natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Lifts: Apply planting soil in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

D. Compaction: Compact each lift of planting soil to 75 percent of maximum Standard Proctor density according to ASTM D 698 except where a different compaction value is indicated on Drawings.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 BLENDING PLANTING SOIL IN PLACE

A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Preparation: Till unamended, existing soil in planting areas to a minimum depth of 4 inches . Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C. Mixing: Apply soil amendments , except compost, and fertilizer, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.

1. Mix contractor recommended amendments with dry soil before mixing fertilizer.
2. Mix fertilizer with planting soil no more than seven days before planting.

D. Compaction: Compact blended planting soil to 75 percent of maximum Standard Proctor density according to ASTM D 698 except where a different compaction value is indicated on Drawings.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.6 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

A. Application: Apply [**compost component of planting-soil mix**] [**4 inches of compost**] [**6 inches of compost**] <**Insert depth>** to surface of in-place planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Finish Grading: Grade surface to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests:

1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D 698. Space tests at no less than one for each 1000 sq. ft. **of in-place soil or part thereof. See Section 01 4000 "QualityRequirements" for retesting and re-inspecting requirements andSection 01 7300 "Execution" for requi**rements for correcting theWork.

C. Soil will be considered defective if it does not pass tests.

D. Prepare test reports.

E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.8 PROTECTION AND CLEANING

A. Protection Zone: Identify protection zones according to Section 01 5639 "Temporary Tree and Plant Protection."

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

C. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION 32 9113

SECTION 32 9200 - TURF AND GRASSES

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Seeding.

B. Related Sections:

1. Division 31 Section “Site Clearing” for topsoil stripping and stockpiling.
2. Division 31 Section “Earth Moving” for excavation, filling, backfilling, and rough grading.
3. Division 32 Section “Plants” for plant materials.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Whatever soil is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product.

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.
2. Topsoil mix.
3. Grass seed mix.

B. Qualification Data: For qualified landscape Installer.

C. Product Certificates: For soil amendments and fertilizers, from manufacturer.

D. Material Test Reports: For standardized ASTM D 5268 topsoil and imported or manufactured topsoil.

E. Maintenance Instructions: Recommended procedures from manufacturer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment as follows:

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
   a. Certified Landscape Technician - Exterior, with installation specialty area(s), designated CLT-Exterior.
   b. Certified Turfgrass Professional, designated CTP.
5. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
6. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for turf growth.
   a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce planting soil suitable for healthy, viable plants.
   b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws.

1.7 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. See Maintenance Requirements in Section 3.4. Begin maintenance immediately after each area is planted and continue until turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of Substantial Completion.
   a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

PART 2 - PRODUCTS & MATERIALS

2.1 TOPSOIL

A. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for plant growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil. Topsoil test results shall show recommendation for soil additives or fertilizers to correct nutrient deficiencies.

2.2 GRASS SEED

A. Grass seed shall be 85% tall fescue, 10% Kentucky Bluegrass, 5% Accent Perennial Ryegrass per ODOT Item 659.

2.3 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: O, with a minimum of 95 percent passing through No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through No. 60 (0.25-mm) sieve.
2. Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) sieve.

C. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 (0.30-mm) sieve.

D. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

2.4 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing 1/2-inch (12.5-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.

2.5 FERTILIZERS

A. Granular, non-burning produce composed of not less than 50% organic slow acting, guaranteed analysis professional fertilizer conforming to the following:

1. Type A: Starter Fertilizer containing 20% nitrogen, 26% phosphoric acid, and 6% potash by weight.
2. Type B: Secondary fertilizer containing 31% nitrogen, 3% phosphoric acid, and 10% potash by weight.

2.6 PLANTING SOILS

A. Native Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

1. Supplement with imported topsoil when quantities are insufficient.

B. Imported Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes.

1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch (25 mm) or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes, grubs, other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled, pore-space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.

PART 3 - EXECUTION

3.1 PREPARATION OF SEED BED

A. De-compaction: De-compact areas heavily trafficked by construction activities prior to rough grading.

B. Rough Grading: Grade surfaces to assure drainage away from structures and to prevent ponding and pockets of surface drainage. Provide subgrade free from irregular surface changes and as follows:

1. Rough grade shall equal plus/ minus 0.20 ft., sub grade tolerance shall be free of exposed boulders or stones exceeding 1” in greatest dimension.
2. Fill in all areas of settlement to proper grade before subsequent placement of topsoil.

C. Topsoil Depths:

1. Lawn: Areas to receive seed must have minimum six (6) inches average depth of topsoil placed.
2. Planted Beds: Areas identified as planting beds shall have minimum twelve (12) inches average depth of topsoil placed.

D. Fine Grading: Grade area to a smooth, free draining even surface with a loose, moderately course texture. Roll, scarify, rake and level to obtain a true, even lawn surface and fill depressions to drain. Seed bed to be approximately ½” – 1” below all sidewalks and curbs. Do not move heavy objects except lawn making equipment over the lawn areas after the soil is prepared unless it is loosened and re-graded. Restore prepared areas to specified condition if eroded, settled, or otherwise disturbed after fine grading.

E. Fertilizing: Apply Type A / starter fertilizer to turf areas at a rate equal to 1.0 lb. of actual nitrogen per 1,000 s.f..

1. Apply fertilizers by mechanical drop or rotary distributor, thoroughly and evenly incorporated with soil to a depth of 3” by dicing. Fertilize areas inaccessible to power equipment with hand tools and incorporate into soil.

3.2 INSTALLATION OF GRASS SEED

A. Grass seed shall only be sown at the following times;

1. Spring Seed Planting: April 1 to June 1
2. Fall Seed Planting: August 15 to October 1

B. Perform seeding work only after planting and other work affecting the ground surface have been completed. Limit preparation of seed areas to those ready for immediate seeding.

C. Seed immediately after preparation of bed.

D. Perform seeding operations when soil is dry and when winds do not exceed five miles per hour velocity.

E. Seed to be applied at manufacture rates in cross directions with seed drilling or slice seeding equipment. Apply 50% of the seed in each direction. Seed application by hydro-seeding methods are not acceptable.

F. Apply hydro-mulch with immediately after seeding. Slurry to be composed of clean water and mulch. Apply mulch slurry at minimum rate of 1,500 pounds to 2,000 pounds per acre on slopes steeper than 4:1. Direct slurry to evenly cover designated seed areas. Repair ruts, depressions and all damage caused by hydro-mulching equipment.

G. Immediately reseed and reapply hydro-mulch to areas that show poor germination.

3.3 MAINTENANCE

A. Complete the following at a minimum:

1. Maintain new installed seeded lawn areas by watering, spot weeding, mowing, trimming, removing clippings and leaves, applying herbicides, fun-gicides, insecticides, and re-seeding until a full, uniform stand of grass free of weed, undesirable grass species, disease, and insects is achieved.
2. Water daily to maintain adequate surface soil moisture for seed germination. Thereafter apply one-half (1/2) inch water every two or three days until accepted.
3. Repair, re-work, and re-seed all respective areas that have washed out, are eroded, or did not catch.
4. Set mower blades at a minimum height of two and one-half (2-1/2) inches. Not more than thirty (30) percent of the grass leaf/blade shall be removed at the initial or subsequent mowing. Mow all lawns before turf reaches a height of four (4) inches.
5. If infestation of weeds or crabgrass develops, treat infestation by hand weeding or herbicidal control. Furnish and install weed chemical control per manufacturer recommendations.
6. Apply Type B fertilizer to lawns approximately thirty (30) days after installation at a rate equal to 1.0 lb. of actual nitrogen per 1,000 sq. ft. Apply with mechanical drop or rotary type distributor. Water the fertilizer thoroughly into the soil.

B. Provide erosion control measures to adequately slow water and impede soil loss.

3.4 ACCEPTANCE

A. Inspection to determine acceptance of installed lawns will be made by the Architect, upon Contractor's request. Provide notification at least three (3) working days before requested inspection date.

B. New lawn areas will be acceptable provided all requirements, including maintenance, have been complied with, and a healthy uniform, close stand of grass is established free of weeds, undesirable grass species, disease and insects.

C. No individual lawn areas shall have bare spots or unacceptable cover totaling more than two (2) percent of the individual areas, in those areas requested for inspection.

D. Upon acceptance, the Owner will assume lawn maintenance.

END OF SECTION 32 9200

SECTION 32 9300 - PLANTS

PART 1 - PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Plants.
2. Planting soils.
3. Landscape edgings.

B. Related Sections:

1. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
2. Division 31 Section "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
3. Division 32 Section "Turf and Grasses" for turf (lawn) and erosion-control materials.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball per ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1.

D. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1.

E. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

F. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1.

G. Finish Grade: Elevation of finished surface of planting soil.

H. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

I. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

J. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

K. Planting Area: Areas to be planted.

L. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

M. Plant; Plants; Plant Material: These terms refer to vegetation, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

N. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

O. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

P. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

Q. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

R. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site.

1.4 SUBMITTALS

A. Product Data: For each type of product, including soils.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.

B. Samples for Verification: For each of the following:

1. Organic Mulch: 1-quart (1-liter) volume of each organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.

E. Material Test Reports: For existing native surface topsoil and imported or manufactured topsoil.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of maintenance periods.

G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants as follows:

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's personnel assigned to the Work shall have certification in the following category from the Professional Landcare Network:
   a. Certified Landscape Technician - Exterior, with installation specialty area(s), designated CLT-Exterior.
5. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for plant growth.
   a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce planting soil suitable for healthy, viable plants.
   b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Provide quality, size, genus, species, and variety of plants, complying with requirements in ANSI Z60.1.

E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain specified sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

F. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Architect of sources of planting materials 14 days in advance of delivery to site.

G. Preinstallation Conference: Conduct conference at jobsite trailer at least one month prior to installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. All plant material shall be covered during transport.

B. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water to maintain root systems in a moist, but not overly-wet condition.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

D. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.8 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Inspection of the planting will be made by the Architect. No bare root plants are acceptable.
2. Failures include, but are not limited to, the following:
   a. Death and unsatisfactory growth.
   b. Structural failures including plantings falling or blowing over.
3. Warranty Periods from Date of Inspection:
   a. Trees, Shrubs, Vines, and Ornamental Grasses: 24 months.
   b. Ground Covers, Biennials, Perennials, and Other Plants: 24 months.
4. Include the following remedial actions:
   a. Immediately remove dead plants and replace unless re-planting will occur in the succeeding planting season.
   b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
   c. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. See Maintenance Requirements in Section 3.11. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than date of substantial completion.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. See Maintenance Requirements in Section 3.11. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than date of substantial completion.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, and shearing; and complying with ANSI Z60.1; and with healthy root systems

developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees and shrubs with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots will be rejected.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar.

E. Select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: O, with a minimum of 95 percent passing through No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through No. 60 (0.25-mm) sieve.
2. Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) sieve.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.

2.4 FERTILIZERS

A. Granular, non-burning produce composed of not less than 50% organic slow acting, guaranteed analysis professional fertilizer conforming to the following:

1. Type A: Starter Fertilizer containing 20% nitrogen, 26% phosphoric acid, and 6% potash by weight.
2. Type B: Secondary fertilizer containing 31% nitrogen, 3% phosphoric acid, and 10% potash by weight.

2.5 PLANTING SOILS

A. Native Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

1. Supplement with imported planting soil when quantities are insufficient.
2. Mix existing, native surface topsoil with soil amendments and fertilizers as recommended by soils.

B. Imported Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs, or marshes.

1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch (25 mm) or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.

2.6 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of the following:

1. Type: Shredded hardwood bark.
2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.
3. Color: Natural.

2.7 PESTICIDES

A. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

B. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.8 MISCELLANEOUS PRODUCTS

A. Burlap: Non-synthetic, biodegradable.

B. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance as follows:

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas prior to placement.

D. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 12 inches (300 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
   a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
   b. Mix lime with dry soil before mixing fertilizer.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Application of Mycorrhizal Fungi: Broadcast dry product uniformly over prepared soil at rate and time recommended by manufacturer.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate pits and trenches. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Maintain supervision of excavations during working hours.
2. Keep excavations covered or otherwise protected when unattended by Installer's personnel.

B. Subsoil and topsoil removed from excavations may be used as planting soil subject to testing.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the

top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with portion of ball 2-4” above adjacent finish grades.

1. Use planting soil for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Set container-grown stock plumb and in center of planting pit or trench.

1. Use planting soil for backfill.
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Set fabric bag-grown stock plumb and in center of planting pit or trench.

1. Use planting soil for backfill.
2. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

F. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

G. Trees and shrubs shall be oriented the same way as they were in the nursery.

3.6 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Do not apply pruning paint to wounds.

3.7 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.8 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas as follows:

1. Trees and Tree-like Shrubs in Turf Areas: Apply organic mulch ring of 3-inch (75-mm) average thickness, with 36-inch (900-mm) radius around trunks or stems. Do not place mulch within 3 inches (75 mm) of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 3-inch (75-mm) average thickness of organic mulch extending 12 inches (300 mm) over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches (75 mm) of trunks or stems.

3.9 EDGING INSTALLATION

A. Shovel-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, 4- to 6-inch- (100- to 150-mm-) deep, shovel-cut edge.

3.10 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, resetting to proper grades or vertical position, and performing

other operations to establish healthy, viable plantings. Spray or treat to keep trees and shrubs free of insects and disease.

B. Fill in soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.11 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.12 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 32 9300

SECTION 33 1300 - DISINFECTION OF WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Disinfection of site domestic water lines.

B. Testing and reporting results..

1.2 REFERENCE STANDARDS

A. AWWA B300 - Hypochlorites; American Water Works Association; 2011 (ANSI/AWWA B300).

B. AWWA B301 - Liquid Chlorine; American Water Works Association; 2010 (ANSI/AWWA B301).

C. AWWA B302 - Ammonium Sulfate; American Water Works Association; 2010 (ANSI/AWWA B302).

D. AWWA B303 - Sodium Chlorite; American Water Works Association; 2010.

E. AWWA C651 - Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651).

1.3 SUBMITTALS

A. Test Reports: Indicate results comparative to specified requirements.

B. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.

C. Disinfection report:

1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and time of completion.
3. Test locations.
4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
5. Date and time of flushing start and completion.
6. Disinfectant residual after flushing in ppm for each outlet tested.

D. Bacteriological report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.

2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Certification that water conforms, or fails to conform, to bacterial standards of local water department.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with AWWA C651.

B. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years documented experience.

C. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of Ohio.

1.5 REGULATORY REQUIREMENTS

A. . Provide certificate of compliance from authority having jurisdiction indicating approval of water system.

PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Liquid Chlorine, AWWA B302, Ammonium Sulfate, and AWWA B303, Sodium Chlorite.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that piping system has been cleaned, inspected, and pressure tested.

B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems...

3.2 DISINFECTION

A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.

B. Provide and attach equipment required to perform the work.

C. Flush piping system with clean potable water until dirty water does not appear at point of outlet.

D. Introduce treatment into piping system.

E. Maintain disinfectant in system for 24 hours.

F. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.

G. Replace permanent system devices removed for disinfection.

3.3 FIELD QUALITY CONTROL

A. . Test samples in accordance with AWWA C651

END OF SECTION 33 1300

SECTION 33 1443 - PACKAGE PUMPING SYSTEM FOR WASTEWATER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Divisions 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. The Contractor shall furnish and install a complete factory-built and tested Duplex Chopper Pump Station for sanitary wastewater, consisting of a basin package, NEMA 4X control panel enclosure and electrical quick disconnect, pump(s), pump removal system, discharge assembly with shut-off valve, check valve, alarm device, level control system, and all necessary internal wiring and controls to form a complete packaged system.

B. All equipment in the wet well shall be capable of constant submergence in sewage to a minimum depth of ten feet without electrical power being energized.

C. Contractor shall provide and install one (1) pump station.

D. For ease of serviceability, all pumps and motors shall be of like type and horsepower throughout the system.

E. The Contractor shall provide all labor, materials, tools and equipment required to furnish and install the pump station complete as shown on the Contract Drawings and as specified herein.

F. The contract drawings and specifications were prepared based on the named manufacturer in this item and the Contractor shall include in his base bid proposal, equipment by the specified manufacturer at the not to exceed pricing noted above.

G. The contractor shall furnish one (1) spare pump unit, fully assembled and ready for use of the same type and model supplied with the Duplex Chopper Pump Station. The Contractor shall coordinate with the Owner for delivery of the spare pump unit.

1.3 QUALITY ASSURANCE

A. All pump manufacturers must have been in the business of manufacturing complete pump stations for a minimum of five (5) years successful field operation of actual proposed equipment and minimum of 10 installations at equivalent application.

B. The pump manufacturer shall be the entity which designs, machines, assembles, hydraulically tests and warranties the final product. Any entity that does not meet this

definition will not be considered an acceptable supplier. For quality control reasons and future pump and parts availability, all major castings of the pump shall be sourced and machined in North America.

C. Manufacturer Representatives, Distributors, or Packagers will not be considered to be manufacturers. The term “pump manufacturer” or “pump station manufacturer” shall be defined as the entity which designs, machines, assembles, hydraulically tests and warranties the final product. Any entity that does not meet this definition will not be considered a “pump manufacturer” or “pump station manufacturer” and is not an acceptable supplier.

D. For quality control reasons and future pump and parts availability, all major castings of the pump shall be sourced and machined in North America.

E. Supplier shall provide a list of names and dates of similar installations for verification by the engineer or Owner’s Representative.

F. Manufacturer must demonstrate to the satisfaction of engineer that the proposed pump equipment will meet system flows and heads required. In addition, pre-submittal must also demonstrate to the satisfaction of the engineer that the equipment being proposed meets or exceeds all performance and safety requirements, materials of construction, and user benefits of the specified equipment. Only pre-approved pump station manufacturers will be considered. All bids utilizing manufacturers not pre-approved will be considered non-responsive.

G. Certified Pump Test

1. Each pump shall be shop tested for capacity, head, speed, power and efficiency in accordance with Standards of the Hydraulic Institute.
2. Certified copies of each test curve shall be furnished to the Engineer for approval.
3. Test shall consist of checking each pump at its rated speed, head, capacity, efficiency, and brake horsepower.
4. The pumps shall not leave the manufacturer’s plant until receipt of the Engineer’s approval.

H. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

I. If Contractor chooses to submit a bid that does not meet all the requirements of this specification, the bid shall include a written description of the deviation with data that shows the magnitude of and justification for the deviation from this specification. The decision to accept material deviating from this specification shall be the responsibility of the specifying engineer.

1.4 SUBMITTALS

A. The Contractor shall submit manufacturer’s technical data and application instruction in accordance with the General and Supplementary Conditions and Division 1 Specifications, and any additional information listed herein.

B. Product Data: Submit the manufacturer's technical data and installation instructions including certified pump curves with efficiency, capacity, head, speed, brake horsepower required and operating point required for each pump. Submit all wiring diagrams.

C. Manufacturer's Data:

1. The Contractor shall submit, as a minimum, the following information:
   a. Motor data, including starting kVA, starting torque, full load current, full load torque efficiency curves, and power factor curves (typical motor test data from equivalent motors are acceptable).
   b. Materials of construction for all components.
   c. Details of the new pump installation.
2. Manufacturer's Certificates, including certified test curves with the design points clearly marked (computer model printouts are not acceptable). Performance curves shall be submitted for each pump to be supplied to both the Engineer and Owner.
3. The pump manufacturer must be certified to ISO 9001 by an accredited agency, with scope of registration including design control and service after sales activities.

D. Warranty: The Equipment Manufacturer shall submit a warranty certificate for review for all pump equipment. The date of the warranty begins after Owner's acceptance.

E. After receipt of notice to proceed, the contractor shall furnish the engineer the shop drawings detailing the equipment to be furnished for the Duplex Chopper Pump Station, including dimensional data and materials of construction.

F. Prior to completion of equipment delivery, the contractor shall supply one (1) electronic digital copy in PDF format and three (3) paper copies of Operation and Maintenance instructions.

1.5 WARRANTY

A. The manufacturer shall provide a warranty on any defective part(s) and labor to replace defective parts for a period of twenty-four (24) months after notice of Owner's acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable pump station manufacturer(s) are:

1. Excel Fluid Group, LLC, Derek Wootten, derek.wootten@excelfluidgroup.comderek.wootten@excelfluidgroup.com
2. Pump Stations LLC, Brandon Lantz blantz@pumpsystemsllc.comblantz@pumpsystemsllc.com
3. Buckeye Pumps, Inc, Josh Mullins, josh.mullins@otpnet.com
4. Or Engineer pre-approved equal.

2.2 STATION CONFIGURATION

A. Pump Station Configurations

1. Duplex Station Configuration: Basins shall be supplied in a wet well configuration, a minimum of 5.0 feet in diameter with a separate, attached valve vault.

B. Factory Wiring

1. All wiring in the pump station shall be installed and functionally tested prior to shipment from the factory. As a minimum requirement, all wire connections inside the basin wet well must be completed during factory assembly and 100% functionally tested prior to shipment. All electrical wires penetrating or passing through the silhouette of the pump station must be guaranteed to be water tight by the manufacturer and must be installed at the factory prior to shipment. Direct burial electrical cable must be factory installed in the station and arrive at the job site with a minimum length of thirty (30) feet external to the station ready to unroll and connect to power source and control panel. Consult factory for other available lengths. Factory wiring and testing shall be a specific part of the UL listing.

2.3 PUMP STATION AND ACCESS

A. Wet Well and Valve Vault Design

1. The basin shall be fiberglass (FRP) reinforced polyester resin with a 3" ballast support flange. The basin shall be furnished with one (1) flexible inlet flange (shipped loose to facilitate field location). The inlet flange shall accept a 6" PVC pipe. Inlet location can vary to accommodate ease of installation. Basin capacities and dimensions shall be as shown on the contract drawings or as specified herein.
2. The basin FRP wall laminate thickness shall vary with the wet well depth to provide the aggregate strength to meet the tensile and flexural physical property requirements. The basin FRP wall laminate must be designed to withstand wall collapse or buckling based on a hydrostatic pressure of 62.4 pounds per square foot, a saturated soil weight of 120 pounds per cubic foot, a soil modulus of 700 pounds per square foot.
3. Basin must comply with the pipe stiffness values as specified in ASTM D 3753. The basin laminate must be constructed to withstand or exceed 150% of the assumed loading on any depth. The finished FRP laminate shall have a Barcol hardness of at least 90% of the resin manufactures specified hardness for the fully cured resin. The Barcol Hardness shall be the same for both interior and exterior surfaces.
4. Manufacture must submit documentation including calculation and production certification that basin(s) on the project are in compliance with the above requirements.
5. All piping inside the basin silhouette shall be at a level in the station that is lower than the frost depth or depth of bury specified for the low pressure sewer piping, whichever is lowest
6. Piping material is indicated on the project drawings.

7. The basin package shall be furnished with junction box. In case of groundwater flooding around station location, the junction box shall be protected from such flooding.
8. Each cover shall be a lockable aluminum hatch capable of supporting normal foot traffic.
9. The level switch junction box shall be a NEMA 4X-rated box and mounted just beneath the wet well access opening.
10. The manufacturer shall guarantee all bulkhead penetrations are watertight.

B. Pump Removal System

1. The basin shall be equipped with 300 series stainless steel rail assemblies, one for each pump to facilitate removal of the pumps from ground level. A stainless-steel lifting chain shall be supplied for pump removal. Removal system must not require the loosening of fasteners to facilitate pump removal and shall provide for automatic alignment and re-connection of discharge piping for the replacement pump and level control. Pump and level control replacement shall be accomplished while the basin is full of sewage without the need to de-water the basin.

C. Check Valve

1. The pump discharge piping shall be equipped with factory installed gravity operated check valve built into the discharge piping.
2. Ball-type check valves are unacceptable due to their limited sealing capacity in slurry applications.

D. Shut-Off Valve

1. The pump discharge piping shall be equipped with a factory installed shut off valve. All valves shall be operable from ground level. Shut off valve must be replaceable without excavating basin exterior.

2.4 PUMPS

A. Pumps

1. The submersible chopper pump shall be capable of reducing all components in normal domestic sewage, including “foreign objects,” such as sanitary napkins, wood, plastic, glass, wipes, rubber and disposable diapers to finely-divided particles which will pass freely through the passages of the pump and the discharge piping. The temperature limitation of the liquid being pumped is 160 °F (71°C) intermittent and shall be capable of running dry for extended periods of time.
2. The pump shall be constructed of ASTM A48, Class 30 cast iron components.
3. Pumps shall have a seal leak detection sensor that signals an alarm in the control panel.
4. Submersible pumps shall be rated to operate in a Class 1, Division 1, Groups C and D hazardous location.

B. Performance and Design Conditions

1. In order to insure proper operation in all conditions, pump(s) must operate without overheating in continuous operation, maximum head condition required by the system. Pump(s) must also be capable of operating at zero or negative heads without damage to the pump(s).
2. Design Conditions:
   a. 29 GPM @ 38' TDH
   b. 480 V, 3 PH
3. The pump(s) shall be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valve be allowed to create a false apparent head.

C. Construction

1. The volute, seal plates and motor housing shall be constructed of high-quality ASTM A-48 class 30 cast iron. The pump(s) shall be painted with air dry enamel of 2 mil minimum thickness. All exposed hardware shall be 300 series stainless steel.
2. The pump impeller shall be of the recessed, vortex design.
3. The pump shall be a three-bearing design consisting of an upper ball bearing, an intermediate ball bearing restrained for the purpose of carrying the thrust loads, and an oil lubricated lower bronze sleeve bearing to carry radial loads and prevent shaft deflection imposed by the pump impeller and operation. The oil lubricated sleeve bearing shall be located between two mechanical seals. Lip type seals are not acceptable. Designs reducing the number of bearings or substituting sleeve bearings for ball bearings will not be considered equal. Bearings shall have a 50,000 hour B-10 life.

D. Mechanical Seal

1. The pump shall utilize a tandem mechanical shaft seal arrangement and shall operate in an oil atmosphere. Each seal shall be double floating, self-aligning rotary shaft seals to prevent leakage between the motor and pump. The materials of construction shall be silicon carbide. The seal shall be commercially available and not a proprietary design of the manufacturer.

2.5 ELECTRIC MOTOR

A. Design

1. Single phase motors shall be of the capacitor start, capacitor run, NEMA L design and three phase motors shall be of the dual-voltage 240/480, NEMA B design. The motor shall be designed to be non-overloading throughout the entire pump curve. The motor shall be constructed with the open windings operating in a sealed housing, which contains clean dielectric oil for heat dissipation from the windings and for lubrication of the bearings, making it capable of operating in a totally, partially, or non-submerged condition for extended periods of time without damage due to heat being generated. Oil used must be able to be disposed of as non-hazardous waste. Air-filled motors shall not be acceptable.
2. Protection against excessive temperatures shall be provided by heat sensor.

3. The pumps shall be equipped with a watertight strain relief cord grip with a grommet that protects the outer cord jacket. An epoxy-filled cord jacket will provide anti-wicking moisture protection.

2.6 CONTROLS

A. Level Detection

1. Duplex Pump Stations: The level detection system shall consist of four (4) float switches, each with integral 30’ cords and independent circuits, one for each function: LOW OFF, LEAD PUMP ON, LAG PUMP ON, HIGH LEVEL ALARM.

B. All float bracket(s) and fasteners throughout the assembly shall be 300 Series stainless steel.

2.7 CONTROL PANEL

A. The Contractor shall furnish all labor, equipment and materials to install pump control center as shown on the Drawings in a NEMA 4X enclosure, for operation on a 240 volt, single phase, 60 Hertz service complete transient voltage suppressor, control transformers with dedicated circuit breakers /fuses, and an automatic electrical alternator providing alternating operation of pumps under normal conditions or, in case of high level, allowing two pumps to operate simultaneously. For each pump motor, there shall be included: a H-O-A switch, circuit breaker, phase converter VFD unit to produce 480 volt three phase power to the pumps, motor temperature and leak sensor monitoring relays, three current transformers, selectable amperage display allowing for motor current monitoring and a 120 volt GFI duplex receptacle on a 20 amp dedicated circuit.

B. If a motor is disabled (e.g. overload, overtempt, or in off position) it shall shut down and lock out. If the faulted motor is lead, an induced alternation shall occur. If the faulted motor is lag, the next motor shall automatically substitute.

C. Overload units shall be precalibrated to match motor and control characteristics and factory sealed to ensure trip setting is tamper-proof. The panel shall be provided with hand/off/automatic pump operation selector switches, all necessary control relays and auxiliary isolated contacts, including for interface with telemetry system; pump running pilot lights on operator's control plate; running time meters mounted on operator's control plate, a strip heater to provide condensation protection, lightning arrestor, and high level alarm with weatherproof alarm light with guard and on/off/test selector switch. A delayed start feature shall be incorporated into the control panel, preventing, in the event of power failure, simultaneous starting of both pumps.

D. Intrinsically safe terminals and relays shall be provided for connection of the liquid level sensing float switches for pump station operation in automatic mode.

E. Solid-state reduced-voltage starters shall be provided inside the control panel for each pump motor. The solid-state reduced-voltage starter shall consist of an SCR-based power section, logic board and paralleling bypass contactor. The paralleling bypass contactor shall be energized when the motor reaches full speed.

F. See electrical drawings for additional requirements.

2.8 OSHA CONFINED SPACE

A. All maintenance tasks for the pump station must be possible without entry into the pump station as per OSHA 1910.146, permit-required confined spaces): “Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant’s body breaks the plane of an opening into the space.”

2.9 CORROSION PROTECTION

A. All materials exposed to wastewater shall have inherent corrosion protection: i.e., painted cast iron, fiberglass, stainless steel, PVC, HDPE.

2.10 SAFETY

A. The Duplex Pump Station shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled, factory-wired and tested pump station assembly shall be U.L. listed. pump stations not U.L. listed will not be acceptable.

B. The pumps shall meet accepted standards for plumbing equipment for use in or near residences, shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low-pressure sewer system applications. As evidence of compliance with this requirement, the pump shall bear the seal of NSF International. Third-party testing to NSF standard is not acceptable.

PART 3 - EXECUTION

3.1 TESTING AND STARTUP

A. The pumps provided shall be factory tested at three points to verify the pump performs at the design points.

1. Tests shall consist of checking the unit at its rated speed, head, capacity, efficiency and brake horsepower, and at such other conditions of head and capacity to properly establish the performance curve.
2. The standards of the Hydraulic Institute shall govern the procedures and calculations for these tests.
3. All completed stations shall be factory leak tested to assure the integrity of all joints, seams and penetrations. All necessary penetrations such as inlets, discharge fittings and cable connectors shall be included in this test along with their respective sealing means (grommets, gaskets etc.).

B. The Contractor shall test all power and control devices in Control Panel for proper operation.

C. A factory trained service technician shall be provided for a minimum of one-half (1/2) day to test and make adjustments to the control panel and level system to place it into operation and provide training in operation and maintenance.

D. After all testing has been completed to the satisfaction of the Owner and/or Engineer, the entire Lift Station and Control Panel System shall operate satisfactorily for a minimum test period of 30 days.

1. Cumulative down time of all components furnished shall not exceed 1/2 hour as recorded by the Engineer during the test period.
2. System documentation shall be delivered on the last day of test period. Test period shall not end until system documentation has been delivered.

E. If the cumulative downtime limit is exceeded, the Engineer shall have the following options:

1. Extend the test period as required until the cumulative downtime during the preceding 30 days does not exceed 1/2 hour as recorded by the Engineer.
2. Sub-systems which have no components contributing to the cumulative downtime will be approved as a partial acceptance.
3. Subsystems which have components that contributed to the cumulative downtime shall have their test period begin after all repairs and adjustments have been made.

3.2 FIELD TESTING

A. Each pump shall be submerged, operated and tested for performance compliance to its respective curve.

END OF SECTION 33 14 43

SECTION 33 21 00 – DOMESTIC WATER WELLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes materials and installation for drilling, construction, development, testing, and completion of domestic water wells for potable use.

B. Work includes well casing, screen, grout, seals, wellhead, pump, and appurtenances.

1.2 REFERENCES

A. ASTM D5092 – Design and Installation of Groundwater Monitoring Wells.

B. ASTM D578 – Glass Fiber Reinforced Plastic (FRP) Casing Specification.

C. ASTM D5521 – Development of Ground Water Monitoring Wells.

D. AWWA A100 – Water Wells.

E. State and Local Health Department Standards for Potable Water Wells.

1.3 SUBMITTALS

A. Shop Drawings: Submit proposed drilling method, casing and screen details, and pump assembly.

B. Product Data: Provide manufacturer's data for casing, screen, grout, and pump.

C. Test Reports: Submit results of well development and pumping test.

1.4 QUALITY ASSURANCE

A. All work shall be performed by a licensed well driller in accordance with state regulations.

B. Contractor shall have at least 5 years of experience in water well construction of similar capacity.

1.5 SITE CONDITIONS

A. Verify location, elevation, and accessibility before drilling.

B. Protect adjacent structures and underground utilities during drilling and construction.

PART 2 - PRODUCTS

2.1 CASING AND SCREEN

A. Casing: Schedule 80 PVC, stainless steel, or fiberglass, as indicated on drawings.

B. Screen: Continuous slot or wire-wound stainless steel screen, sized for aquifer yield and gradation.

C. Joints: Threaded or solvent-welded connections ensuring watertight assembly.

2.2 GROUT AND SEALING MATERIAL

A. Neat cement or bentonite grout as specified by state health department.

B. Annular seal shall extend from casing bottom to surface, or as shown on drawings.

2.3 PUMP AND MOTOR

A. Submersible pump sized for required flow and head.

B. Motor: NEMA-rated, corrosion resistant, suitable for continuous submerged operation.

C. Discharge Piping: Schedule 80 PVC or galvanized steel with check valve and pressure gauge.

2.4 WELLHEAD

A. Sanitary well seal or pitless adapter assembly with electrical conduit and vent.

B. Concrete pad around well casing top, minimum 4 ft x 4 ft x 6 in thick.

PART 3 - EXECUTION

3.1 RILLING

A. Drill well to depths indicated or as directed by Engineer to obtain adequate yield and water quality.

B. Use rotary or cable tool method appropriate for soil and rock conditions.

C. Record lithologic log for the full depth of the borehole.

3.2 CASING AND SCREEN INSTALLATION

A. Install casing and screen sections true and plumb.

B. Place gravel pack around screen as indicated on drawings.

C. Seal annular space with approved grout from bottom upward.

3.3 WELL DEVELOPMENT

A. Develop well using airlifting, surging, or pumping until water is clear and sand-free.

B. Record total time, methods used, and results.

3.4 TESTING

A. Conduct pump test for minimum of 4 hours at rated capacity.

B. Submit discharge, drawdown, and recovery data.

3.5 DISINFECTION

A. Disinfect well and pump per AWWA A100 standards before connection to system.

B. Flush system until free of chlorine residuals.

3.6 PROTECTION

A. Cap or cover well casing securely after completion to prevent contamination.

B. Maintain protection until permanent pump and piping are installed.

END OF SECTION 33 21 00

SECTION 33 64 00 – UNDERGROUND PROPANE STORAGE TANK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes furnishing, installation, and testing of a 2,000-gallon underground propane storage tank and associated piping, valves, and appurtenances .

B. Work includes:

1. Excavation, bedding, and backfill.
2. Tank installation and anchoring.
3. Propane fill and vapor piping.
4. Valve assemblies, overfill protection, and venting.
5. Testing, commissioning, and marking of the tank.

1.2 REFERENCES

A. NFPA 58 – Liquefied Petroleum Gas Code.

B. UL 58 – Standard for Steel Underground Tanks for Flammable and Combustible Liquids.

C. ASME B31.3 – Process Piping.

D. API RP 1604 – Design and Installation of Underground Storage Tanks for Liquefied Petroleum Gas.

E. ASTM A516/A516M – Pressure Vessel Steel Plates.

1.3 SUBMITTALS

A. Product Data: Tank manufacturer specifications, fittings, valves, and piping.

B. Shop Drawings: Layout, piping, and site plan with dimensions and setbacks.

C. Operation & Maintenance Manuals: Including inspection and testing schedule.

D. Certifications: Hydrostatic test certificates and UL listing.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 10 years of experience in propane tank fabrication.

B. Installer Qualifications: Minimum 5 years of experience installing underground propane tanks.

C. Testing: Hydrostatic and leak testing per NFPA 58 and manufacturer instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Transport tank in accordance with manufacturer and DOT regulations.

B. Protect tank from physical damage during storage and handling.

C. Maintain tank orientation and avoid bending or deforming.

1.6 PROJECT CONDITIONS

A. Excavation shall consider local utility locations, soil type, and groundwater table.

B. Ensure adequate site access for delivery and installation equipment.

PART 2 - PRODUCTS

2.1 TANK

A. Capacity: 10,000 U.S. gallons.

B. Material: Carbon steel, minimum 3/16" wall thickness, ASTM A516 Grade 55 or equivalent.

C. Coating: Factory-applied corrosion-resistant epoxy or fusion-bonded coating.

D. Design: ASME certified for underground LPG storage.

E. Fittings: Fill, vapor, liquid withdrawal, pressure relief, and liquid level gauge.

F. Anchoring: Concrete Deadman or engineered ballast to prevent flotation.

2.2 PIPING AND VALVES

A. Fill and vapor lines: Schedule 40 steel or approved LPG-rated pipe.

B. Valves: Manual shut off, check valves, and pressure relief valves as per NFPA 58.

C. Fittings: Threaded or flanged with corrosion protection.

2.3 BACKFILL MATERIAL

A. Sand or pea gravel free of debris, sharp rocks, or organic material.

B. Compacted in layers per manufacturer’s requirements.

2.4 ACCESSORIES

A. Tank marker posts with warning signs.

B. Vent pipe to terminate above grade per NFPA 58.

C. Protective bollards or fencing as required by site.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify excavation dimensions, depth, and soil conditions.

B. Confirm no conflicts with utilities or underground structures.

3.2 INSTALLATION

A. Place bedding material (sand or pea gravel) 6 inches minimum.

B. Lower tank into excavation, ensuring level positioning and proper anchoring.

C. Connect fill, vapor, and withdrawal piping.

D. Backfill in layers, compacted per manufacturer instructions.

3.3 TESTING

A. Hydrostatic test of tank per manufacturer and NFPA 58.

B. Leak test piping and fittings using approved methods.

3.4 COMMISSIONING

A. Verify all fittings, valves, and vents are operational.

B. Provide operator training on filling, withdrawal, and emergency procedures.

C. Document installation, testing, and certification.

3.5 CLEANING AND PROTECTION

A. Remove debris and excess material from site.

B. Protect tank markers and vent piping until final acceptance.

END OF SECTION 33 64 00