

# PROJECT MANUAL

*New Campground*  
*Missouri State Fairgrounds*  
*Sedalia, Missouri*

Designed By: Allstate Consultants LLC  
3312 LeMone Industrial Boulevard  
Columbia, MO 65201

Date Issued: September 19, 2025

Project No.: F2307-01

STATE *of* MISSOURI

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OFFICE *of* ADMINISTRATION  
Facilities Management, Design and Construction

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**SECTION 000107 - PROFESSIONAL SEALS AND CERTIFICATIONS**

**PROJECT NAME: MISSOURI STATE FAIRGROUNDS  
NEW CAMPGROUND –SEDALIA, MISSOURI**

**PROJECT NUMBER: F2307-01**

**SITE NUMBER: 1501**

**FACILITY ASSET NUMBERS:**

**THE FOLLOWING DESIGN PROFESSIONALS HAVE SIGNED AND SEALED THE ORIGINAL PLANS AND SPECIFICATIONS FOR THIS PROJECT, WHICH ARE ON FILE WITH THE DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION:**



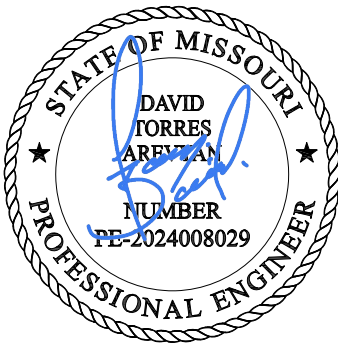
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9-19-25

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 and shall be submitted with your bid to [FMDCBids@oa.mo.gov](mailto:FMDCBids@oa.mo.gov)

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### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section provides a comprehensive list of the drawings that comprise the Bid Documents for this project.

### PART 2 - PROJECT INFORMATION

#### 2.1 INFORMATION

- A. NAME: Missouri State Fairgrounds New Campground – Sedalia, Missouri
- B. PROJECT NUMBER: F2307-01
- C. SITE NUMBER: 1501
- D. FACILITY ASSET NUMBERS:

### PART 3 - EXECUTION

#### 3.1 LIST OF DRAWINGS

- A. The following list of drawings is a part of the Bid Documents:

	<u>TITLE</u>	<u>SHEET #</u>	<u>DATE</u>	<u>CAD #</u>
1.	Cover	Sheet C-001	09/19/25	C-COV-01
2.	Overall Layout	Sheet C-002	09/19/25	C-LAY-02
3.	Overall Phasing	Sheet C-003	09/19/25	C-PHA-03

#### **STREET AND GRADING**

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7.	Street Profiles	Sheet C-104	09/19/25	C-STR-04
8.	Street Profiles	Sheet C-105	09/19/25	C-STR-05
9.	Street Profiles	Sheet C-106	09/19/25	C-STR-06
10.	Details	Sheet C-107	09/19/25	C-STR-07

11.	Details	Sheet C-108	09/19/25	C-STR-08
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**SANITARY SEWER**

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21.	Sanitary Sewer Profile	Sheet C-209	09/19/25	C-SAN-09
22.	Sanitary Sewer Profile	Sheet C-210	09/19/25	C-SAN-10
23.	Sanitary Sewer Profile	Sheet C-211	09/19/25	C-SAN-11
24.	Sanitary Sewer Profile	Sheet C-212	09/19/25	C-SAN-12
25.	Sanitary Details	Sheet C-213	09/19/25	C-SAN-13
26.	Sanitary Details	Sheet C-214	09/19/25	C-SAN-14
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**WATERLINE**

28.	Waterline Plan	Sheet C-301	09/19/25	C-WAT-01
29.	Waterline Plan	Sheet C-302	09/19/25	C-WAT-02
30.	Waterline Details	Sheet C-303	09/19/25	C-WAT-03
31.	Waterline Details	Sheet C-304	09/19/25	C-WAT-04
32.	Waterline Details	Sheet C-305	09/19/25	C-WAT-05

**ARCHITECTURAL**

33.	General Information	Sheet G-001	09/19/25	G-GLS-01
34.	Accessibility Guidelines	Sheet G-002	09/19/25	G-GLS-02
35.	Life Safety Plans & Project Information	Sheet G-003	09/19/25	G-PRJ-03
36.	Plans	Sheet A-1	09/19/25	A-PLN-01
37.	Elevations & Sections	Sheet A-3	09/19/25	A-ELV-02
38.	Schedules & Details	Sheet A-5	09/19/25	A-SCH-03

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39.	Structural Design Criteria and Notes	Sheet S-001	09/19/25	S-DES-01
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41.	Framing Plan	Sheet S-151	09/19/25	S-FRA-03
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**END OF SECTION 000115**

## SECTION 001116 - INVITATION FOR BID

### 1.0 OWNER:

- A. The State of Missouri  
Office of Administration,  
Division of Facilities Management, Design and Construction  
Jefferson City, Missouri

### 2.0 PROJECT TITLE AND NUMBER:

- A. New Campground  
Missouri State Fairgrounds  
Sedalia, Missouri  
**Project No.: F2307-01**

### 3.0 BIDS WILL BE RECEIVED:

- A. Until: 1:30 PM, October 23, 2025
- B. **Only electronic bids sent to [FMDCBids@oa.mo.gov](mailto:FMDCBids@oa.mo.gov) shall be accepted: (See Instructions to Bidders for further detail)**

### 4.0 DESCRIPTION:

- A. Scope: The project includes site grading, granular street surfacing, utility pads, and offsite extensions for water, sewer, and electric.
- B. MBE/WBE/SDVE Goals: MBE 10%, WBE 10%, and SDVE 3%. **NOTE: Only MBE/WBE firms certified by the State of Missouri Office of Equal Opportunity as of the date of bid opening, or SDVE(s) meeting the requirements of Section 34.074, RSMo and 1 CSR 30-5.010, can be used to satisfy the MBE/WBE/SDVE participation goals for this project.**

### 5.0 PRE-BID MEETING:

- A. Place/Time: 1:00 PM, October 2, 2025, at Missouri State Fairgrounds boardroom, 2503 W 16th Street, Sedalia, MO.
- B. Access to State of Missouri property requires presentation of a photo ID by all persons

### 6.0 HOW TO GET PLANS & SPECIFICATIONS:

- A. View Only Electronic bid sets are available at no cost or paper bid sets for a deposit of \$100.00 from American Document Solutions (ADS). MAKE CHECKS PAYABLE TO: American Document Solutions. Mail to: American Document Solutions, 1400 Forum Blvd., Suite 7A, Columbia, Missouri 65203. Phone 573-446-7768, Fax 573-355-5433, <https://www.adsplanroom.net>. NOTE: Prime contractors will be allowed a maximum of two bid sets at the deposit rate shown above. Other requesters will be allowed only one bid set at this rate. Additional bid sets or parts thereof may be obtained by any bidder at the cost of printing and shipping by request to American Document Solutions at the address shown above. Bidder must secure at least one bid set to become a planholder.
- B. **Refunds: Return plans and specifications in unmarked condition within 15 working days of bid opening to American Document Solutions, 1400 Forum Blvd., Suite 7A, Columbia, Missouri 65203. Phone 573-446-7768, Fax 573-355-5433. Deposits for plans not returned within 15 working days shall be forfeited.**
- C. Information for upcoming bids, including downloadable plans, specifications, Invitation for Bid, bid tabulation, award, addenda, and access to the ADS planholders list, is available on the Division of Facilities Management, Design and Construction's web site: <https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans>.

### 7.0 POINT OF CONTACT:

- A. Designer: Allstate Consultants LLC, Brian Harrington, (573) 875-8799, email: [bharrington@allstate75.com](mailto:bharrington@allstate75.com)
- B. Project Manager: Scott Samuels, (573) 690-6760, email: [scott.samuels@oa.mo.gov](mailto:scott.samuels@oa.mo.gov)

### 8.0 GENERAL INFORMATION:

- A. The State reserves the right to reject any and all bids and to waive all informalities in bids. No bid may be withdrawn for a period of 20 working days subsequent to the specified bid opening time. The contractor shall pay not less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, as determined by the Missouri Department of Labor and Industrial Relations and as set out in the detailed plans and specifications.
- B. Bid results will be available at <https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans> after it is verified that at least one bid is awardable and affordable.

## **SECTION 002113 – INSTRUCTIONS TO BIDDERS**

### **1.0 - SPECIAL NOTICE TO BIDDERS**

- A. If awarded a contract, the Bidder's employees, and the employees of all subcontractors, who perform the work on the project must adhere to requirements in Section 013513 – Site Security and Health Requirements as applicable per Agency.
- B. The Bidder's prices shall include all city, state, and federal sales, excise, and similar taxes that may lawfully be assessed in connection with the performance of work, and the purchased of materials to be incorporated in the work. **THIS PROJECT IS NOT TAX EXEMPT.**

### **2.0 - BID DOCUMENTS**

- A. The number of sets obtainable by one (1) party may be limited in accordance with available supply.
- B. For the convenience of contractors, subcontractors and suppliers, bidding documents are available on the Owner's website at <https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans>.

### **3.0 - BIDDERS' OBLIGATIONS**

- A. Bidders must carefully examine the entire site of the work and shall make all reasonable and necessary investigations to inform themselves thoroughly as to the facilities available as well as to all the difficulties involved in the completion of all work in accordance with the specifications and the plans. Bidders are required to examine all maps, plans and data mentioned in the specifications. No plea of ignorance concerning observable existing conditions or difficulties that may be encountered in the execution of the work under this contract will be accepted as an excuse for any failure or omission on the part of the successful Bidder (contractor) to fulfill every detail of the requirements of the contract, nor accepted as a basis for any claims for extra compensation or time extension.
- B. Under no circumstances will Bidders give their plans and specifications to other Bidders. It is highly encouraged, but not required, that all Bidders be on the official planholders list to receive project updates including but not limited to any addenda that are issued during the bidding process.

### **4.0 - INTERPRETATIONS**

- A. No Bidder shall be entitled to rely on oral or written representations from any person as to the meaning of the plans and specifications or the acceptability of alternate products, materials, form or type of construction.
- B. Bidders shall make all requests for interpretations in writing and submit all requests to the Project Designer and Project Manager identified in Section 007300 – Supplementary Conditions with all necessary supporting documentation no less than five (5) working days before opening of bids. Responses to requests for interpretation will be issued via a written addendum and will be sent as promptly as is practicable to all official planholders and posted on the Owner's website. All such addenda shall become part of the bid and contract documents.
- C. Bidders shall make all requests for an "Acceptable Substitution" on the Section 006325 Substitution Request Form. The request shall be emailed to the Project Designer and Project Manager identified in Section 007300 – Supplementary Conditions no less than five (5) working days before opening of bids. Responses to requests for substitutions will be issued via a written addendum and will be sent as promptly as is practicable to all official planholders and posted on the Owner's website. All such addenda shall become part of the bid and contract documents.
- D. An "Acceptable Substitution" requested after the award of bid will only be approved if proven to the satisfaction of the Owner and the Designer that the product is acceptable in design, strength, durability, usefulness, and convenience for the purpose intended. Approval of the substitution after award is at the sole discretion of the Owner and all requests of this nature must be submitted in accordance with Article 3.1 of the General Conditions.

## **5.0 - BIDS AND BIDDING PROCEDURE**

- A. Bidders shall submit all submission forms and accompanying documents listed in Section 004113 – Bid Form, Article 5.0, Attachments to Bid by the stated time on the bid documents or the bid will be rejected for being non-responsive.
- B. Depending on the specific project requirements, **the following is a GENERIC list** of all possible bid forms that may be due with bid submittals. Bidders must verify each specific project’s requirements in Section 004113 to ensure they have provided all the required documentation with their submission.

### **Bid Submittal – due before stated date and time of bid opening (see IFB):**

004113	Bid Form (all pages are always required)
004322	Unit Prices Form
004336	Proposed Subcontractors Form
004337	MBE/WBE/SDVE Compliance Evaluation Form
004338	MBE/WBE/SDVE Eligibility Determination for Joint Ventures
004339	MBE/WBE/SDVE GFE Determination
004340	SDVE Business Form
004541	Affidavit of Work Authorization
004545	Anti-Discrimination Against Israel Act Certification form

- C. The Bidder shall submit its bid on the forms provided by the Owner in the same file format (PDF) with each space fully and properly completed, typewritten or legibly printed, including all amounts required for alternate bids, unit prices, cost accounting data, etc. The Owner will reject bids that are not on the Owner’s forms or that do not contain all requested information. All forms can be found on the Owner’s website at <https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans> and shall be submitted with your bid to [FMDCBids@oa.mo.gov](mailto:FMDCBids@oa.mo.gov).
- D. All bids shall be submitted without additional terms and conditions, modifications, or reservations. The completed forms should not include interlineations, alterations, or erasures. Bids not in compliance with the requirements of this paragraph will be rejected as non-responsive.
- E. All bids shall be accompanied by a bid bond executed by the bidder and a duly authorized surety company, certified check, cashier's check or bank draft made payable to the Division of Facilities Management, Design and Construction, State of Missouri, in the amount indicated in the bid documents in Section 004113. Failure of the Bidder to submit the duly authorized bid bond or the full amount required shall be sufficient cause to reject his bid. The Bidder agrees that the proceeds of the check, draft, or bond shall become the property of the State of Missouri, if for any reason the Bidder withdraws his bid after bid closing or if the Bidder, within ten (10) working days after notification of award, refuses or is unable to 1) execute the tendered contract, 2) provide an acceptable performance and payment bond, or 3) provide evidence of required insurance coverage.
- F. The bid bond check or draft submitted by the successful Bidder will be returned after the receipt of an acceptable performance and payment bond and execution of the formal contract. Checks or drafts of all other Bidders will be returned within a reasonable time after it is determined that the bid represented by same will receive no further consideration by the State of Missouri.

## **6.0 - SIGNING OF BIDS**

- A. A bid should contain the full and correct legal name of the Bidder. If the Bidder is an entity registered with the Missouri Secretary of State, the Bidder’s name on the bid form should appear as shown in the Secretary of State’s records. If the Bidder is an entity organized in a state other than Missouri, the Bidder must provide a Certificate of Authority to do business in the State of Missouri.
- B. If the successful Bidder is doing business in the State of Missouri under a fictitious name, the Bidder shall furnish to Owner, attached to the Bid Form, a properly certified copy of the certificate of Registration of Fictitious Name from the State of Missouri, and such certificate shall remain on file with the Owner.
- C. A bid from an individual shall be signed as noted on the Bid Form.
- D. A bid from a partnership or joint venture shall require only one signature of a partner, an officer of the joint venture authorized to bind the venture, or an attorney-in-fact. If the bid is signed by an officer of

a joint venture or an attorney-in-fact, a document evidencing the individual's authority to execute contracts should be included with the bid form.

- E. A bid from a limited liability company (LLC) shall be signed by a manager or a managing member of the LLC.
- F. A bid from a corporation shall have the correct corporate name thereon and the signature of an authorized officer of the corporation. Title of office held by the person signing for the corporation shall appear, along with typed name of said individual and the corporate license number shall be provided. In addition, for corporate proposals, the President or Vice-President listed per the current filing with the Missouri Secretary of State should sign as the Bidder. If the signatory is other than the corporate president or vice president, the bidder must provide satisfactory evidence that the signatory has the legal authority to bind the corporation.

#### **7.0 - RECEIVING BID SUBMITTALS**

- A. It is the Bidder's sole responsibility to ensure receipt of the bid submittals by Owner on or before the date and time specified in the Invitation for Bid or as modified via written addenda. Bids received after the date and time specified will not be considered by the Owner.
- B. All bids shall be received via email at [FMDCBids@oa.mo.gov](mailto:FMDCBids@oa.mo.gov) and bids received by the Owner through any other means, including hard copies, will not be considered, and will be discarded by the Owner unopened.

#### **8.0 - MODIFICATION AND WITHDRAWAL OF BIDS**

- A. Bidder may withdraw a bid at any time prior to the scheduled closing time for receipt of bids, but no bidder may withdraw his bid for a period of twenty (20) working days after the scheduled closing time for receipt of bids.
- B. Bidder may modify a bid until the scheduled closing time by sending a revised bid to [FMDCBids@oa.mo.gov](mailto:FMDCBids@oa.mo.gov) with a note in the subject line and body of the email that it is a revised bid. All revised bids must be submitted to [FMDCBids@oa.mo.gov](mailto:FMDCBids@oa.mo.gov), revised bids sent any other way will not be considered.

#### **9.0 - AWARD OF CONTRACT**

- A. The Owner reserves the right to reject any and/or all bids and further to waive all informalities in bidding when deemed in the best interest of the State of Missouri.
- B. The Owner reserves the right to let other contracts in connection with the work including, but not limited to, contracts for the furnishing and installation of furniture, equipment, machinery, appliances and other apparatuses.
- C. The Owner will award a contract to the lowest, responsive, and responsible Bidder in accordance with Section 8.250, RSMo. No contract will be awarded to any Bidder who has had a contract with the Owner terminated within the preceding twelve months for material breach of contract or who has been suspended or debarred by the Owner.
- D. Award of alternates, if any, will be made in numerical order unless all bids received are such that the order of acceptance of alternates does not affect the determination of the lowest, responsive, responsible bidder.
- E. No award shall be considered binding upon the Owner until the written contract has been properly executed and the following documentation has been provided: 1) performance and payment bond consistent with Article 6.1 of the General Conditions; 2) proof of the required insurance coverage; 3) an executed Section 004541 - Affidavit of Work Authorization form; and 4) documentation evidence enrollment and participation in a federal work authorization program.
- F. Failure to execute and return the contract and associated documents within the prescribed period shall be treated, at the option of the Owner, as a breach of Bidder's obligation and the Owner shall be under no further obligation to Bidder.
- G. Transient employers subject to Sections 285.230 and 285.234, RSMo, (out-of-state employers who temporarily transact any business in the State of Missouri) may be required to file a bond with the

Missouri Department of Revenue. No contract will be awarded by the Owner unless the successful Bidder certifies that he has complied with all applicable provisions of Section 285.230-234.

- H. Sections 285.525 and 285.530, RSMo, require business entities to enroll and participate in a federal work authorization program in order to be eligible to receive award of any state contract in excess of \$5,000. Bidders should submit with their bid an Affidavit of Work Authorization (Section 004541) along with appropriate documentation evidencing such enrollment and participation. Bidders must also submit an E-Verify Memorandum before the Owner may award a contract to the Bidder. Information regarding a E-Verify is located at <https://www.e-verify.gov/employers/enrolling-in-e-verify>. The contractor shall be responsible for ensuring that all subcontractors and suppliers associated with this contract enroll in E-Verify.
- I. The successful Bidder must be registered in MissouriBUYS powered by MOVERS at <https://missouribuys.mo.gov/supplier-registration#> as an approved vendor prior to being issued a contract.

#### **10.0 - CONTRACT SECURITY**

- A. The successful Bidder shall furnish a performance/payment bond as set forth in General Conditions Article 6.1 prior to the State executing the contract and issuing a notice to proceed.

#### **11.0 - LIST OF SUBCONTRACTORS**

- A. If required by “Section 004113 – Bid Form,” each Bidder must submit as part of their bid a list of subcontractors to be used in performing the work (Section 004336). The list must specify the name of the single designated subcontractor, manufacturer, or suppliers for each category of work listed in “Section 004336 - Proposed Subcontractors Form.” If work within a category will be performed by more than one subcontractor, the bidder must provide the name of each subcontractor and specify the exact portion of the work to be done by each. If the Bidder intends to perform any of the designated subcontract work with the use of his own employees, the Bidder shall make that fact clear, by listing his own firm for the subject category. **If any category of work is left vacant or if more than one subcontractor is listed for any category without designating the portion of work to be performed by each, the bid shall be rejected.**

#### **12.0 - WORKING DAYS**

- A. Contract duration time is stated in working days and will use the following definition in determining the actual calendar date for contract completion:
  - 1. Working days are defined as all calendar days except Saturdays, Sundays and the following State of Missouri observed holidays: New Year’s Day, Martin Luther King, Jr. Day, Lincoln Day, Washington’s Birthday, Truman Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day and Christmas Day.

#### **13.0 - AMERICAN AND MISSOURI - MADE PRODUCTS AND FIRMS**

- A. By signing the bid form and submitting a bid on this project, the Bidder certifies that it will use American and Missouri products as set forth in Article 1.7 of the General Conditions. Bidders are advised to review those requirements carefully prior to bidding.
- B. A preference shall be given to Missouri firms, corporations or individuals, or firms, corporations or individuals that maintain Missouri offices or places of business, when the quality of performance promised is equal or better and the price quoted is the same or less.
- C. Pursuant to Section 34.076, RSMo, a contractor or Bidder domiciled outside the boundaries of the State of Missouri shall be required, in order to be successful, to submit a bid the same percent less than the lowest bid submitted by a responsible contractor or Bidder domiciled in Missouri as would be required for such a Missouri domiciled contractor or Bidder to succeed over the bidding contractor or Bidder domiciled outside Missouri on a like contract or bid being let in the Bidder’s domiciliary state and, further, the contractor or Bidder domiciled outside the boundaries of Missouri shall be required to submit an audited financial statement as would be required of a Missouri domiciled contractor or Bidder on a like contract or bid being let in the domiciliary state of that contractor or Bidder.

**14.0 – ANTI-DISCRIMINATION AGAINST ISRAEL ACT CERTIFICATION:**

- A. If the Bidder meets the section 34.600, RSMo., definition of a “company” and the Bidder has ten or more employees, the Bidder must certify in writing that the Bidder is not currently engaged in a boycott of goods or services from the State of Israel and shall not engage in a boycott of goods or services from the State of Israel, if awarded a contract, for the duration of the contract. The Bidder is required to complete and submit the applicable portion of Section 004545 - Anti-Discrimination Against Israel Act Certification with its Bid Form. The applicable portion of the exhibit must be submitted prior to execution of a contract by the Owner and issuance of Notice to Proceed.

**15.0 – MBE/WBE/SDVE INSTRUCTIONS**

A. Definitions:

- 1. “**MBE**” means a Minority Business Enterprise.
- 2. “**MINORITY**” has the same meaning as set forth in 1 C.S.R. 10-17.010.
- 3. “**MINORITY BUSINESS ENTERPRISE**” has the same meaning as set forth in section 37.020, RSMo.
- 4. “**WBE**” means a Women’s Business Enterprise.
- 5. “**WOMEN’S BUSINESS ENTERPRISE**” has the same meaning as set forth in section 37.020, RSMo.
- 6. “**SDVE**” means a Service-Disabled Veterans Enterprise.
- 7. “**SERVICE-DISABLED VETERAN**” has the same meaning as set forth in section 34.074, RSMo.
- 8. “**SERVICE-DISABLED VETERAN ENTERPRISE**” has the same meaning as “Service-Disabled Veteran Business” set forth in section 34.074, RSMo.

B. MBE/WBE/SDVE General Requirements:

- 1. For all bids greater than \$100,000, the Bidder shall obtain MBE, WBE and SDVE participation in an amount equal to or greater than the percentage goals set forth in the Invitation for Bid and the Bid Form, unless the Bidder is granted a Good Faith Effort waiver by the Director of the Division, as set forth below. If the Bidder does not meet the MBE, WBE and SDVE goals, or make a good faith effort to do so, the Bidder shall be nonresponsive, and its bid shall be rejected.
- 2. The Bidder should submit with its bid all the information requested in the MBE/WBE/SDVE Compliance Evaluation Form for every MBE, WBE, or SDVE subcontractor or material supplier the Bidder intends to use for the contract work. The Bidder is required to submit all MBE/WBE/SDVE documentation before the stated time and date set forth in the Invitation for Bid. If the Bidder fails to provide such information by the specified date and time, the Owner shall reject the bid.
- 3. The Director reserves the right to request additional information from a Bidder to clarify the Bidder’s proposed MBE, WBE, and/or SDVE participation. The Bidder shall submit the clarifying information requested by the Owner within two (2) working days of receiving the request for clarification.
- 4. Pursuant to section 34.074, RSMo, a Prime Bidder that qualifies as an SDVE shall receive a three-percentage point bonus preference in the contract award evaluation process. The bonus preference will be calculated and applied by reducing the bid amount of the eligible SDVE by three percent of the apparent low responsive Bidder’s bid. Based on this calculation, if the eligible SDVE’s evaluation is less than the apparent low responsive Bidder’s bid, the eligible SDVE’s bid will become the apparent low responsive bid. This reduction is for evaluation purposes only and will have no impact on the actual amount(s) of the bid or the amount(s) of any contract awarded. In order to be eligible for the SDVE preference, the Bidder must complete and submit with its bid the Missouri Service-Disabled Veteran Business Form, and any information required by the form.

C. Computation of MBE/WBE/SDVE Goal Participation:

- 1. A Bidder who is a MBE, WBE, or SDVE may count 100% of the contract towards the MBE, WBE or SDVE goal, less any amounts awarded to another MBE, WBE or SDVE. (NOTE: a MBE firm that bids as general contractor must obtain WBE and SDVE participation; a WBE firm that bids as

a general contractor must obtain MBE and SDVE participation; and a SDVE firm that bids as general contractor must obtain MBE and WBE participation.) For the remaining contract amount to be counted towards the MBE, WBE or SDVE goal, the Bidder must complete the MBE/WBE/SDVE Compliance Evaluation Form (Section 004337) identifying itself as an MBE, WBE or SDVE.

2. The total dollar value of the work granted to a certified MBE, WBE or SDVE by the Bidder shall be counted towards the applicable goal.
3. Expenditures for materials and supplies obtained from a certified MBE, WBE, or SDVE supplier or manufacturer may be counted towards the MBE, WBE and SDVE goals, if the MBE, WBE, or SDVE assumes the actual and contractual responsibility for the provision of the materials and supplies.
4. The total dollar value of the work granted to a second or subsequent tier subcontractor or a supplier may be counted towards a Bidder's MBE, WBE and SDVE goals, if the MBE, WBE, or SDVE properly assumes the actual and contractual responsibility for the work.
5. The total dollar value of work granted to a certified joint venture equal to the percentage of the ownership and control of the MBE, WBE, or SDVE partner in the joint venture may be counted towards the MBE/WBE/SDVE goals.
6. Only expenditures to a MBE, WBE, or SDVE that performs a commercially useful function in the work may be counted towards the MBE, WBE and SDVE goals. A MBE, WBE, or SDVE performs a commercially useful function when it is responsible for executing a distinct element of the work and carrying out its responsibilities by performing, managing and supervising the work or providing supplies or manufactured materials.

D. Certification of MBE/WBE/SDVE Subcontractors:

1. In order to be counted towards the goals, an MBE or WBE must be certified by the State of Missouri Office of Equal Opportunity and an SDVE must be certified by the State of Missouri, Office of Equal Opportunity or by the Federal U.S. Small Business Administration directory.
2. The Bidder may determine the certification status of a proposed MBE or WBE subcontractor or supplier by referring to the Office of Equal Opportunity (OEO)'s online MBE/WBE directory <https://apps1.mo.gov/MWBCertifiedFirms/>. The Bidder may determine the eligibility of a SDVE subcontractor or supplier by referring to the Office of Equal Opportunity online SDVE directory at <https://o eo .mo.gov/sdve-certification-program/> or the Federal U.S. Small Business Administration directory <https://veterans.certify.sba.gov/#search>.
3. Additional information, clarifications, or other information regarding the MBE/WBE/SDVE listings in the directories may be obtained by contacting the Contract Specialist of record as shown in the Supplementary Conditions (Section 007300).

E. Waiver of MBE/WBE/SDVE Participation:

1. If a Bidder has made a good faith effort to secure the required MBE, WBE and/or SDVE participation and has failed, the Bidder shall submit with its bid the information requested in MBE/WBE/SDVE Good Faith Effort (GFE) Determination form. The Director will determine if the Bidder made a good faith effort to meet the applicable goals. If the Director determines that the Bidder did not make a good faith effort, the bid shall be rejected as being nonresponsive to the bid requirements. Bidders who demonstrate that they have made a good faith effort to include MBE, WBE, and/or SDVE participation will be granted a waiver and will be considered to be responsive to the applicable participation goals, regardless of the percent of actual participation obtained, if the bid is otherwise acceptable.
2. In determining whether a Bidder has made a good faith effort to obtain MBE, WBE and/or SDVE participation, the Director may evaluate the factors set forth in 1 CSR 30-5.010(6)(C) and the following:
  - a. The amount of actual participation obtained;

- b. How and when the Bidder contacted potential MBE, WBE, and SDVE subcontractors and suppliers;
- c. The documentation provided by the Bidder to support its contacts, including whether the Bidder provided the names, addresses, phone numbers, and dates of contact for MBE/WBE/SDVE firms contacted for specific categories of work;
- d. If project information, including plans and specifications, were provided to MBE/WBE/SDVE subcontractors;
- e. Whether the Bidder made any attempts to follow-up with MBE, WBE or SDVE firms prior to bid;
- f. Amount of bids received from any of the subcontractors and/or suppliers that the Bidder contacted;
- g. The Bidder's stated reasons for rejecting any bids;

F. Contractor MBE/WBE/SDVE Obligations

- 1. If awarded a contract, the Bidder will be contractually required to subcontract with or obtain materials from the MBE, WBE, and SDVE firms listed in its bid, in amounts equal to or greater than the dollar amount in the bid, unless the amount is modified in writing by the Owner.
- 2. If the Contractor fails to meet or maintain the participation requirements contained in the Contractor's bid, the Contractor must satisfactorily explain to the Director why it cannot comply with the requirement and why failing meeting the requirement was beyond the Contractor's control. If the Director finds the Contractor's explanation unsatisfactory, the Director may take any appropriate action including, but not limited to:
  - a. Declaring the Contractor ineligible to participate in any contracts with the Division for up to twelve (12) months (suspension); and/or
  - b. Declaring the Contractor be nonresponsive to the Invitation for Bid, or in breach of contract and rejecting the bid or terminating the contract.
- 3. If the Contractor replaces an MBE, WBE, or SDVE during the course of the contract, the Contractor shall replace it with another MBE, WBE, or SDVE or make a good faith effort to do so. All MBE, WBE and SDVE substitutions must be approved by the Director in writing.
- 4. The Contractor shall provide the Owner with regular reports on its progress in meeting its MBE/WBE/SDVE obligations. At a minimum, the Contractor shall report the dollar-value of work completed by each MBE, WBE, or SDVE during the preceding month and the cumulative total of work completed by each MBE, WBE or SDVE to date with each monthly application for payment. The Contractor shall also make a final report, which shall include the total dollar-value of work completed by each MBE, WBE, and SDVE during the entire contract.



# State of Missouri Construction Contract

THIS AGREEMENT is made (DATE) by and between:

## *Contractor Name and Address*

hereinafter called the "Contractor," and the **State of Missouri**, hereinafter called the "**Owner**", represented by the Office of Administration, Division of Facilities Management, Design and Construction.

WITNESSETH, that the Contractor and the Owner, for the consideration stated herein agree as follows:

## **ARTICLE 1. STATEMENT OF WORK**

The Contractor shall furnish all labor and materials and perform all work required for furnishing and installing all labor, materials, equipment and transportation and everything necessarily inferred from the general nature and tendency of the plans and specifications for the proper execution of the work for:

**Project Name:**                    **New Campground  
Missouri State Fairgrounds  
Sedalia, Missouri**

**Project Number:**            **F2307-01**

in strict accordance with the Contract Documents as enumerated in Article 7, all of which are made a part hereof.

## **ARTICLE 2. TIME OF COMPLETION**

The contract completion date is **June 30, 2026**. This time includes ten (10) working days for the Contractor to receive, sign and return the contract form along with required bonding and insurance certificates. Failure of the Contractor to provide correct bonding and insurance within the ten (10) working days shall not be grounds for a time extension. Receipt of proper bonding and insurance is a condition precedent to the formation of the contract and if not timely received, may result in forfeiture of the Contractor's bid security. Work may not commence until the Owner issues a written Notice to Proceed and must commence within seven (7) working days thereafter.

## **ARTICLE 3. LIQUIDATED DAMAGES**

Whenever time is mentioned in this contract, time shall be and is of the essence of this contract. The Owner would suffer a loss should the Contractor fail to have the work embraced in this contract fully completed on or before the time above specified. THEREFORE, the parties hereto realize in order to adjust satisfactorily the damages on account of such failure that it might be impossible to compute accurately or estimate the amount of such loss or damages which the Owner would sustain by reason of failure to complete fully said work within the time required by this contract. The Contractor hereby covenants and agrees to pay the Owner, as and for **liquidated damages, the sum of \$1,000** per day for each and every day, Sunday and legal holidays excepted, during which the work remains incomplete and unfinished. Any sum which may be due the Owner for such damages shall be deducted and retained by the Owner from any balance which may be due the Contractor when said work shall have been finished and accepted. But such provisions shall not release the Bond of the Contractor from liability according to its terms. In case of failure to complete, the Owner will be under no obligation to show or prove any actual or specific loss or damage.

**ARTICLE 4. CONTRACT SUM**

The Owner shall pay the Contractor for the prompt, faithful and efficient performance of the conditions and undertakings of this contract, subject to additions, and deductions as provided herein, in current funds the sum of:

Base Bid: \$

Accepted Alternates, if applicable to the Project and accepted by the Owner.

**TOTAL CONTRACT AMOUNT: (\$CONTRACT AMOUNT)**

**ARTICLE 5. PREVAILING WAGE RATE**

**MISSOURI PREVAILING WAGE LAW (Sections 290.210 to 290.340, RSMo):** The Contractor shall pay not less than the specified hourly rate of wages, as set out in the wage order attached to and made part of the specifications for work under this contract, to all workers performing work under the contract, in accordance with sections 290.210 to 290.340, RSMo. The Contractor shall forfeit a penalty to the Owner of one hundred dollars per day (or portion of a day) for each worker that is paid less than the specified rates for any work done under the contract by the Contractor or by any subcontractor, in accordance with section 290.250, RSMo.

**DAVIS-BACON ACT:** If this Project is financed in whole or in part from Federal funds (as indicated in the Instructions to Bidders or other bid or contract documents for this Project), then this contract shall be subject to all applicable federal labor statutes, rules and regulations, including provisions of the Davis-Bacon Act, 40 U.S.C. §3141 et seq., and the “Federal Labor Standards Provisions,” as further set forth in Section 007333 – Supplementary General Conditions for Federally Funded/Assisted Construction Projects, which is incorporated into the contract by reference. Where the Missouri Prevailing Wage Law and the Davis-Bacon Act require payment of different wages for work performed under this contract, the Contractor and all Subcontractors shall pay the greater of the wages required under either law, on a classification-by-classification basis.

**ARTICLE 6. MINORITY/WOMEN/SERVICE DISABLED VETERAN BUSINESS ENTERPRISE PARTICIPATION**

The Contractor has been granted a waiver of the 10% MBE and 10% WBE and 3% SDVE participation goals. The Contractor agrees to secure the MBE/WBE/SDVE participation amounts for this project as follows: (OR)

The Contractor has met the MBE/WBE/SDVE participation goals and agrees to secure the MBE/WBE/SDVE participation amounts for this project as follows:

MBE/WBE/SDVE Firm: Subcontract Amt:\$  
MBE/WBE/SDVE Firm: Subcontract Amt:\$  
MBE/WBE/SDVE Firm: Subcontract Amt:\$

Total \$

MBE/WBE/SDVE assignments identified above shall not be changed without a contract change signed by the Owner.

The Director of the Division of Facilities Management, Design and Construction or his Designee shall be the final authority to resolve disputes and disagreements between the Contractor and the MBE/WBE/SDVE firms listed above when such disputes impact the subcontract amounts shown above.

**ARTICLE 7. CONTRACT DOCUMENTS**

The following documents are hereby incorporated into this contract by reference (all division/section numbers and titles are as utilized in the Project Manual published by the Owner for this Project):

- 1. Division 0 – Procurement and Contracting Information, including, but not limited to:
  - a. Invitation for Bid (Section 001116)
  - b. Instructions to Bidders (Section 002113)
  - c. Supplementary Instructions to Bidders (if applicable) (Section 002213)

- d. The following documents as completed and executed by the Contractor and accepted by the Owner, if applicable:
  - i. Bid Form (Section 004113)
  - ii. Unit Prices (Section 004322)
  - iii. Proposed Contractors Form (Section 004336)
  - iv. MBE, WBE, SDVE Compliance Evaluation Form(s) (Section 004337)
  - v. MBE, WBE, SDVE Eligibility Determination Form for Joint Ventures (Section 004338)
  - vi. MBE, WBE, SDVE Good Faith Effort (GFE) Determination Form (Section 004339)
  - vii. Missouri Service Disabled Veteran Business Form (Section 004340)
  - viii. Affidavit of Work Authorization (Section 004541)
- e. Performance and Payment Bond, completed and executed by the Contractor and surety (Section 006113)
- f. General Conditions (Section 007213)
- g. Supplementary Conditions (Section 007300)
- h. Supplementary General Conditions for Federally Funded/Assisted Construction Projects (Section 007333), if applicable
  - i. Wage Rate(s) (Section 007346)
- 2. Division 1 – General Requirements
- 3. All Drawings identified in the Project Manual
- 4. All Technical Specifications included in the Project Manual
- 5. Addenda, if applicable

**ARTICLE 8 – CERTIFICATION**

By signing this contract, the Contractor hereby re-certifies compliance with all legal requirements set forth in Section 6.0, Bidder’s Certifications of the Bid Form.

By signature below, the parties hereby execute this contract document.

**APPROVED:**

\_\_\_\_\_  
 Brian Yansen, Director  
 Division of Facilities Management,  
 Design and Construction

\_\_\_\_\_  
 Contractor’s Authorized Signature

I, Corporate Secretary, certify that I am Secretary of the corporation named above and that (CONTRACTOR NAME), who signed said contract on behalf of the corporation, was then (TITLE) of said corporation and that said contract was duly signed for and in behalf of the corporation by authority of its governing body, and is within the scope of its corporate powers.

\_\_\_\_\_  
*Corporate Secretary*

**SECTION 006113 - PERFORMANCE AND PAYMENT BOND FORM**

KNOW ALL MEN BY THESE PRESENTS, THAT we \_\_\_\_\_

as principal, and \_\_\_\_\_

\_\_\_\_\_ as Surety, are held and firmly bound unto the

STATE OF MISSOURI. in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_ )

for payment whereof the Principal and Surety bind themselves, their heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

WHEREAS, the Principal has, by means of a written agreement dated the \_\_\_\_\_

day of \_\_\_\_\_, 20\_\_\_\_\_, enter into a contract with the State of Missouri for

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

(Insert Project Title and Number)

NOW, THEREFORE, if the Principal shall faithfully perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the State of Missouri, with or without notice to the Surety and during the life of any guaranty required under the contract; and shall also faithfully perform and fulfill all undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made with or without notice to the Surety; and shall also promptly make payment for materials incorporated, consumed or used in connection with the work set forth in the contract referred to above, and all insurance premiums, both compensation and all other kinds of insurance, on said work, and for all labor performed on such work, whether by subcontractor or otherwise, at not less than the prevailing hourly rate of wages for work of a similar character (exclusive of maintenance work) in the locality in which the work is performed and not less than the prevailing hourly rate of wages for legal holiday and overtime work (exclusive of maintenance work) in the locality in which the work is performed both as determined by the Department of Labor and Industrial Relations or determined by the Court of Appeal, as provided for in said contract and in any and all duly authorized modifications of said contract that may be hereafter made, with or without notice to the Surety, then, this obligation shall be void and of no effect, but it is expressly understood that if the Principal should make default in or should fail to strictly, faithfully and efficiently do, perform and comply with any or more of the covenants, agreements, stipulations, conditions, requirements or undertakings, as specified in or by the terms of said contract, and with the time therein named, then this obligation shall be valid and binding upon each of the parties hereto and this bond shall remain in full force and effect; and the same may be sued on at the instance of any material man, laborer, mechanic, subcontractor, individual, or otherwise to whom such payment is due, in the name of the State of Missouri, to the use of any such person.

AND, IT IS FURTHER specifically provided that any modifications which may hereinafter be made in the terms of the contract or in the work to be done under it or the giving by the Owner of any extension of the time for the performance of the contract or any other forbearance on the part of either the Owner or the Principal to the other, shall not in any way release the Principal and the Surety, or either or any of them, their heirs, executors, administrators and successors, from their liability hereunder, notice to the Surety of any such extension, modifications or forbearance being hereby waived.

IN WITNESS WHEREOF, the above bounden parties have executed the within instrument this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_.

**AS APPLICABLE:**

**AN INDIVIDUAL**

Name: \_\_\_\_\_  
Signature: \_\_\_\_\_

**A PARTNERSHIP**

Name of Partner: \_\_\_\_\_  
Signature of Partner: \_\_\_\_\_

Name of Partner: \_\_\_\_\_  
Signature of Partner: \_\_\_\_\_

**CORPORATION**

Firm Name: \_\_\_\_\_  
Signature of President: \_\_\_\_\_

**SURETY**

Surety Name: \_\_\_\_\_  
Attorney-in-Fact: \_\_\_\_\_  
Address of Attorney-in-Fact: \_\_\_\_\_

Telephone Number of Attorney-in-Fact: \_\_\_\_\_  
Signature Attorney-in-Fact: \_\_\_\_\_

**NOTE:** Surety shall attach Power of Attorney



STATE OF MISSOURI  
 OFFICE OF ADMINISTRATION  
 DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION  
**PRODUCT SUBSTITUTION REQUEST**

PROJECT NUMBER

PROJECT TITLE AND LOCATION

CHECK APPROPRIATE BOX

**SUBSTITUTION PRIOR TO BID OPENING**  
 (Minimum of (5) working days prior to receipt of Bids as per Article 4 – Instructions to Bidders)

**SUBSTITUTION FOLLOWING AWARD**  
 (Maximum of (20) working days from Notice to Proceed as per Article 3 – General Conditions)

FROM: BIDDER/CONTRACTOR (PRINT COMPANY NAME)

TO: ARCHITECT/ENGINEER (PRINT COMPANY NAME)

Bidder/Contractor hereby requests acceptance of the following product or systems as a substitution in accordance with provisions of Division One of the Bidding Documents:

SPECIFIED PRODUCT OR SYSTEM

SPECIFICATION SECTION NO.

SUPPORTING DATA

Product data for proposed substitution is attached (include description of product, standards, performance, and test data)

Sample  Sample will be sent, if requested

**QUALITY COMPARISON**

	SPECIFIED PRODUCT	SUBSTITUTION REQUEST
NAME, BRAND		
CATALOG NO.		
MANUFACTURER		
VENDOR		

**PREVIOUS INSTALLATIONS**

PROJECT	ARCHITECT/ENGINEER	DATE INSTALLED
LOCATION		

**SIGNIFICANT VARIATIONS FROM SPECIFIED PRODUCT**

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**REASON FOR SUBSTITUTION**

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**DOES PROPOSED SUBSTITUTION AFFECT OTHER PARTS OF WORK?**

YES     NO

IF YES, EXPLAIN

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**SUBSTITUTION REQUIRES DIMENSIONAL REVISION OR REDESIGN OF STRUCTURE OR A/E WORK**

YES     NO

**BIDDER'S/CONTRACTOR'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENT:**

We have investigated the proposed substitution. We believe that it is equal or superior in all respects to specified product, except as stated above; that it will provide the same Warranty as specified product; that we have included complete implications of the substitution; that we will pay redesign and other costs caused by the substitution which subsequently become apparent; and that we will pay costs to modify other parts of the Work as may be needed, to make all parts of the Work complete and functioning as a result of the substitution.

BIDDER/CONTRACTOR

DATE

**REVIEW AND ACTION**

Resubmit Substitution Request with the following additional information:

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Substitution is accepted.

Substitution is accepted with the following comments:

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Substitution is not accepted.

ARCHITECT/ENGINEER

DATE



PROJECT NUMBER
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KNOW ALL MEN BY THESE PRESENT THAT:                    hereinafter called "Subcontractor" who heretofore entered into an agreement with                    hereinafter called "Contractor", for the performance of work and/or furnishing of material for the construction of the project entitled

(PROJECT TITLE, PROJECT LOCATION, AND PROJECT NUMBER)

at  
 \_\_\_\_\_  
 (ADDRESS OF PROJECT)

for the State of Missouri (Owner) which said subcontract is by this reference incorporated herein, in consideration of such final payment by Contractor.

DOES HEREBY:

1. ACKNOWLEDGE that they have been **PAID IN FULL** all sums due for work and materials contracted or done by their Subcontractors, Material Vendors, Equipment and Fixture Suppliers, Agents and Employees, or otherwise in the performance of the Work called for by the aforesaid Contract and all modifications or extras or additions thereto, for the construction of said project or otherwise.
2. RELEASE and fully, finally, and forever discharge the Owner from any and all suits, actions, claims, and demands for payment for work performed or materials supplied by Subcontractor in accordance with the requirements of the above referenced Contract.
1. REPRESENT that all of their Employees, Subcontractors, Material Vendors, Equipment and Fixture Suppliers, and everyone else has been **paid in full** all sums due them, or any of them, in connection with performance of said Work, or anything done or omitted by them, or any of them in connection with the construction of said improvements, or otherwise.

DATED this            day of            , 20    .

NAME OF SUBCONTRACTOR
-----------------------

BY (TYPED OR PRINTED NAME)
----------------------------

SIGNATURE
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TITLE
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ORIGINAL: FILE/Closeout Documents



STATE OF MISSOURI  
 OFFICE OF ADMINISTRATION  
 DIVISION OF FACILITIES MANAGEMENT,  
 DESIGN AND CONSTRUCTION

**MBE/WBE/SDVE PROGRESS REPORT**

Remit with **ALL** Progress and Final Payments

(Please check appropriate box) CONSULTANT CONSTRUCTION

PAY APP NO.	PROJECT NUMBER
CHECK IF FINAL <input checked="" type="checkbox"/> <b>FINAL</b>	DATE

PROJECT TITLE			
PROJECT LOCATION			
FIRM			
ORIGINAL CONTRACT SUM (Same as Line Item 1. on Form A of Application for Payment) \$		TOTAL CONTRACT SUM TO DATE (Same as Line Item 3. on Form A of Application for Payment) \$	
THE TOTAL MBE/WBE/SDVE PARTICIPATION DOLLAR AMOUNT OF THIS PROJECT AS INDICATED IN THE ORIGINAL CONTRACT: \$			
SELECT MBE, WBE, SDVE	ORIGINAL CONTRACT PARTICIPATION AMOUNT	PARTICIPATION AMOUNT PAID-TO-DATE (includes approved contract changes)	CONSULTANT/SUBCONSULTANT OR CONTRACTOR/SUBCONTRACTOR/SUPPLIER COMPANY NAME
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	

Revised 06/2023

## **INSTRUCTIONS FOR MBE/WBE/SDVE PROGRESS REPORT**

### **CONTRACTOR OR CONSULTANT TO FILL OUT AND REMIT WITH EACH PAY APPLICATION:**

The MBE/WBE/SDVE Progress Report for the project is issued with the contract comprising values reported in the consultant's Proposal or on the successful contractor's Section 004337 Compliance Evaluation Forms.

At Initial Pay Application fill in the following:

1. Pay App No. Start with 1.
2. Fill in the Project Number and Date.
3. Enter Project Title, Project Location, and Firm.
4. Fill in the "Original Contract Sum" and "Total Contract Sum To Date" (Reference applicable Line Items on Form A of Application for Payment).
5. Indicate the Total Participation Dollar Amount from the Original Contract.
6. Select MBE, WBE, or SDVE for each Consultant/Subconsultant or Contractor/Subcontractor/Supplier.
7. Enter the "Total Amount of Subcontract", "\$ Amount (Paid-To-Date)", and Company Name.

For all subsequent Pay Applications fill in the following:

1. Pay App No.
2. If Final Pay App, check box.
3. Fill in the Project Number and Date.
4. Enter Project Title, Project Location, and Firm
5. At each Pay App fill in the "Original Contract Sum" and "Total Contract Sum To Date" (reference applicable Line Items on Form A of Application for Payment).
6. Indicate the Total Participation Dollar Amount from the Original Contract.
7. Select MBE, WBE, or SDVE for each Consultant/Subconsultant or Contractor/Subcontractor/Supplier
8. Enter the "Total Amount of Subcontract", "\$ Amount (Paid-To-Date)", and Company Name.



STATE OF MISSOURI  
 OFFICE OF ADMINISTRATION  
 DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION  
**AFFIDAVIT – COMPLIANCE WITH PREVAILING WAGE LAW**

PROJECT NUMBER
----------------

Before me, the undersigned Notary Public, in and for the County of \_\_\_\_\_

State of \_\_\_\_\_ personally came and appeared \_\_\_\_\_

(NAME)

\_\_\_\_\_ of the \_\_\_\_\_

(POSITION) (NAME OF THE COMPANY)

(a corporation) (a partnership) (a proprietorship) and after being duly sworn did depose and say that all provisions and requirements set out in Chapter 290, Sections 290.210 through and including 290.340, Missouri Revised Statutes, pertaining to the payment of wages to workmen employed on public works project have been fully satisfied and there has been no exception to the full and completed compliance with said provisions and requirements and with Wage Determination No: \_\_\_\_\_ issued by the Department of Labor and Industrial Relations, State of Missouri on the \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_ in carrying out the contract and working in connection with \_\_\_\_\_

(NAME OF PROJECT)

Located at \_\_\_\_\_ in \_\_\_\_\_ County

(NAME OF THE INSTITUTION)

Missouri, and completed on the \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_

SIGNATURE

**NOTARY INFORMATION**

NOTARY PUBLIC EMBOSSEER OR BLACK INK RUBBER STAMP SEAL	STATE	COUNTY (OR CITY OF ST. LOUIS)
	SUBSCRIBED AND SWORN BEFORE ME, THIS	
	DAY OF	YEAR
	NOTARY PUBLIC SIGNATURE	MY COMMISSION EXPIRES
NOTARY PUBLIC NAME (TYPED OR PRINTED)		<b>USE RUBBER STAMP IN CLEAR AREA BELOW</b>

FILE: Closeout Documents

# GENERAL CONDITIONS

## INDEX

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## SECTION 007213 - GENERAL CONDITIONS

- A. These General Conditions apply to each section of these specifications. The Contractor is subject to the provisions contained herein.
- B. The General Conditions are intended to define the relationship of the Owner, the Designer and the Contractor thereby establishing certain rules and provisions governing the operation and performance of the work so that the work may be performed in a safe, orderly, expeditious and workmanlike manner.

## ARTICLE 1 – GENERAL PROVISIONS

### ARTICLE 1.1 - DEFINITIONS

As used in these contract documents, the following terms shall have the meanings and refer to the parties designated in these definitions.

1. **"COMMISSIONER"**: The Commissioner of the Office of Administration.
2. **"CONSTRUCTION DOCUMENTS"**: The "Construction Documents" shall consist of the Project Manual, Drawings and Addenda.
3. **"CONSTRUCTION REPRESENTATIVE:"** Whenever the term "Construction Representative" is used, it shall mean the Owner's Representative at the work site.
4. **"CONTRACTOR"**: Party or parties who have entered into a contract with the Owner to furnish work under these specifications and drawings.
5. **"DESIGNER"**: When the term "Designer" is used herein, it shall refer to the Architect, Engineer, or Consultant of Record specified and defined in Paragraph 2.0 of the Supplemental Conditions, or his duly authorized representative. The Designer may be either a consultant or state employee.
6. **"DIRECTOR"**: Whenever the term "Director" is used, it shall mean the Director of the Division of Facilities Management, Design and Construction or his Designee, representing the Office of Administration, State of Missouri. The Director is the agent of the Owner.
7. **"DIVISION"**: Shall mean the Division of Facilities Management, Design and Construction, State of Missouri.
8. **"INCIDENTAL JOB BURDENS"**: Shall mean those expenses relating to the cost of work, incurred either in the home office or on the job-site, which are necessary in the course of doing business but are incidental to the job. Such costs include office supplies and equipment, postage, courier services, telephone expenses including long distance, water and ice and other similar expenses.
9. **"JOINT VENTURE"**: An association of two (2) or more businesses to carry out a single business enterprise for profit for which purpose they combine their property, capital, efforts, skills and knowledge.
10. **"OWNER"**: Whenever the term "Owner" is used, it shall mean the State of Missouri. Acting by and through the Office of Administration, Division of Facilities Management, Design and Construction.
11. **"PROJECT"**: Wherever the term "Project" is used, it shall mean the work required to be completed by the construction contract.
12. **"PROJECT MANUAL"**: The "Project Manual" shall consist of Introductory Information, Invitation for Bid, Instructions to Bidders, Bid Documents, Additional Information, Standard Forms, General Conditions, Supplemental General Conditions, General Requirements and Technical Specifications.
13. **"SUBCONTRACTOR"**: Party or parties who contract under, or for the performance of part or this entire Contract between the Owner and Contractor. The subcontract may or may not be direct with the Contractor.
14. **"WORK"**: All supervision, labor, materials, tools, supplies, equipment, and any incidental operations and/or activities required by or reasonably inferable from the Contract Documents necessary to construct the Project and to produce the results intended by the Contract Documents in a safe, expeditious, orderly, and workmanlike manner so that the project shall be complete and finished in the best manner known to each respective trade.
15. **"WORKING DAYS"**: are all calendar days except Saturdays, Sundays and the following holidays: New Year's Day, Martin Luther King, Jr. Day, Lincoln Day, Washington's Birthday (observed), Truman Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Columbus Day, Veterans Day (observed), Thanksgiving Day, Christmas Day.

## ARTICLE 1.2 DRAWINGS AND SPECIFICATIONS

- A. In case of discrepancy between drawings and specifications, specifications shall govern. Should discrepancies in architectural drawings, structural drawings and mechanical drawings occur, architectural drawings shall govern and, in case of conflict between structural and mechanical drawings, structural drawings shall govern.
- B. Specifications are separated into titled divisions for convenience of reference only and to facilitate letting of contracts and subcontracts. The Contractor is responsible for establishing the scope of work for subcontractors, which may cross titled divisions. Neither the Owner nor Designer will establish limits and jurisdiction of subcontracts.
- C. Figured dimensions take precedence over scaled measurements and details over smaller scale general drawings. In the event of conflict between any of the documents contained within the contract, the documents shall take precedence and be controlling in the following sequence: addenda, supplementary general conditions, general conditions, division 1 specifications, technical division specifications, drawings, bid form and instructions to bidders.
- D. Anything shown on drawings and not mentioned in these specifications or vice versa, as well as any incidental work which is obviously necessary to complete the project within the limits established by the drawings and specifications, although not shown on or described therein, shall be performed by the Contractor at no additional cost as a part of his contract.
- E. Upon encountering conditions differing materially from those indicated in the contract documents, the Contractor shall promptly notify the Designer and Construction Representative in writing before such conditions are disturbed. The Designer shall promptly investigate said conditions and report to the Owner, with a recommended course of action. If conditions do materially differ and cause an increase or decrease in contract cost or time required for completion of any portion of the work, a contract change will be initiated as outlined in Article 4 of these General Conditions.
- E. Only work included in the contract documents is authorized, and the Contractor shall do no work other than that described therein or in accordance with appropriately authorized and approved contract changes.

## ARTICLE 1.3 - COMPLIANCE WITH LAWS, PERMITS, REGULATIONS AND INSPECTIONS

- A. Since the Owner is the State of Missouri, municipal or political subdivisions, zoning ordinances, construction codes (other than licensing of trades), and other like ordinances are not applicable to construction on Owner's property, and Contractor will not be required to submit drawings and specifications to any municipal or political subdivision, authority, obtain construction permits or any other licenses (other than licensing of trades) or permits from or submit to inspections by any municipality or political subdivision relating to the construction for this project. All permits or licenses required by municipality or political subdivision for operation on property not belonging to Owner shall be obtained by and paid for by Contractor. Each Contractor shall comply with all applicable laws, ordinances, rules and regulations that pertain to the work of this contract.
- B. Contractors, subcontractors and their employees engaged in the businesses of electrical, mechanical, plumbing, carpentry, sprinkler system work, and other construction related trades shall be licensed to perform such work by the municipal or political subdivision where the project is located, if such licensure is required by local code. Local codes shall dictate the level (master, journeyman, and apprentice) and the number, type and ratio of licensed tradesmen required for this project within the jurisdiction of such municipal or political subdivision.
- C. Equipment and controls manufacturers and their authorized service and installation technicians that do not maintain an office within the jurisdiction of the municipal or political subdivision but are a listed or specified contractor or subcontractor on this project are exempt from Paragraph 1.3 B above.
- D. The Contractor shall post a copy of the wage determination issued for the project and included as a part of the contract documents, in a prominent and easily accessible location at the site of construction for the duration of the project.
- E. Any contractor or subcontractor to such contractor at any tier signing a contract to work on this project shall provide a ten-hour Occupational Safety and Health Administration (OSHA) construction safety program for their on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the Department of Labor and Industrial Relations which is at least as stringent as an approved OSHA program. The contractor shall forfeit as a penalty to the public body on whose

behalf the contract is made or awarded, two thousand five hundred dollars plus one hundred dollars for each employee employed by the contractor or subcontractor, for each calendar day, or portion thereof, such employee is employed without the required training.

#### **ARTICLE 1.4 - NONDISCRIMINATION IN EMPLOYMENT**

A. The Contractor and his subcontractors will not discriminate against individuals based on race, color, religion, national origin, sex, disability, or age, but may use restrictions which relate to bona fide occupational qualifications. Specifically, the Contractor and his subcontractors shall not discriminate:

1. Against recipients of service on the basis of race, color, religion, national origin, sex, disability or age.
2. Against any employee or applicant, for employment on the basis of race, color, religion, national origin, sex or otherwise qualified disability status.
3. Against any applicant for employment or employee on the basis of age, where such applicant or employee is between ages 40 and 70 and where such Contractor employs at least 20 persons.
4. Against any applicant for employment or employee on the basis of that person's status as a disabled or Vietnam-era veteran.

The Contractor and his Subcontractors will ensure applicants for employment and employees are treated equally without regard to race, color, religion, national origin, sex, disability, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion and transfer; recruitment or recruitment advertising; and selection for training, including apprenticeship. The Contractor and his Subcontractors will give written notice of their commitments under this clause to any labor union with which they have bargaining or other agreements under this clause to any labor union with which they have bargaining or other agreements.

B. In the event of the Contractor's or his subcontractor's noncompliance with any provisions of this Article of the Contract, the Owner may cancel this contract in whole or in part or require the Contractor to terminate his contract with the subcontractor.

#### **ARTICLE 1.5 - ANTI-KICKBACK**

No employee of the division, shall have or acquire any pecuniary interest, whether direct or indirect, in this contract or in any part hereof. No officer, employee, designer, attorney, or administrator of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall have or acquire any pecuniary interest, whether direct or indirect, in this contract, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

#### **ARTICLE 1.6 - PATENTS AND ROYALTIES**

A. The Contractor shall hold and save the Owner and its officers, agents, servants, and employees harmless from liabilities of any nature or kind, including cost and expenses, for, or on account of, any patented or unpatented invention, process, article or appliance manufactured or used in the performance of this contract, including its use by the Owner, unless otherwise specifically stipulated in the contract documents.

B. If the Contractor uses any design, device or materials covered by letters, patent or copyright, the Contractor shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device or material. It is mutually agreed and understood, without exception, that the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this contract and shall indemnify the Owner for any cost, expense or damage it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

## **ARTICLE 1.7 - PREFERENCE FOR AMERICAN AND MISSOURI PRODUCTS AND SERVICES**

- A. By virtue of statutory authority a preference will be given to Missouri labor and to products of mines, forests and quarries of the state of Missouri when they are found in marketable quantities in the state, and all such materials shall be of the best quality and suitable character that can be obtained at reasonable market prices, all as provided for in Section 8.280, Missouri Revised Statutes and Cumulative Supplements.
- B. Furthermore, pursuant to Section 34.076 Missouri Revised Statutes and Cumulative Supplements, a preference shall be given to those persons doing business as Missouri firms, corporations, or individuals, or which maintain Missouri offices or places of business, when the quality of performance promised is equal or better and the price quoted is the same or less. In addition, in order for a non-domiciliary bidder to be successful, his bid must be that same percentage lower than a domiciliary Missouri bidder's bid, as would be required for a Missouri bidder to successfully bid in the non-domiciliary state.
- C. In accordance with the Missouri Domestic Products Procurement Act Section 34.350 RSMo and Cumulative Supplements any manufactured goods or commodities used or supplied in the performance of this contract or any subcontract thereto shall be manufactured, assembled or produced in the United States, unless the specified products are not manufactured, assembled or produced in the United States in sufficient quantities to meet the agency's requirements or cannot be manufactured, assembled or produced in the United States within the necessary time in sufficient quantities to meet the contract requirements, or if obtaining the specified products manufactured, assembled or produced in the United States would increase the cost of this contract for purchase of the product by more than ten percent.

## **ARTICLE 1.8 - COMMUNICATIONS**

- A. All notices, requests, instructions, approvals, and claims must be in writing and shall be delivered to the Designer and copied to the Construction Representative for the project except as required by Article 1.12 Disputes and Disagreements, or as otherwise specified by the Owner in writing as stated in Section 012600. Any such notice shall be deemed to have been given as of the time of actual receipt.
- B. The Contractor shall attend on-site progress and coordination meetings, as scheduled by the Construction Representative, no less than once a month.

- C. The Contractor shall ensure that major subcontractors and suppliers shall attend monthly progress meetings as necessary to coordinate the work, and as specifically requested by the Construction Representative.

## **ARTICLE 1.9 - SEPARATE CONTRACTS AND COOPERATION**

- A. The Owner reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his work with theirs.
- B. The Contractor shall consult the drawings for all other contractors in connection with this work. Any work conflicting with the above shall be brought to the attention of the Owner's Representative before the work is performed. If the Contractor fails to do this, and constructs any work which interferes with the work of another contractor, the Contractor shall remove any part so conflicting and rebuild same, as directed by the Owner's Representative at no additional cost to the Owner.
- C. Each contractor shall be required to coordinate his work with other contractors so as to afford others reasonable opportunity for execution of their work. No contractor shall delay any other contractor by neglecting to perform contract work at the proper time. If any contractor causes delay to another, they shall be liable directly to that contractor for such delay in addition to any liquidated damages which might be due the Owner.
- D. Should the Contractor or project associated subcontractors refuse to cooperate with the instructions and reasonable requests of other Contractors or other subcontractors in the overall coordinating of the work, the Owner may take such appropriate action and issue directions, as required, to avoid unnecessary and unwarranted delays.
- E. Each Contractor shall be responsible for damage done to Owner's or other Contractor's property by him/her or workers in his employ through their fault or negligence.
- F. Should a Contractor sustain any damage through any act or omission of any other Contractor having a contract with the Owner, the Contractor so damaged shall have no claim or cause of action against the Owner for such damage, but shall have a claim or cause of action against the other Contractor to recover any and all damages sustained by reason of the acts or omissions of such Contractor. The phrase "acts or omissions" as used in this section shall be defined to include, but

not be limited to, any unreasonable delay on the part of any such contractors.

#### **ARTICLE 1.10 - ASSIGNMENT OF CONTRACT**

- A. No assignment by Contractor of any amount or any part of this contract or of the funds to be received there under will be recognized unless such assignment has had the written approval of the Director and the surety has been given due notice of such assignment and has furnished written consent thereto. In addition to the usual recitals in assignment contracts, the following language must be set forth: "It is agreed that the funds to be paid to the assignee under this assignment are subject to performance by the Contractor of this contract and to claims or liens for services rendered or materials supplied for the performance of the work called for in said contract in favor of all persons, firms or corporations rendering such services or supplying such materials."

#### **ARTICLE 1.11 - INDEMNIFICATION**

- A. Contractor agrees to indemnify and save harmless Owner and its respective commissioners, officers, officials, agents, consultants and employees and Designer, their agents, servants and employees, from and against any and all liability for damage arising from injuries to persons or damage to property occasioned by any acts or omissions of Contractor, any subcontractors, agents, servants or employees, including any and all expense, legal or otherwise, which may be incurred by Owner or Designer, its agents, servants or employees, in defense of any claim, action or suit.
- B. The obligations of the Contractor under this paragraph shall not extend to the liability of the Designer, his agents or employees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, contract changes, design or specifications, or (2) giving of or the failure to give directions or instructions by the Designer, his agents or employees as required by this contract documents provided such giving or failure to give is the primary cause of the injury or damage.

#### **ARTICLE 1.12 - DISPUTES AND DISAGREEMENTS**

It is hereby expressly agreed and understood that in case any controversy or difference of opinion arises during construction, best efforts will be given to resolution at the field level. Should those efforts be unsuccessful, the Contractor has the right to appeal in writing, the decision of the Director's Designee to the Director at Room 730 Truman Building, P.O. Box 809, Jefferson City, Missouri 65102. The decision of the Director shall be final and binding on all parties.

#### **ARTICLE 2 -- OWNER/DESIGNER RESPONSIBILITIES**

- A. The Owner shall give all orders and directions contemplated under this contract relative to the execution of the work. During progress of work the Owner will be represented at the project site by the Construction Representative and/or Designer, whose responsibilities are to see that this contract is properly fulfilled.
- B. The Owner shall at all times have access to the work whenever it is in preparation or progress. The Contractors shall provide proper facilities for such access and for inspection and supervision.
- C. All materials and workmanship used in the work shall be subject to the inspection of the Designer and Construction Representative, and any work which is deemed defective shall be removed, rebuilt or made good immediately upon notice. The cost of such correction shall be borne by the Contractor. Contractor shall not be entitled to an extension of the contract completion date in order to remedy defective work. All rejected materials shall be immediately removed from the site of the work.
- D. If the Contractor fails to proceed at once with the correction of rejected defective materials or workmanship, the Owner may, by separate contract or otherwise, have the defects remedied or rejected. Materials removed from the site and charge the cost of the same against any monies which may be due the Contractor, without prejudice to any other rights or remedies of the Owner.
- E. Failure or neglect on the part of Owner to observe faulty work, or work done which is not in accordance with the drawings and specifications shall not relieve the Contractor from responsibility for correcting such work without additional compensation.
- F. The Owner shall have the right to direct the Contractor to uncover any completed work.
  - 1. If the Contractor fails to adequately notify the Construction Representative and/or Designer of an inspection as required by the Contract Documents, the Contractor shall, upon written request, uncover the work. The Contractor shall bear all costs associated with uncovering and again covering the work exposed.
  - 2. If the Contractor is directed to uncover work, which was not otherwise required by the Contract Documents to be inspected, and the work is found to be defective in any respect, no compensation shall be allowed for this work. If, however, such work is found to meet

the requirements of this contract, the actual cost of labor and material necessarily involved in the examination and replacement plus 10% shall be allowed the Contractor.

- G. The Designer shall give all orders and directions contemplated under this contract relative to the scope of the work and shall give the initial interpretation of the contract documents.
- H. The Owner may file a written notice to the Contractor to dismiss immediately any subcontractors, project managers, superintendents, foremen, workers, watchmen or other employees whom the Owner may deem incompetent, careless or a hindrance to proper or timely execution of the work. The Contractor shall comply with such notice as promptly as practicable without detriment to the work or its progress.
- I. If in the Owner's judgment it becomes necessary at any time to accelerate work, when ordered by the Owner in writing, the Contractor shall redirect resources to such work items and execute such portions of the work as may be required to complete the work within the current approved contract schedule.

### **ARTICLE 3 -- CONTRACTOR RESPONSIBILITIES**

The Contractor shall register and utilize the Owner's eBuilder digital project management system for submission of documents described in the following sections. This includes but is not limited to submittals as required by designer, payment applications, Request for Information (RFI), construction change orders, Request for Proposals (RFP), Designer Supplemental Instructions (DSI), etc.

#### **ARTICLE 3.1 -- ACCEPTABLE SUBSTITUTIONS**

- A. The Contractor may request use of any article, device, product, material, fixture, form or type of construction which in the judgment of the Owner and Designer is equal in all respects to that named. Standard products of manufacturers other than those specified will be accepted when, prior to the ordering or use thereof, it is proven to the satisfaction of the Owner and Designer that they are equal in design, strength, durability, usefulness and convenience for the purpose intended.
- B. Any changes required in the details and dimensions indicated on the drawings for the substitution of products other than those specified shall be properly made at the expense of the Contractor requesting the substitution or change.
- C. The Contractor shall submit a request for such substitutions in writing to the Owner and Designer within twenty (20) working days after the date of

the "Notice to Proceed." Thereafter no consideration will be given to alternate forms of accomplishing the work. This Article does not preclude the Owner from exercising the provisions of Article 4 hereof.

- D. Any request for substitution by the Contractor shall be submitted in accordance with SECTION 002113 - INSTRUCTIONS TO BIDDERS.
- E. When a material has been approved, no change in brand or make will be permitted unless:
  - 1. Written verification is received from the manufacturer stating they cannot make delivery on the date previously agreed, or
  - 2. Material delivered fails to comply with contract requirements.

#### **ARTICLE 3.2 -- SUBMITTALS**

- A. The Contractor's submittals must be submitted with such promptness as to allow for review and approval so as not to cause delay in the work. The Contractor shall coordinate preparation and processing of submittals with performance of construction activities.

Coordinate each submittal with fabrication, = purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

Submit four (4) copies to the Designer and additional copies as required for the subcontractors and material suppliers. Also provide copies to meet the requirements for maintenance manuals.

- B. All subcontractors' shop drawings and schedules shall be submitted by the Contractor and shall bear evidence that Contractor has received, reviewed, and approved them. Any shop drawings and schedules submitted without this evidence will be returned to the Contractor for resubmission.
- C. The Contractor shall include with the shop drawing, a letter indicating any and all deviations from the drawings and/or specifications. Failure to notify the Designer of such deviations will be grounds for subsequent rejection of the related work or materials. If, in the opinion of the Designer, the deviations are not acceptable, the Contractor will be required to furnish the item as specified and indicated on the drawings.
- D. The Designer shall check shop drawings and schedules with reasonable promptness and approve them only if they conform to the design concept of the project and comply with the information given in the contract documents. The approval shall not relieve the Contractor from the responsibility to comply with the drawings and specifications, unless the Contractor has called the Designer's attention to the deviation, in writing, at the time of

submission and the Designer has knowingly approved thereof. An approval of any such modification will be given only under the following conditions:

1. It is in the best interest of the Owner
  2. It does not increase the contract sum and/or completion time
  3. It does not deviate from the design intent
  4. It is without prejudice to any and all rights under the surety bond.
- E. No extension of time will be granted because of the Contractor's failure to submit shop drawings and schedules in ample time to allow for review, possible resubmission, and approval. Fabrication of work shall not commence until the Contractor has received approval. The Contractor shall furnish prints of approved shop drawings and schedules to all subcontractors whose work is in any way related to the work under this contract. Only prints bearing this approval will be allowed on the site of construction
- F. The Contractor shall maintain a complete file on-site of approved shop drawings available for use by the Construction Representative.

#### **ARTICLE 3.3 – AS-BUILT DRAWINGS**

- A. The Contractor shall update a complete set of the construction drawings, shop drawings and schedules of all work monthly by marking changes, and at the completion of their work (prior to submission of request for final payment) note all changes and turn the set over to the Construction Representative. The updates shall show all addenda, all field changes that were made to adapt to field conditions, changes resulting from contract changes or supplemental instructions, and all locations of structures, buried installations of piping, conduit, and utility services. All buried and concealed items both inside and outside shall be accurately located as to depth and referenced to permanent features such as interior or exterior wall faces and dimensions shall be given in a neat and legible manner in a contrasting colored pencil or ink. If approved by the Designer, an electronic file format may be provided.

#### **ARTICLE 3.4 – GUARANTY AND WARRANTIES**

- A. General Guaranty
1. Neither the final certificate of payment nor any provision in the contract documents nor partial use or occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with contract requirements.

2. The Contractor or surety shall remedy any defects in the work and pay for any damage to property resulting there from which shall appear within a period of one (1) year from the date of substantial completion unless a longer period is otherwise specified or a differing guaranty period has been established in the substantial completion certificate. The Owner will give notice of observed defects with reasonable promptness.
3. In case of default on the part of the Contractor in fulfilling this part of this contract, the Owner may correct the work or repair the damage and the cost and expense incurred in such event shall be paid by or recoverable from the Contractor or surety.
4. The work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's guaranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment

#### **B. Extended Warranty**

Manufacturer's certificates of warranty shall be obtained for all major equipment. Warranty shall be obtained for at least one year. Where a longer period is offered at no additional cost or called for in the specific equipment specifications, the longer period shall govern.

#### **ARTICLE 3.5 -- OPERATION AND MAINTENANCE MANUALS**

- A. Immediately after equipment submittals are approved and no later than ten (10) working days prior to the substantial completion inspection, the Contractor shall provide to the Designer three (3) copies of operating instructions and service manuals, containing the following:
1. Start-up and Shut-down Procedures: Provide a step-by-step write up of all major equipment. When manufacturer's printed start-up, trouble shooting and shut-down procedures are available; they may be incorporated into the operating manual for reference.

2. Operating Instructions: Written operating instructions shall be included for the efficient and safe operation of all equipment.
  3. Equipment List: List of all major equipment as installed shall be prepared to include model number, capacities, flow rate, name plate data, shop drawings and air and water balance reports.
  4. Service Instructions: Provide the following information for all pieces of equipment.
    - a. Recommended spare parts including catalog number and name of local supplier or factory representative.
    - b. Belt sizes, types, and lengths.
    - c. Wiring diagrams.
  5. Manufacturer's Certificate of Warranty as described in Article 3.4.
  6. Prior to the final payment, furnish to the Designer three (4) copies of parts catalogs for each piece of equipment furnished by him/her on the project with the components identified by number for replacement ordering.
- B. Submission of operating instructions shall be done in the following manner.
1. Manuals shall be in quadruplicate, and all materials shall be bound into volumes of standard 8½" x 11" hard binders. Large drawings too bulky to be folded into 8½" x 11" shall be separately bound or folded and in envelopes, cross referenced and indexed with the manuals.
  2. The manuals shall identify project name, project number, and include the name and address of the Contractor, subcontractors and manufacturers who were involved with the activity described in that particular manual.
  3. Internally subdivide the binder contents with permanent page dividers, logically organized with tab titles clearly printed under reinforced laminated plastic tabs.
  4. Contents: Prepare a Table of Contents for each volume, with each product or system description identified.
- ARTICLE 3.6 – OTHER CONTRACTOR RESPONSIBILITIES**
- A. The Contractor shall keep on site, during progress of the work, a competent superintendent satisfactory to the Construction Representative. The superintendent shall represent the Contractor and all agreements made by the superintendent shall be binding. The superintendent shall carefully study and compare all drawings, specifications and other instructions and shall promptly notify the Construction Representative and Designer, in writing, any error, inconsistency or omission which may be discovered. The superintendent shall coordinate all work on the project. Any change of the superintendent shall be approved by the Construction Representative.
- B. Contractor shall, at all times, enforce strict discipline and good order among his employees, and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him/her.
- C. The Contractor shall supply sufficient labor, material, plant and equipment and pay when due any laborer, subcontractor or supplier for supplies furnished and otherwise prosecute the work with diligence to prevent work stoppage and ensure completion thereof within the time specified.
- D. The Contractor and each of his subcontractors shall submit to the Construction Representative, through the Designer such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed under this contract.
- E. The Contractor, subcontractors, and material suppliers shall upon written request, give the Owner access to all time cards, material invoices, payrolls, estimates, profit and loss statements, and all other direct or indirect costs related to this work.
- F. The Contractor shall be responsible for laying out all contract work such as layout of architectural, structural, mechanical and electrical work, which shall be coordinated with layouts of subcontractors for general construction work. The Contractor is also responsible for unloading, uncrating and handling of all materials and equipment to be erected or placed by him/her, whether furnished by Contractor or others. No extra charges or compensation will be allowed as a result of failure to verify dimensions before ordering materials or fabricating items.
- G. The Contractor must notify the Construction Representative at least one working day before placing concrete or burying underground utilities, pipelines, etc.
- H. Contractors shall prearrange time with the Construction Representative for the interruption of any facility operation. Unless otherwise specified in these documents, all connections, alterations or relocations as well as all other portions of the work will be performed during normal working hours.

- I. The Contractor shall coordinate all work so there will not be prolonged interruptions of existing equipment operation. Any existing plumbing, heating, ventilating, air conditioning or electrical disconnections necessary for the project, which affect portions of this construction or building or any other building must be scheduled with the Construction Representative to minimize or avoid any disruption of facility operations. In no case, unless previously approved in writing by the Construction Representative, shall utilities be left disconnected at the end of a work day or over a weekend. Any interruption of utilities either intentionally or accidentally shall not relieve the Contractor responsible for the interruption from the responsibility to repair and restore the utility to normal service. Repairs and restoration shall be made before the workers responsible for the repair and restoration leave the job.
- J. Contractors shall limit operations and storage of materials to the area within the project, except as necessary to connect to existing utilities, and shall not encroach on neighboring property. The Contractor shall be responsible for repair of their damage to property on or off the project site occurring during construction of project. All such repairs shall be made to the satisfaction of the property owner.
- K. Unless otherwise permitted, all materials shall be new and both workmanship and materials shall be of the best quality.
- L. Unless otherwise provided and stipulated within these specifications, the Contractor shall furnish, construct, and/or install and pay for materials, devices, mechanisms, equipment, all necessary personnel, utilities including, but not limited to water, heat, light and electric power, transportation services, applicable taxes of every nature, and all other facilities necessary for the proper execution and completion of the work.
- M. Contractor shall carefully examine the plans and drawings and shall be responsible for the proper fitting of his material, equipment and apparatus into the building.
- N. The Contractor or subcontractors shall not overload, or permit others to overload, any part of any structure during the performance of this contract.
- O. All temporary shoring, bracing, etc., required for the removal of existing work and/or for the installation of new work shall be included in this contract. The Contractor shall make good, at no cost to the Owner, any damage caused by improper support or failure of shoring in any respect. Each Contractor shall be responsible for shoring required to protect his work or adjacent property and improvements of Owner and shall be responsible for shoring or for giving written notice to adjacent property owners. Shoring shall be removed only after completion of permanent supports.
- P. The Contractor shall provide at the proper time such material as is required for support of the work. If openings are required, whether shown on drawings or not, the Contractor shall see that they are properly constructed.
- Q. During the performance of work the Contractor shall be responsible for providing and maintaining warning signs, lights, signal devices, barricades, guard rails, fences and other devices appropriately located on site which will give proper and understandable warning to all persons of danger of entry onto land, structure or equipment.
- R. The Contractor shall be responsible for protection, including weather protection, and proper maintenance of all equipment and materials.
- S. The Contractor shall be responsible for care of the finished work and shall protect same from damage or defacement until substantial completion by the Owner. If the work is damaged by any cause, the Contractor shall immediately begin to make repairs in accordance with the drawings and specifications. Contractor shall be liable for all damage or loss unless attributable to the acts or omissions of the Owner or Designer. Any claim for reimbursement shall be submitted in accordance with Article 4. After substantial completion the Contractor will only be responsible for damage resulting from acts or omissions of the Contractor or subcontractors through final warranty.
- T. In the event the Contractor encounters an unforeseen hazardous material, the Contractor shall immediately stop work in the area affected and report the condition to the Owner and Designer in writing. The Contractor shall not be required, pursuant to Article 4, to perform, any work relating to hazardous materials.
- U. In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 4.
- V. Before commencing work, Contractors shall confer with the Construction Representative and facility representative and review any facility rules and regulations which may affect the conduct of the work.

W. Project signs will only be erected on major projects and only as described in the specifications. If no sign is specified, none shall be erected.

### **ARTICLE 3.7 -- SUBCONTRACTS**

- A. Subcontractor assignments as identified in the bid form shall not be changed without written approval of the Owner. The Owner will not approve changes of a listed subcontractor unless the Contractor documents, to the satisfaction of the Owner that the subcontractor cannot or will not perform the work as specified.
- B. The Contractor is fully responsible to the Owner for the acts and omissions of all subcontractors and of persons either directly or indirectly employed by them.
- C. Every subcontractor shall be bound by the applicable terms and provisions of these contract documents, but no contractual relationship shall exist between any subcontractor and the Owner unless the right of the Contractor to proceed with the work is suspended or this contract is terminated as herein provided, and the Owner in writing elects to assume the subcontract.
- D. The Contractor shall upon receipt of "Notice to Proceed" and prior to submission of the first payment request, notify the Designer and Construction Representative in writing of the names of any subcontractors to be used in addition to those identified in the bid form and all major material suppliers proposed for all parts of the work.

### **ARTICLE 4 -- CHANGES IN THE WORK**

#### **4.1 CHANGES IN THE WORK**

- A. The Construction Representative, without giving notice to the surety and without invalidating this contract, may order extra work or make changes by altering, adding to or deducting from the work, this contract sum being adjusted accordingly. All such work shall be executed under the conditions of the original contract. A claim for extension of time caused by any change must be adjusted at the time of ordering such change. No future request for time will be considered.
- B. Each Contract Change shall include all costs required to perform the work including all labor, material, equipment, overheads and profit, delay, disruptions, or other miscellaneous expenses. No subsequent requests for additional compensation including claims for delay, disruption, or reduced efficiency as a result of each change will be considered. Values from the Schedule of Values will not be binding as a basis for additions to or deductions from the contract price.

C. The amount of any adjustment in this contract price for authorized changes shall be agreed upon before such changes become effective and shall be determined, through submission of a request for proposal, as follows:

- 1. By an acceptable fixed price proposal from the Contractor. Breakdowns shall include all takeoff sheets of each Contractor and subcontractor. Breakdown shall include a listing of each item of material with unit prices and number of hours of labor for each task. Labor costs per hour shall be included with labor burden identified, which shall be not less than the prevailing wage rate, etc. Overhead and profit shall be shown separately for each subcontractor and the Contractor.
  - 2. By a cost-plus-fixed-fee (time and material) basis with maximum price, total cost not to exceed said maximum. Breakdown shall include a listing of each item of material with unit prices and number of hours of labor for each task. Labor costs per hour shall be included with labor burden identified, which shall be not less than the prevailing wage rate, etc. Overhead and profit shall be shown separately for each subcontractor and the Contractor.
  - 3. By unit prices contained in Contractor's original bid form and incorporated in the construction contract.
- D. Overhead and Profit on Contract Changes shall be applied as follows:

- 1. The overhead and profit charge by the Contractor and all subcontractors shall be considered to include, but is not limited to: incidental job burdens, small truck (under 1 ton) expense, mileage, small hand tools, warranty costs, company benefits and general office overhead. Project supervision including field supervision and job site office expense shall be considered a part of overhead and profit unless a compensable time extension is granted.
- 2. The percentages for overhead and profit charged on Contract Changes shall be subject to the following limits: (a) the percentage mark-up for the Contractor shall be limited to the Contractor's fee; (b) fifteen percent (15%) maximum for Work directly performed by employees of a subcontractor, or sub-subcontractor; (c) five percent (5%) maximum for the Work performed or passed through to the Owner by the Contractor; (d) five percent (5%) maximum subcontractor's mark-up for

Work performed by a sub-subcontractor and passed through to the Owner by the subcontractor and Contractor; and (e) in no case shall the total overhead and profit paid by the Owner on any Contract Changes exceed twenty-five percent (25%) of the cost of materials, labor and equipment (exclusive of Contractor or any Subcontractor overhead and profit) necessary to put the contract change work in place.

3. The Contractor will be allowed to add the cost of Contractor's payment and performance bonding, builder's risk insurance, and general liability insurance to their cost of work. The above listed bonding and insurance cost shall not exceed two percent (2%) and shall be allowed on the total cost of the added work, including overhead and profit.
  4. On proposals covering both increases and decreases in the amount of this contract, the application of overhead and profit shall be on the net change in the cost of the work.
  5. The percentage(s) for overhead and profit to be credited to the Owner on Contract Changes that are solely decreases in the quantity of work or materials shall be the same as those for additive Contract Changes provided above.
- E. No claim for an addition to this contract sum shall be valid unless authorized as aforesaid in writing by the Owner. In the event that none of the foregoing methods are agreed upon, the Owner may order the Contractor to perform work on a time and material basis. The cost of such work shall be determined by the Contractor's actual labor and material cost to perform the work plus overhead and profit as outlined herein. The Designer and Construction Representative shall approve the Contractor's daily time and material invoices for the work involved.
- F. If the Contractor claims that any instructions involve extra cost under this contract, the Contractor shall give the Owner's Representative written notice thereof within a reasonable time after the receipt of such instructions, and in any event before proceeding to execute the work. No such claim shall be valid unless so made and authorized by the Owner, in writing.
- G. In an emergency affecting the safety of life or of the structure or of adjoining property, the Contractor, without special instruction or authorization from the Construction Representative, is hereby permitted to act at their discretion to prevent such threatened loss or injury. The Contractor shall submit a claim for compensation for such emergency work in writing to the Owner's Representative.

#### ARTICLE 4.2 – CHANGES IN COMPLETION TIME

- A. Extension of the number of work days stipulated in the Contract for completion of the work with compensation may be made when:
1. The contractor documents that proposed Changes in the work, as provided in Article 4.1, extends construction activities critical to contract completion date, OR
  2. The Owner suspends all work for convenience of the Owner as provided in Article 7.3, OR
  3. An Owner caused delay extends construction activities critical to contract completion (except as provided elsewhere in these General Conditions). The Contractor is to review the work activities yet to begin and evaluate the possibility of rescheduling the work to minimize the overall project delay.
- B. Extension of the number of work days stipulated in the Contract for completion of the work without compensation may be made when:
1. Weather-related delays occur, subject to provisions for the inclusion of a specified number of "bad weather" days when provided for in Section 012100-Allowances, OR
  2. Labor strikes or acts of God occur, OR
  3. The work of the Contractor is delayed on account of conditions which were beyond the control of the Contractor, subcontractors or suppliers, and were not the result of their fault or negligence.
- C. No time extension or compensation will be provided for delays caused by or within the control of the Contractor, subcontractors or suppliers and for concurrent delays caused by the Owner.
- D. The Contractor shall notify the Owner promptly of any occurrence or conditions which in the Contractor's opinion results in a need for an extension of time. The notice shall be in writing and shall include all necessary supporting materials with details of any resultant costs and be submitted in time to permit full investigation and evaluation of the Contractor's claim. The Owner shall promptly acknowledge the Contractor's notice and, after recommendation from the Owner's Representative and/or Designer, shall provide a decision to the Contractor. Failure on the part of the Contractor to provide such notice and to detail the costs shall constitute a waiver by the Contractor of any claim. Requests for extensions of time shall be for working days only.

## **ARTICLE 5 - CONSTRUCTION AND COMPLETION**

### **ARTICLE 5.1 – CONSTRUCTION COMMENCEMENT**

A. Upon receipt of the "Intent to Award" letter, the Contractor must submit the following properly executed instruments to the Owner:

1. Contract;
2. Performance/payment bond as described in Article 6.1;
3. Certificates of Insurance, or the actual policies themselves, showing that the Contractor has obtained the insurance coverage required by Article 6.2.

Above referenced items must be received by the Owner within ten (10) working days after the effective date of the contract. If not received, the Owner may treat the failure to timely submit them as a refusal by the Contractor to accept a contract for this work and may retain as liquidated damages the Contractor's bid bond, cashier's check or certified check as provided in the Instructions to Bidders. Upon receipt the Owner will issue a "Notice to Proceed" with the work to the Contractor.

B. Within the time frame noted in Section 013200 - Schedules, following receipt of the "Notice to Proceed", the Contractor shall submit to the Owner a progress schedule and schedule of values, showing activities through the end of the contract period. Should the Contractor not receive written notification from the Owner of the disapproval of the schedule of values within fifteen (15) working days, the Contractor may consider it approved for purpose of determining when the first monthly Application and Certification for Payment may be submitted.

C. The Contractor may commence work upon receipt of the Division of Facilities Management, Design and Construction's "Notice to Proceed" letter. Contractor shall prosecute the work with faithfulness and energy, and shall complete the entire work on or before the completion time stated in the contract documents or pay to the Owner the damages resulting from the failure to timely complete the work as set out within Article 5.4.

### **ARTICLE 5.2 -- PROJECT CONSTRUCTION**

A. Each Contractor shall submit for the Owner's approval, in reproducible form, a progress schedule showing the rate of progress and the order of the work proposed to carry on various phases of the project. The schedule shall be in conformance

with the requirements outlined in Section 013200 – Schedules.

B. Contractor shall employ and supply a sufficient force of workers, material, and equipment and shall pay when due, any worker, subcontractor or supplier and otherwise prosecute the work with such diligence so as to maintain the rate of progress indicated on the progress schedule, prevent work stoppage, and insure completion of the project within the time specified.

### **ARTICLE 5.3 -- PROJECT COMPLETION**

A. Substantial Completion. A Project is substantially complete when construction is essentially complete and work items remaining to be completed can be done without interfering with the Owner's ability to use the Project for its intended purpose.

1. Once the Contractor has reached what they believe is Substantial Completion, the Contractor shall notify the Designer and the Construction Representative of the following:
  - a. That work is essentially complete with the exception of certain listed work items. The list shall be referred to as the "Contractor's Punch."
  - b. That all Operation and Maintenance Manuals have been assembled and submitted in accordance with Article 3.5A.
  - c. That the Work is ready for inspection by the Designer and Construction Representative. The Owner shall be entitled to a minimum of ten working days notice before the inspection shall be performed.

2. If the work is acceptable, the Owner shall issue a Certificate of Substantial Completion, which shall set forth the responsibilities of the Owner and the Contractor for utilities, security, maintenance, damage to the work and risk of loss. The Certificate shall also identify those remaining items of work to be performed by the Contractor. All such work items shall be complete within 30 working days of the date of the Certificate, unless the Certificate specifies a different time. If the Contractor shall be required to perform tests that must be delayed due to climatic conditions, it is understood that such tests and affected equipment will be identified on the Certificate and shall be accomplished by the Contractor at the earliest possible date. Performance of the tests may not be required before Substantial Completion can be issued. The date of the issuance of the Certificate of

Substantial Completion shall determine whether or not the work was completed within the contract time and whether or not Liquidated Damages are due.

3. If the work is not acceptable, and the Owner does not issue a Certificate of Substantial Completion, the Owner shall be entitled to charge the Contractor with the Designer's and Owner's costs of re-inspection, including time and travel.
- B. Partial Occupancy. Contractor agrees that the Owner shall be permitted to occupy and use any completed or partially completed portions of the Project, when such occupancy and use is in the Owner's best interest. Owner shall notify Contractor of its desire and intention to take Partial Occupancy as soon as possible but at least ten (10) working days before the Owner intends to occupy. If the Contractor believes that the portion of the work the Owner intends to occupy is not ready for occupancy, the Contractor shall notify the Owner immediately. The Designer shall inspect the work in accordance with the procedures above. If the Contractor claims increased cost of the project or delay in completion as a result of the occupancy, he shall notify the Owner immediately but in all cases before occupancy occurs.
- C. Final Completion. The Project is finally complete when the Certificate of Substantial Completion has been issued and all work items identified therein as incomplete have been completed, and when all administrative items required by the contract have been completed. Final Completion entitles the Contractor to payment of the outstanding balance of the contract amount including all change orders and retainage. Within five (5) working days of the date of the Certificate of Substantial Completion, the Contractor shall identify the cost to complete any outstanding items of work. The Designer shall review the Contractor's estimate and either approve it or provide an independent estimate for all such items. If the Contractor fails to complete the remaining items within the time specified in the Certificate, the Owner may terminate the contract and go to the surety for project completion in accordance with Article 7.2 or release the contract balance to the Contractor less 150% of the approved estimate to complete the outstanding items. Upon completion of the outstanding items, when a final cost has been established, any monies remaining shall be paid to the Contractor. Failure to complete items of work does not relieve the Contractor from the obligation to complete the administrative requirements of the contract, such as the provisions of Article 5.3 FAILURE TO COMPLETE ALL ITEMS OF WORK UNDER THE CONTRACT SHALL BE CONSIDERED A

#### DEFAULT AND BE GROUNDS FOR CONTRACT TERMINATION AND DEBARMENT.

- D. Liquidated Damages. Contractor agrees that the Owner may deduct from the contract price and retain as liquidated damages, and not as penalty or forfeiture, the sum stipulated in this contract for each work day after the Contract Completion Day on which work is not Substantially Complete. Assessment of Liquidated Damages shall not relieve the Contractor or the surety of any responsibility or obligation under the Contract. In addition, the Owner may, without prejudice to any other rights, claims, or remedies the Owner may have including the right to Liquidated Damages, charge the Contractor for all additional expenses incurred by the Owner and/or Designer as the result of the extended contract period through Final Completion. Additional Expenses shall include but not be limited to the costs of additional inspections.
- E. Early Completion. The Contractor has the right to finish the work before the contract completion date; however, the Owner assumes no liability for any hindrances to the Contractor unless Owner caused delays result in a time extension to the contract completion date. The Contractor shall not be entitled to any claims for lost efficiencies or for delay if a Certificate of Substantial Completion is given on or before the Contract Completion Date.

#### ARTICLE 5.4 -- PAYMENT TO CONTRACTOR

- A. Payments on account of this contract will be made monthly in proportion to the work which has been completed. Request for payment must be submitted on the Owner's forms. No other pay request will be processed. Supporting breakdowns must be in the same format as Owner's forms and must provide the same level of detail. The Designer will, within 5 working days from receipt of the contractor's request for payment either issue a Certificate for Payment to the Owner, for such amount as the Designer determines is properly due, or notify the Contractor in writing of reasons for withholding a Certificate. The Owner shall make payment within 30 calendar days after the "Application and Certification for Payment" has been received and certified by the Designer. The following items are to be attached to the contractor's pay request:
  1. Updated construction schedule
  2. Certified payrolls consisting of name, occupation and craft, number of hours worked and actual wages paid for each individual employee, of the Contractor and all subcontractors working on the project

- B. The Owner shall retain 5 percent of the amount of each such payment application, except as allowed by Article 5.4, until final completion and acceptance of all work covered by this contract.
- C. Each payment made to Contractor shall be on account of the total amount payable to Contractor and all material and work covered by paid partial payment shall thereupon become the sole property of Owner. This provision shall not be construed as relieving Contractor from sole responsibility for care and protection of materials and work upon which payments have been made or restoration of any damaged work or as a waiver of the right of Owner to require fulfillment of all terms of this contract.
- D. Materials delivered to the work site and not incorporated in the work will be allowed in the Application and Certification for Payment on the basis of one hundred (100%) percent of value, subject to the 5% retainage providing that they are suitably stored on the site or in an approved warehouse in accordance with the following requirements:
1. Material has previously been approved through submittal and acceptance of shop drawings conforming to requirements of Article 3.2 of General Conditions.
  2. Delivery is made in accordance with the time frame on the approved schedule.
  3. Materials, equipment, etc., are properly stored and protected from damage and deterioration and remain so - if not, previously approved amounts will be deleted from subsequent pay applications.
  4. The payment request is accompanied by a breakdown identifying the material equipment, etc. in sufficient detail to establish quantity and value.
- E. The Contractor shall be allowed to include in the Application and Certification for Payment, one hundred (100%) of the value, subject to retainage, of major equipment and material stored off the site if all of the following conditions are met:
1. The request for consideration of payment for materials stored off site is made at least 15 working days prior to submittal of the Application for Payment including such material. Only materials inspected will be considered for inclusion on Application for Payment requests.
  2. Materials stored in one location off site are valued in excess of \$25,000.
  3. That a Certificate of Insurance is provided indicating adequate protection from loss, theft conversion or damage for materials stored off site. This Certificate shall show the State of Missouri as an additional insured for this loss.
4. The materials are stored in a facility approved and inspected, by the Construction Representative.
  5. Contractor shall be responsible for, Owner costs to inspect out of state facilities, and any delays in the completion of the work caused by damage to the material or for any other failure of the Contractor to have access to this material for the execution of the work.
- F. The Owner shall determine the amount, quality and acceptability of the work and materials which are to be paid for under this contract. In the event any questions shall arise between the parties, relative to this contract or specifications, determination or decision of the Owner or the Construction Representative and the Designer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this contract affected in any manner or to any extent by such question.
- G. Payments Withheld: The Owner may withhold or nullify in whole or part any certificate to such extent as may be necessary to protect the Owner from loss on account of:
1. Defective work not remedied. When a notice of noncompliance is issued on an item or items, corrective action shall be undertaken immediately. Until corrective action is completed, no monies will be paid and no additional time will be allowed for the item or items. The cost of corrective action(s) shall be borne by the Contractor.
  2. A reasonable doubt that this contract can be completed for the unpaid balance.
  3. Failure of the Contractor to update as-built drawings monthly for review by the Construction Representative.
  4. Failure of the Contractor to update the construction schedule.
- When the Construction Representative is satisfied the Contractor has remedied above deficiencies, payment shall be released.
- H. Final Payment: Upon receipt of written notice from the Contractor to the Designer and Project Representative that the work is ready for final inspection and acceptance, the Designer and Project Representative, with the Contractor, shall promptly make such inspection. If the work is acceptable and the contract fully performed, the Construction Representative shall complete a final acceptance report and the Contractor will be

directed to submit a final Application and Certification for Payment. If the Owner approves the same, the entire balance shall be due and payable, with the exception of deductions as provided for under Article 5.4.

1. Where the specifications provide for the performance by the Contractor of (certain tests for the purpose of balancing and checking the air conditioning and heating equipment and the Contractor shall have furnished and installed all such equipment in accordance with the specifications, but said test cannot then be made because of climatic conditions, such test shall may be considered as required under the provisions of the specifications, Section 013300 and this contract may be substantial Full payment will not be made until the tests have been made and the equipment and system is finally accepted. If the tests are not completed when scheduled, the Owner may deduct 150% of the value of the tests from the final payment.
2. The final payment shall not become due until the Contractor delivers to the Construction Representative:
  - a) A complete file of releases, on the standard form included in the contract documents as "Final Receipt of Payment and Release Form", from subcontractors and material suppliers evidencing payment in full for services, equipment and materials, as the case may require, if the Owner approves, or a consent from the Surety to final payment accepting liability for any unpaid amounts.
  - b) An Affidavit of Compliance with Prevailing Wage Law, in the form as included in this contract specifications, properly executed by each subcontractor, and the Contractor
  - c) Certified copies of all payrolls
  - d) As-built drawings
3. If any claim remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such a claim including all costs and a reasonable attorney's fee.
4. Missouri statute requires prompt payment from the Owner to the Contractor within thirty calendar days and from the Contractor to his subcontractors within fifteen calendar days. Failure to make payments within the required

time frame entitles the receiving party to charge interest at the rate of one and one half percent per month calculated from the expiration of the statutory time period until paid.

5. The value of all unused unit price allowances and/or 150% of the value of the outstanding work items, and/or liquidated damages may be deducted from the final pay request without executing a Contract Change. Any unit price items which exceed the number of units in the contract may be added by Contract Change.

## **ARTICLE 6 -- INSURANCE AND BONDS**

### **ARTICLE 6.1 -- BOND**

- A. Contractor shall furnish a performance/payment bond in an amount equal to 100% of the contract price to guarantee faithful performance of the contract and 100% of the contract price to guarantee the payment of all persons performing labor on the project and furnishing materials in connection therewith under this contract as set forth in the standard form of performance and payment bond included in the contract documents. The surety on such bond shall be issued by a surety company authorized by the Missouri Department of Insurance to do business in the state of Missouri.
- B. All Performance/Payment Bonds furnished in response to this provision shall be provided by a bonding company with a rating of B+ or higher as established by A.M. Best Company, Inc. in their most recent publication.

**ARTICLE 6.2 – INSURANCE**

- A. The successful Contractor shall procure and maintain for the duration of the contract issued a policy or policies of insurance for the protection of both the Contractor and the Owner and their respective officers, officials, agents, consultants and employees. The Owner requires certification of insurance coverage from the Contractor prior to commencing work.
- B. Minimum Scope and Extent of Coverage
  - 1. General Liability  
Commercial General Liability, ISO coverage form number or equivalent CG 00 01 ("occurrence" basis), or I-SO coverage form number CG 00 02, or ISO equivalent.  
  
If ISO equivalent or manuscript general liability coverage forms are used, minimum coverage will be as follows: Premises/Operations; Independent Contractors; Products/Completed Operations; personal Injury; Broad Form Property Damage including Completed Operations; Broad Form Contractual Liability Coverage to include Contractor's obligations under Article 1.11 Indemnification and any other Special Hazards required by the work of the contract.
  - 2. Automobile Liability  
Business Automobile Liability Insurance, ISO Coverage form number or equivalent CA 00 01 covering automobile liability, code 1 "ANY AUTO".
  - 3. Workers' Compensation and Employer's Liability  
Statutory Workers' Compensation Insurance for Missouri and standard Employer's Liability Insurance, or the authorization to self-insure for such liability from the Missouri Division of Workers' Compensation.
  - 4. Builder's Risk or Installation Floater Insurance  
Insurance upon the work and all materials, equipment, supplies, temporary structures and similar items which may be incident to the performance of the work and located at or adjacent to the site, against loss or damage from fire and such other casualties as are included in extended coverage in broad "All Risk" form, including coverage for Flood and Earthquake, in an amount not less than the replacement cost of the work or this contract price, whichever is greater, with loss payable to Contractor and Owner as their respective interests may appear.

Contractor shall maintain sufficient insurance to cover the full value of the work and materials as the work progresses, and shall furnish Owner copies of all endorsements. If Builder's Risk Reporting- Form of Endorsement is used, Contractor shall make all reports as required therein so as to keep in force an amount of insurance which will equal the replacement cost of the work, materials, equipment, supplies, temporary structures, and other property covered thereby; and if, as a result of Contractor's failure to make any such report, the amount of insurance so recoverable shall be less than such replacement cost, Contractor's interest in the proceeds of such insurance, if any, shall be subordinated to Owner's interest to the end that Owner may receive full reimbursement for its loss.

- C. Minimum Limits of Insurance
  - 1. General Liability  
Contractor  
\$2,000,000 combined single limit per occurrence for bodily injury, personal injury, and property damage  
\$2,000,000 annual aggregate
  - 2. Automobile Liability  
\$2,000,000 combined single limit per occurrence for bodily injury and property damage
  - 3. Workers' Compensation and Employers Liability  
Workers' Compensation limits as required by applicable State Statutes (generally unlimited) and minimum of \$1,000,000 limit per accident for Employer's Liability.  
  
General Liability and Automobile Liability insurance may be arranged under individual policies for the full limits required or by a combination of underlying policies with the balance provided by a form-following Excess or Umbrella Liability policy.
- D. Deductibles and Self-Insured Retentions  
All deductibles, co-payment clauses, and self-insured retentions must be declared to and approved by the Owner. The Owner reserves the right to request the reduction or elimination of unacceptable deductibles or self-insured retentions, as they would apply to the Owner, and their respective officers, officials, agents, consultants and employees. Alternatively, the Owner may request Contractor to procure a bond guaranteeing

payment of losses and related investigations, claims administration, and defense expenses.

E. Other Insurance Provisions and Requirements

The respective insurance policies and coverage, as specified below, must contain, or be endorsed to contain the following conditions or provisions:

1. General Liability

The Owner, and its respective commissioners, officers, officials, agents, consultants and employees shall be endorsed as additional insured's by ISO form CG 20 26 Additional Insured - Designated Person or Organization. As additional insured's, they shall be covered as to work performed by or on behalf of the Contractor or as to liability which arises out of Contractor's activities or resulting from the performance of services or the delivery of goods called for by the Contract.

Contractor's insurance coverage shall be primary with respect to all additional insured's. Insurance of self-insurance programs maintained by the designated additional -insured's shall be excess of the Contractor's insurance and shall not contribute with it.

Additionally, the Contractor and Contractor's general liability insurer shall agree to waive all rights of subrogation against the Owner and any of their respective officers, officials, agents, consultants or employees for claims, losses, or expenses which arise out of Contractor's activities or result from the performance of services or the delivery of goods called for by the Contract.

Contractor's failure to comply with the terms and conditions of these insurance policies shall not affect or abridge coverage for the Owner, or for any of their officers, officials, agents, consultants or employees.

2. Automobile Insurance

The Owner, and their respective officers, officials, agents, consultants and employees shall be endorsed as additional insured's by ISO form CG 20 26 - Additional Insured Designated Person or Organization. As additional insured's, they shall be covered as to work performed by or on behalf of the Contractor or as to liability which arises out of Contractor's activities or resulting from the performance of services or the delivery of goods called for by the Contract.

Contractor's insurance coverage shall be primary with respect to all additional insured's. Insurance or self-insurance

programs maintained by the designated additional insured's shall be in excess of the Contractor's insurance and shall not contribute with it.

Additionally, the Contractor and Contractor's automobile insurer shall agree to waive all rights of subrogation against the Owner and any of their respective officers, officials, agents, consultants or employees for claims, losses, or expenses which arise out of Contractor's activities or result from the performance of services or the delivery of goods called for by the Contract.

Contractor's failure to comply with the terms and conditions of these insurance policies shall not affect or abridge coverage for the Owner or for any of its officers, officials, agents, consultants or employees.

3. Workers' Compensation/Employer's Liability

Contractor's workers' compensation insurance shall be endorsed with NCCI form WC 00 03 01 A - Alternative Employer Endorsement. The Alternative Employer Endorsement shall designate the Owner as "alternate employers."

4. All Coverages

Each insurance policy required by this section of the Contract shall contain a stipulation, endorsed if necessary, that the Owner will receive a minimum of a thirty (30) calendar day advance notice of any policy cancellation. Ten (10) calendar days advance notice is required for policy cancellation due to non-payment of premium.

F. Insurer Qualifications and Acceptability

Insurance required hereunder shall be issued by an A.M. Best, "B+" rated, Class IX insurance company approved to conduct insurance business in the state of Missouri.

G. Verification of Insurance Coverage

Prior to Owner issuing a Notice to Proceed, the Contractor shall furnish the Owner with Certificate(s) of Insurance and with any applicable original endorsements evidencing the required insurance coverage. The insurance certificates and endorsements are to be signed by a person authorized by that insurer to bind coverage on its behalf. All certificates and endorsements received by the Owner are subject to review and approval by the Owner. The Owner reserves the right to require certified copies of all required policies at any time. If the scope of this contract will exceed one (1) year - or, if any of Contractor's applicable insurance coverage expires prior to completion of the work or services required under this contract -

the Contractor will provide a renewal or replacement certificate before continuing work or services hereunder. If the Contractor fails to provide documentation of required insurance coverage, the Owner may issue a stop work order and no additional contract completion time and/or compensation shall be granted as a result thereof.

## **ARTICLE 7 – SUSPENSION OR TERMINATION OF CONTRACT**

### **ARTICLE 7.1 - FOR SITE CONDITIONS**

When conditions at the site of the proposed work are considered by the Owner to be unsatisfactory for prosecution of the work, the Contractor may be ordered in writing to suspend the work or any part thereof until reasonable conditions exist. When such suspension is not due to fault or negligence of the Contractor, time allowed for completion of such suspended work will be extended by a period of time equal to that lost due to delay occasioned by ordered suspension. This will be a no cost time extension.

### **ARTICLE 7.2 - FOR CAUSE**

#### **A. Termination or Suspension for Cause:**

1. If the Contractor shall file for bankruptcy, or should make a general assignment for the benefit of the creditors, or if a receiver should be appointed on account of insolvency, or if the contractor should persistently or repeatedly refuse or fail to supply enough properly skilled workers or proper materials, or if the contractor should fail to make prompt payment to subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Owner, or otherwise be guilty of a substantial violation of any provision of this contract, then the Owner may serve notice on the Contractor and the surety setting forth the violations and demanding compliance with this contract. Unless within ten (10) consecutive calendar days after serving such notice, such violations shall cease and satisfactory arrangements for correction be made, the Owner may suspend the Contractor's right to proceed with the work or terminate this contract.
2. In the event the Owner suspends Contractor's right to proceed with the work or terminates the contract, the Owner may demand that the Contractor's surety take over and complete the work on this contract, after the surety submits a written proposal to the Owner and receives written approval and upon the surety's failure or refusal to do so within ten (10) consecutive

calendar days after demand therefore, the Owner may take over the work and prosecute the same to completion by bid or negotiated contract, or the Owner may elect to take possession of and utilize in completing the work such materials, supplies, appliances and plant as may be on the site of the work, and all subcontractors, if the Owner elects, shall be bound to perform their contracts.

- B. The Contractor and its surety shall be and remain liable to the Owner for any excess cost or damages occasioned to the Owner as a result of the actions above set forth.
- C. The Contractor in the event of such suspension or termination shall not be entitled to receive any further payments under this contract until the work is wholly finished. Then if the unpaid balance under this contract shall exceed all expenses of the Owner as certified by the Director, such excess shall be paid to the Contractor; but, if such expenses shall exceed the unpaid balance as certified by the Director, the Contractor and their surety shall be liable for and shall pay the difference and any damages to the Owner.
- D. In exercising Owner's right to secure completion of the work under any of the provisions hereof, the Director shall have the right to exercise Owner's sole discretion as to the manner, methods and reasonableness of costs of completing the work.
- E. The rights of the Owner to suspend or terminate as herein provided shall be cumulative and not exclusive and shall be in addition to any other remedy provided by law.
- F. The Contractor in the event of such suspension or termination may be declared ineligible for Owner contracts for a minimal period of twelve (12) months. Further, no contract will be awarded to any Contractor who lists in their bid form any subcontractor whose prior performance has contributed, as determined by the Owner, to a breach of a contract. In order to be considered for state-awarded contracts after this period, the Contractor/subcontractor will be required to forward acceptance reports to the Owner regarding successful completion of non-state projects during the intervening twelve (12) months from the date of default. No contracts will be awarded to a subcontractor/Contractor until the ability to perform responsibly in the private sector has been proven to the Owner.

### **ARTICLE 7.3 -- FOR CONVENIENCE**

- A. The Owner may terminate or suspend the Contract or any portion of the Work without cause at any time, and at the Owner's convenience. Notification of a termination or suspension shall be in writing

and shall be given to the Contractor and their surety. If the Contract is suspended, the notice will contain the anticipated duration of the suspension or the conditions under which work will be permitted to resume. If appropriate, the Contractor will be requested to demobilize and re-mobilize and will be reimbursed time and costs associated with the suspension.

B. Upon receipt of notification, the Contractor shall:

1. Cease operations when directed.
2. Take actions to protect the work and any stored materials.
3. Place no further subcontracts or orders for material, supplies, services or facilities except as may be necessary to complete the portion of the Contract that has not been terminated. No claim for payment of materials or supplies ordered after the termination date shall be considered.
4. Terminate all existing subcontracts, rentals, material, and equipment orders.

5. Settle all outstanding liabilities arising from termination with subcontractors and suppliers.

6. Transfer title and deliver to the Owner, work in progress, completed work, supplies and other material produced or acquire for the work terminated, and completed or partially completed plans, drawings information and other property that, if the Contract had been completed, would be required to be furnished to the Owner.

C. For termination without cause and at the Owner's convenience, in addition to payment for work completed prior to date of termination, the Contractor may be entitled to payment of other documented costs directly associated with the early termination of the contract. Payment for anticipated profit and unapplied overhead will not be allowed.

## SECTION 007300 - SUPPLEMENTARY CONDITIONS

### 1.0 GENERAL:

A. These Supplementary General Conditions clarify, add, delete, or otherwise modify standard terms and conditions of DIVISION 0, BIDDING AND CONTRACTING REQUIREMENTS.

### 2.0 CONTACTS:

Designer: Brian Harrington  
Allstate Consultants LLC  
3312 LeMone Industrial Boulevard  
Columbia, Missouri 65201  
Telephone: (573) 875-8799  
Email: [bharrington@allstate75.com](mailto:bharrington@allstate75.com)

Construction Representative: Dustin Cooper  
Division of Facilities Management, Design and Construction  
301 West High Street, Room 730  
Jefferson City, Missouri 65101  
Telephone: (573) 536-1692  
Email: [dustin.cooper@oa.mo.gov](mailto:dustin.cooper@oa.mo.gov)

Project Manager: Scott Samuels  
Division of Facilities Management, Design and Construction  
301 West High Street, Room 730  
Jefferson City, Missouri 65101  
Telephone: (573) 690-6760  
Email: [scott.samuels@oa.mo.gov](mailto:scott.samuels@oa.mo.gov)

Contract Specialist: Paul Girouard  
Division of Facilities Management, Design and Construction  
301 West High Street, Room 730  
Jefferson City, Missouri 65101  
Telephone: (573) 751-4797  
Email: [Paul.Girouard@oa.mo.gov](mailto:Paul.Girouard@oa.mo.gov)

### 3.0 NOTICE: ALL BID MATERIALS ARE DUE AT THE TIME OF BID SUBMITTAL. THERE IS NO SECOND SUBMITTAL FOR THIS PROJECT.

### 4.0 FURNISHING CONSTRUCTION DOCUMENTS:

- A. The Owner will furnish the Contractor with approximately 5 complete sets of drawings and specifications at no charge.
- B. The Owner will furnish the Contractor with approximately 5 sets of explanatory or change drawings at no charge.
- C. The Contractor may make copies of the documents as needed with no additional cost to the Owner.

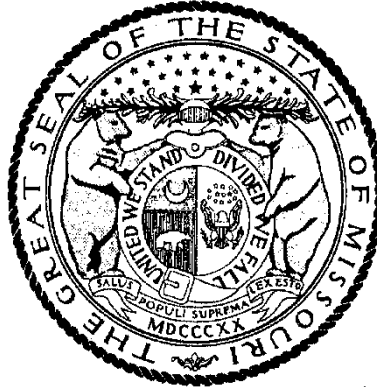
### 5.0 SAFETY REQUIREMENTS

Contractor and subcontractors at any tier shall comply with RSMo 292.675 and Article 1.3, E, of Section 007213, General Conditions.

# Missouri

## Division of Labor Standards

### WAGE AND HOUR SECTION



MIKE KEHOE, Governor

# Annual Wage Order No. 32

Section 080  
**PETTIS COUNTY**

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by \_\_\_\_\_

Logan Hobbs, Director  
Division of Labor Standards

Filed With Secretary of State: \_\_\_\_\_ **March 10, 2025**

Last Date Objections May Be Filed: **April 9, 2025**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	\$72.21
Boilermaker	\$27.82*
Bricklayer-Stone Mason	\$56.32
Carpenter	\$55.57
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	\$55.20
Plasterer	
Communication Technician	\$27.82*
Electrician (Inside Wireman)	\$74.00
Electrician Outside Lineman	\$27.82*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	\$27.82*
Glazier	\$43.38
Ironworker	\$72.47
Laborer	\$52.89
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	\$27.82*
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	\$69.66
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	\$47.31
Plumber	\$80.97
Pipe Fitter	
Roofer	\$61.09
Sheet Metal Worker	\$73.43
Sprinkler Fitter	\$69.03
Truck Driver	\$27.82*
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

\*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

\*\*The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMo Section 290.210.

Heavy Construction Rates for  
 PETTIS County

Section 080

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	\$27.82*
Millwright	
Pile Driver	
Electrician (Outside Lineman)	\$27.82*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	\$50.21
General Laborer	
Skilled Laborer	
Operating Engineer	\$59.26
Group I	
Group II	
Group III	
Group IV	
Truck Driver	\$27.82*
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

\*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

\*\*The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.

# OVERTIME and HOLIDAYS

## OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, "**overtime work**" shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

## HOLIDAYS

January first;  
The last Monday in May;  
July fourth;  
The first Monday in September;  
November eleventh;  
The fourth Thursday in November; and  
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

## **SECTION 011000 – SUMMARY OF WORK**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The Project consists of Improvements to the Sanitary Sewer System and the Stormwater Conveyance System.
  - 1. Project Location: Missouri State Fairgrounds, 2503 West 16<sup>th</sup> Street, Sedalia, Missouri 65301.
  - 2. Owner: State of Missouri, Office of Administration, Division of Facilities Management, Design and Construction, Harry S Truman State Office Building, Post Office Box 809, 301 West High Street, Jefferson City, Missouri 65102.
- B. Contract Documents, dated September 19, 2025 were prepared for the Project by Allstate Consultants LLC, 3312 LeMone Industrial Boulevard, Columbia, Missouri 65201.
- C. The Work consists of focusing on the existing aging sewer laterals within the building facilities and the stormwater portion is focused on the conveyance systems and their capacities.
  - 1. The Work for the new campground includes: comfort station with 12 bathrooms and 4 showers; site grading; granular street surfacing; campsite utility pads; campground utilities and offsite extensions for water, sewer, and electric.
- D. The Work will be constructed under a single prime contract.

#### **1.3 DESIGNER'S ESTIMATE OF CONSTRUCTION COST RANGE (not applicable)**

#### **1.4 WORK UNDER OTHER CONTRACTS (not applicable)**

#### **1.5 FUTURE WORK (not applicable)**

#### **1.6 WORK SEQUENCE**

- A. The Work may be required to be conducted in phases based on the events scheduled for the fairgrounds during the construction of this project. The contractor must coordinate the construction operations with the Facility Manager of the fairgrounds.

#### **1.7 CONTRACTOR USE OF PREMISES**

- A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the Owner's right to perform work or to retain other contractors on portions of the Project.

B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy and use by the public.
2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

**1.8 OCCUPANCY REQUIREMENTS (not applicable)**

**1.9 OWNER-FURNISHED PRODUCTS (not applicable)**

**1.10 MISCELLANEOUS PROVISIONS**

**PART 2 - PRODUCTS (not Applicable)**

**PART 3 - EXECUTION**

**3.1 SCHEDULE OF PRODUCTS ORDERED IN ADVANCE**

**END OF SECTION 011000**

## **SECTION 012100 – ALLOWANCES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements governing allowances.
  - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
  - 1. Weather allowances.
- C. Related Sections include the following:
  - 1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
  - 2. Division 1 Section "Unit Prices" for procedures for using unit prices.

#### **1.3 WEATHER ALLOWANCE**

- A. Included within the completion period for this project are a specified number of “bad weather” days (see Schedule of Allowances).
- B. The Contractor’s progress schedule shall clearly indicate the bad weather day allowance as an “activity” or “activities”. In the event weather conditions preclude performance of critical work activities for 50% or more of the Contractor’s scheduled workday, that day shall be declared unavailable for work due to weather (a “bad weather” day) and charged against the above allowance. Critical work activities will be determined by review of the Contractor’s current progress schedule.
- C. The Contractor’s Representative and the Construction Representative shall agree monthly on the number of “bad weather” days to be charged against the allowance. This determination will be documented in writing and be signed by the Contractor and the Construction Representatives. If there is a failure to agree on all or part of the “bad weather” days for a particular month, that disagreement shall be noted on this written document and signed by each party’s representative. Failure of the Contractor’s representative to sign the “bad weather” day documentation after it is presented, with or without the notes of disagreement, shall constitute agreement with the “bad weather” day determination contained in that document.
- D. There will be no modification to the time of contract performance due solely to the failure to deplete the “bad weather” day allowance.

- E. Once this allowance is depleted, a no cost Change Order time extension will be executed for “bad weather” days, as defined above, encountered during the remainder of the Project.

**1.4 SELECTION AND PURCHASE (not applicable)**

**1.5 SUBMITTALS (not applicable)**

**1.6 COORDINATION (not applicable)**

**1.7 [LUMP-SUM] ALLOWANCES (not applicable)**

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

**PART 3 - EXECUTION**

**3.1 EXAMINATION (not applicable)**

**A. PREPARATION (not applicable)**

**3.2 SCHEDULE OF ALLOWANCES**

- A. Weather Allowance: Included within the completion period for this Project “bad weather” days. The Contract will allow for 10 “bad weather” days.

**END OF SECTION 012100**

## **SECTION 012300 - ALTERNATES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements governing Alternates.

#### **1.3 DEFINITIONS**

- A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents..

- 1. The cost for each alternate is the net addition to the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

- B. No additional time will be allowed for alternate work unless the number of work days is so stated on the bid form.

#### **1.4 PROCEDURES**

- A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate the Alternate Work into the Project.

- 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

- B. Notification: The award of the Contract will indicate whether alternates have been accepted or rejected.

- C. Execute accepted alternates under the same conditions as other Work of this Contract.

- D. Schedule: A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each alternate.

### **PART 2 - PRODUCTS (Not Applicable)**

### **PART 3 - EXECUTION**

#### **3.1 BASE BID**

- A. Site No. 1 – 477 camp sites and 1 comfort station. See Sheet C-004 (Green).

### **3.2 SCHEDULE OF ALTERNATES**

- A. Alternate No. 1: Site No. 2 – 80 camp sites. See Sheet C-004 (Cyan).
- B. Alternate No. 2: Site No. 3 – 1 comfort station. See Sheet C-004 (Magenta).
- C. Alternate No. 3: Site No. 4 – 111 camp sites. See Sheet C-004 (Blue).
- D. Alternate No. 4: Site No. 5 – 83 camp sites. See Sheet C-004 (Yellow).

**END OF SECTION 012300**

## **SECTION 012600 – CONTRACT MODIFICATION PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section specifies administrative and procedural requirements for handling and processing Contract Modifications.
- B. Related Sections include the following:
  - 1. Division 1, Section 012100 "Allowances" for procedural requirements for handling and processing Allowances.
  - 2. Division 1, Section 013115 "Project Management Communications" for administrative requirements for communications.
  - 3. Division 0, Section 007213, Article 3.1 "Acceptable Substitutions" for administrative procedures for handling Requests for Substitutions made after Contract award.

#### **1.3 REQUESTS FOR INFORMATION**

- A. In the event that the Contractor or Subcontractor, at any tier, determines that some portion of the Drawings, Specifications, or other Contract Documents requires clarification or interpretation, the Contractor shall submit a "Request for Information" (RFI) in writing to the Designer. A RFI may only be submitted by the Contractor and shall only be submitted on the RFI forms provided by the Owner. The Contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed. In the RFI, the Contractor shall set forth an interpretation or understanding of the requirement along with reasons why such an understanding was reached.
- B. Responses to RFI shall be issued within ten (10) working days of receipt of the Request from the Contractor unless the Designer determines that a longer time is necessary to provide an adequate response. If a longer time is determined necessary by the Designer, the Designer will, within five (5) working days of receipt of the request, notify the Contractor of the anticipated response time. If the Contractor submits a RFI on a time sensitive activity on the current project schedule, the Contractor shall not be entitled to any time extension due to the time it takes the Designer to respond to the request provided that the Designer responds within the ten (10) working days set forth above.

#### **1.4 MINOR CHANGES IN THE WORK**

- A. Designer will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Amount or the Contract Time, on "Designer's Supplemental Instructions" (DSI).

## **1.5 PROPOSAL REQUESTS**

- A. The Designer or Owner Representative will issue a detailed description of proposed Changes in the Work that may require adjustment to the Contract Amount or the Contract Time. The proposed Change Description will be issued using the "Request for Proposal" (RFP) form. If necessary, the description will include supplemental or revised Drawings and Specifications.
1. Proposal Requests issued by the Designer or Owner Representative are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
  2. Within ten (10) working days after receipt of Proposal Request, submit a proposal for the cost adjustments to the Contract Amount and the Contract Time necessary to execute the Change. The Contractor shall submit his proposal on the appropriate Change Order Detailed Breakdown form. Subcontractors may use the appropriate Change Order Detailed Breakdown form or submit their proposal on their letterhead provided the same level of detail is included. All proposals shall include:
    - a. A detailed breakdown of costs per Article 4.1 of the General Conditions.
    - b. If requesting additional time per Article 4.2 of the General Conditions, include an updated Contractor's Construction Schedule that indicates the effect of the Change including, but not limited to, changes in activity duration, start and finish times, and activity relationship.

## **1.6 CHANGE ORDER PROCEDURES**

- A. On Owner's approval of a Proposal Request, the Designer or Owner Representative will issue a Change Order for signatures of Owner and Contractor on the "Change Order" form.

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

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 012600**

## **SECTION 013100 – COORDINATION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes administrative provisions for coordinating construction operations on Projects including, but not limited to, the following:
  - 1. Administrative and supervisory personnel.
  - 2. Project meetings.
- B. Related Sections include the following:
  - 1. Division 1, Section 013200 "Schedules" for preparing and submitting Contractor's Construction Schedule.
  - 2. Articles 1.8.B and 1.8.C of Section 007213 "General Conditions" for coordinating meetings onsite.
  - 3. Article 5.4.H of Section 007213 "General Conditions" for coordinating Closeout of the Contract.

#### **1.3 COORDINATION**

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections, which depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results
  - 2. where installation of one part of the Work depends on installation of other components, before or after its own installation.
- B. Prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Preparation of Contractor's Construction Schedule.
  - 2. Preparation of the Schedule of Values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Startup and adjustment of systems.

8. Project Closeout activities.
- C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

#### **1.4 SUBMITTALS**

- A. Key Personnel Names: Within fifteen (15) work days of starting construction operations, submit a list of key personnel assignments including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

#### **1.5 PROJECT MEETINGS**

- A. The Owner's Construction Representative will schedule a Pre-Construction Meeting prior to beginning of construction. The date, time, and exact place of this meeting will be determined after Contract Award and notification of all interested parties. The Contractor shall arrange to have the Job Superintendent and all prime Subcontractors present at the meeting. During the Pre-Construction Meeting, the construction procedures and information necessary for submitting payment requests will be discussed and materials distributed along with any other pertinent information.
1. Minutes: Designer will record and distribute meeting minutes.
- B. Progress Meetings: The Owner's Construction Representative will conduct Monthly Progress Meetings as stated in Articles 1.8.B and 1.8.C of Section 007213 "General Conditions".
1. Minutes: Designer will record and distribute to Contractor the meeting minutes.
  2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration including requirements for the following:
    - a. Contract Documents
    - b. Related RFIs
    - c. Purchases
    - d. Deliveries
    - e. Submittals
    - f. Possible conflicts
    - g. Compatibility problems

- h. Time schedules
  - i. Weather limitations
  - j. Manufacturer's written recommendations
  - k. Warranty requirements
  - l. Temporary facilities and controls
  - m. Space and access limitations
  - n. Regulations of authorities having jurisdiction
  - o. Testing and inspecting requirements
  - p. Installation procedures
  - q. Required performance results
  - r. Protection of construction and personnel
- 3. Contractor shall record significant conference discussions, agreements, and disagreements including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
  - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
  - 6. Project name
  - 7. Name and address of Contractor
  - 8. Name and address of Designer
  - 9. RFI number including RFIs that were dropped and not submitted
  - 10. RFI description
  - 11. Date the RFI was submitted
  - 12. Date Designer's response was received
  - 13. Identification of related DSI or Proposal Request, as appropriate

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

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 013100**

## SECTION 013115 - PROJECT MANAGEMENT COMMUNICATIONS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract including General and Supplementary Conditions, Bid Form, and other Division 1 Specification Sections apply to this Section.
- B. Division 1, Section 013300 - Submittals
- C. Division 1, Section 012600 – Contract Modification Procedures

#### 1.2 SUMMARY

- A. Project Management Communications: The Contractor shall use the Internet web based project management communications tool, E-Builder<sup>®</sup> ASP software, and protocols included in that software during this project. The use of project management communications as herein described does not replace or change any contractual responsibilities of the participants.
  - 1. Project management communications is available through E-Builder<sup>®</sup> as provided by "e-Builder<sup>®</sup>" in the form and manner required by the Owner.
  - 2. The project communications database is on-line and fully functional. User registration, electronic and computer equipment, and Internet connections are the responsibility of each project participant. The sharing of user accounts is prohibited
- B. Support: E-Builder<sup>®</sup> will provide on-going support through on-line help files.
- C. Copyrights and Ownership: Nothing in this specification or the subsequent communications supersedes the parties' obligations and rights for copyright or document ownership as established by the Contract Documents. The use of CAD files, processes or design information distributed in this system is intended only for the project specified herein.
- D. Purpose: The intent of using E-Builder<sup>®</sup> is to improve project work efforts by promoting timely initial communications and responses. Secondly, to reduce the number of paper documents while providing improved record keeping by creation of electronic document files
- E. Authorized Users: Access to the web site will be by individuals who are authorized users.
  - 1. Individuals shall complete the E-Builder New Company/User Request Form located at the following web site: <https://oa.mo.gov/facilities/vendor-links/contractor-forms>.

Completed forms shall be emailed to the following email address: [OA.FMDCE-BuilderSupport@oa.mo.gov](mailto:OA.FMDCE-BuilderSupport@oa.mo.gov).

2. Authorized users will be contacted directly and assigned a temporary user password.
  3. Individuals shall be responsible for the proper use of their passwords and access to data as agents of the company in which they are employed.
- F. Administrative Users: Administrative users have access and control of user licenses and all posted items. **DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE!** Improper or abusive language toward any party or repeated posting of items intended to deceive or disrupt the work of the project will not be tolerated and will result in deletion of the offensive items and revocation of user license at the sole discretion of the Administrative User(s).
- G. Communications: The use of fax, email and courier communication for this project is discouraged in favor of using E-Builder® to send messages. Communication functions are as follows:
1. Document Integrity and Revisions:
    - a. Documents, comments, drawings and other records posted to the system shall remain for the project record. The authorship time and date shall be recorded for each document submitted to the system. Submitting a new document or record with a unique ID, authorship, and time stamp shall be the method used to make modifications or corrections.
    - b. The system shall make it easy to identify revised or superseded documents and their predecessors.
    - c. Server or Client side software enhancements during the life of the project shall not alter or restrict the content of data published by the system. System upgrades shall not affect access to older documents or software.
  2. Document Security:
    - a. The system shall provide a method for communication of documents. Documents shall allow security group assignment to respect the contractual parties communication except for Administrative Users. **DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE!**
  3. Document Integration:
    - a. Documents of various types shall be logically related to one another and discoverable. For example, requests for information, daily field reports, supplemental sketches and photographs shall be capable of reference as related records.
  4. Reporting:
    - a. The system shall be capable of generating reports for work in progress, and logs for each document type. Summary reports generated by the system shall be available for team members.
  5. Notifications and Distribution:
    - a. Document distribution to project members shall be accomplished both within the extranet system and via email as appropriate. Project document distribution to parties outside of the project communication system shall be

accomplished by secure email of outgoing documents and attachments, readable by a standard email client.

6. Required Document Types:
  - a. RFI, Request for Information.
  - b. Submittals, including record numbering by drawing and specification section.
  - c. Transmittals, including record of documents and materials delivered in hard copy.
  - d. Meeting Minutes.
  - e. Application for Payments (Draft or Pencil).
  - f. Review Comments.
  - g. Field Reports.
  - h. Construction Photographs.
  - i. Drawings.
  - j. Supplemental Sketches.
  - k. Schedules.
  - l. Specifications.
  - m. Request for Proposals
  - n. Designer's Supplemental Instructions
  - o. Punch Lists

H. Record Keeping: Except for paper documents, which require original signatures and large format documents (greater than 8½ x 11 inches), all other 8½ x 11 inches documents shall be submitted by transmission in electronic form to the E-Builder® web site by licensed users.

- a. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Sub Contractors and suppliers at every tier shall respond to documents received in electronic form on the web site, and consider them as if received in paper document form.
- b. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Sub Contractors and suppliers at every tier reserves the right to and shall reply or respond by transmissions in electronic form on the web site to documents actually received in paper document form.
- c. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Sub Contractors and suppliers at every tier reserves the right to and shall copy any paper document into electronic form and make same available on the web site.

I. Minimum Equipment and Internet Connection: In addition to other requirements specified in this Section, the Owner and his representatives, the Construction Manager and his representatives, the Architect and his consultants, and the Contractor and his sub-contractors and suppliers at every tier required to have a user license(s) shall be responsible for the following:

1. Providing suitable computer systems for each licensed user at the users normal work location<sup>1</sup> with high-speed Internet access, i.e. DSL, local cable company's Internet connection, or T1 connection.
2. Each of the above referenced computer systems shall have the following minimum system<sup>2</sup> and software requirements:
  - a. Desktop configuration (Laptop configurations are similar and should be equal to or exceed desktop system.)
    - 1) Operating System: Windows XP or newer
    - 2) Internet Browser: Internet Explorer 6.01SP2+ (Recommend IE7.0+)
    - 3) Minimum Recommend Connection Speed: 256K or above
    - 4) Processor Speed: 1 Gigahertz and above
    - 5) RAM: 512 mb
    - 6) Operating system and software shall be properly licensed.
    - 7) Internet Explorer version 7 (current version is a free distribution for download). This specification is not intended to restrict the host server or client computers provided that industry standard HTTP clients may access the published content.
    - 8) Adobe Acrobat Reader (current version is a free distribution for download).
    - 9) Users should have the standard Microsoft Office Suite (current version must be purchased) or the equivalent.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION (Not Applicable.)**

**END OF SECTION 013115**

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<sup>1</sup> The normal work location is the place where the user is assigned for more than one-half of his time working on this project.

<sup>2</sup> The minimum system herein will not be sufficient for many tasks and may not be able to process all documents and files stored in the E-Builder® Documents area.

## **SECTION 013200 – SCHEDULE – BAR CHART**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes requirements for a Bar Chart Schedule for the project construction activities, schedule of submittals, and schedule for testing.

### **PART 2 - PRODUCTS – (Not Applicable)**

### **PART 3 - EXECUTION**

#### **3.1 SUBMITTAL PROCEDURES**

- A. The Contractor shall submit to the Designer, within ten (10) working days following the Notice to Proceed, a Progress Schedule including Schedule of Values showing the rate of progress the Contractor agrees to maintain and the order in which he proposed to carry out the various phases of Work. No payments shall be made to the Contractor until the Progress Schedule has been approved by the Owner.
  - 1. The Schedule of Values must have the following line items included with the value of the item as indicated below:
    - a. O&M's (Owner's Manual)
      - 1) \$1,000,000.00 (One million) and under – 2% of the total contract amount
      - 2) Over \$1,000,000.00 (One million) – 1% of the total contract amount
    - b. Close Out Documents
      - 1) \$1,000,000.00 (One million) and under – 2% of the total contract amount
      - 2) Over \$1,000,000.00 (One million) – 1% of the total contract amount
    - c. General Conditions
      - 1) No more than 10%
- B. The Contractor shall submit an updated Schedule for presentation at each Monthly Progress Meeting. The Schedule shall be updated by the Contractor as necessary to reflect the current Schedule and its relationship to the original Schedule. The updated Schedule shall reflect any changes in the logic, sequence, durations, or completion date.

Payments to the Contractor shall be suspended if the Progress Schedule is not adequately updated to reflect actual conditions.

- C. The Contractor shall submit Progress Schedules to Subcontractors to permit coordinating their Progress Schedules to the general construction Work. The Contractor shall coordinate preparation and processing of Schedules and reports with performance of other construction activities.

### 3.2 CONSTRUCTION PROGRESS SCHEDULE – BAR CHART SCHEDULE

- A. Bar-Chart Schedule: The Contractor shall prepare a comprehensive, fully developed, horizontal bar chart-type Contractor’s Construction Schedule. The Contractor for general construction shall prepare the Construction Schedule for the entire Project. The Schedule shall show the percentage of work to be completed at any time, anticipated monthly payments by Owner, as well as significant dates (such as completion of excavation, concrete foundation work, underground lines, superstructure, rough-ins, enclosure, hanging of fixtures, etc.) which shall serve as check points to determine compliance with the approved Schedule. The Schedule shall also include an activity for the number of “bad” weather days specified in Section 012100 – Allowances.
  - 1. The Contractor shall provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week.
    - a. If practical, use the same Schedule of Values breakdown for schedule time bars.
  - 2. The Contractor shall provide a base activity time bar showing duration for each construction activity. Each bar is to indicate start and completion dates for the activity. The Contractor is to place a contrasting bar below each original schedule activity time for indicating actual progress and planned remaining duration for the activity.
  - 3. The Contractor shall prepare the Schedule on a minimal number of separate sheets to readily show the data for the entire construction period.
  - 4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on schedule with other construction activities. Include minor elements involved in the overall sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.
  - 5. Coordinate the Contractor’s Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other required schedules and reports.
  - 6. Indicate the Intent to Award and the Contract Substantial Completion dates on the schedule.
- B. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by the following:
  - 1. Requirement for Phased completion
  - 2. Work by separate Contractors
  - 3. Work by the Owner

4. Pre-purchased materials
  5. Coordination with existing construction
  6. Limitations of continued occupancies
  7. Un-interruptible services
  8. Partial Occupancy prior to Substantial Completion
  9. Site restrictions
  10. Provisions for future construction
  11. Seasonal variations
  12. Environmental control
- C. Work Stages: Use crosshatched bars to indicate important stages of construction for each major portion of the Work. Such stages include, but are not necessarily limited to, the following:
1. Subcontract awards
  2. Submittals
  3. Purchases
  4. Mockups
  5. Fabrication
  6. Sample testing
  7. Deliveries
  8. Installation
  9. Testing
  10. Adjusting
  11. Curing
  12. Startup and placement into final use and operation
- D. Area Separations: Provide a separate time bar to identify each major area of construction for each major portion of the Work. For the purposes of this Article, a “major area” is a story of construction, a separate building, or a similar significant construction element.
1. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.
    - b. Permanent space enclosure
    - c. Completion of mechanical installation
    - d. Completion of the electrical portion of the Work
    - e. Substantial Completion

### **3.3 SCHEDULE OF SUBMITTALS**

- A. Upon acceptance of the Construction Progress Schedule, prepare and submit a complete schedule of submittals. Coordinate the submittal schedule with Section 013300 SUBMITTALS, the approved Construction Progress Schedule, list of subcontracts, Schedule of Values and the list of products.
- B. Prepare the schedule in chronological order. Provide the following information
  - 1. Scheduled date for the first submittal
  - 2. Related Section number
  - 3. Submittal category
  - 4. Name of the Subcontractor
  - 5. Description of the part of the Work covered
  - 6. Scheduled date for resubmittal
  - 7. Scheduled date for the Designer's final release or approval
- C. Distribution: Following the Designer's response to the initial submittal schedule, print and distribute copies to the Designer, Owner, subcontractors, and other parties required to comply with submittal dates indicated.
  - 1. Post copies in the Project meeting room and temporary field office.
  - 2. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned part of the Work and are no longer involved in construction activities.
- D. Schedule Updating: Revise the schedule after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

### **3.4 SCHEDULE OF INSPECTIONS AND TESTS**

- A. Prepare a schedule of inspections, tests, and similar services required by the Contract Documents. Submit the schedule with (15) days of the date established for commencement of the Contract Work. The Contractor is to notify the testing agency at least (5) working days in advance of the required tests unless otherwise specified.
- B. Form: This schedule shall be in tabular form and shall include, but not be limited to, the following:
  - 1. Specification Section number
  - 2. Description of the test
  - 3. Identification of applicable standards
  - 4. Identification of test methods
  - 5. Number of tests required
  - 6. Time schedule or time span for tests
  - 7. Entity responsible for performing tests

8. Requirements for taking samples
  9. Unique characteristics of each service
- C. Distribution: Distribute the schedule to the Owner, Architect, and each party involved in performance of portions of the Work where inspections and tests are required.

**END OF SECTION 013200**

## **SECTION 013300 – SUBMITTALS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract including General and Supplementary Conditions, Bid Form, and other Division 1 Specification Sections apply to this Section.
- B. Division 1, Section 013115 “Project Management Communications” for administrative requirements for communications.

#### **1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work including the following:
  - 1. Shop Drawings
  - 2. Product Data
  - 3. Quality Assurance Submittals
  - 4. Construction Photographs
  - 5. Operating and Maintenance Manuals
  - 6. Warranties
- B. Administrative Submittals: Refer to General and Supplementary Conditions other applicable Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
  - 1. Construction Progress Schedule including Schedule of Values
  - 2. Performance and Payment Bonds
  - 3. Insurance Certificates
  - 4. Applications for Payment
  - 5. Certified Payroll Reports
  - 6. Partial and Final Receipt of Payment and Release Forms
  - 7. Affidavit – Compliance with Prevailing Wage Law
  - 8. Record Drawings
  - 9. Notifications, Permits, etc.
- C. The Contractor is obliged and responsible to check all shop drawings and schedules to assure compliance with contract plans and specifications. The Contractor is responsible for the content of the shop drawings and coordination with other contract work. Shop drawings and schedules shall indicate, in detail, all parts of an Item or Work including erection and setting instructions and integration with the Work of other trades.

- D. The Contractor shall at all times make a copy, of all approved submittals, available on site to the Construction Representative.

### **1.3 SUBMITTAL PROCEDURES**

- A. The Contractor shall comply with the General and Supplementary Conditions and other applicable sections of the Contract Documents. The Contractor shall submit, with such promptness as to cause no delay in his work or in that of any other contractors, all required submittals indicated in Part 3.1 of this section and elsewhere in the Contract Documents. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
  - 1. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
    - a. The Designer reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
- B. Each drawing and/or series of drawings submitted must be accompanied by a letter of transmittal giving a list of the titles and numbers of the drawings. Each series shall be numbered consecutively for ready reference and each drawing shall be marked with the following information:
  - 1. Date of Submission
  - 2. Name of Project
  - 3. Location
  - 4. Section Number of Specification
  - 5. State Project Number
  - 6. Name of Submitting Contractor
  - 7. Name of Subcontractor
  - 8. Indicate if Item is submitted as specified or as a substitution

### **1.4 SHOP DRAWINGS**

- A. Comply with the General Conditions, Article 3.2.
- B. The Contractor shall submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
- C. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings including the following information:
  - 1. Dimensions

2. Identification of products and materials included by sheet and detail number
3. Compliance with specified standards
4. Notation of coordination requirements
5. Notation of dimensions established by field measurement
6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8½"x11" but no larger than 11" x 17".

## **1.5 PRODUCT DATA**

- A. The Contractor shall comply with the General Conditions, Article 3.2.
- B. The Contractor shall collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.
  1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information including the following information:
    - a. Manufacturer's printed recommendations
    - b. Compliance with Trade Association standards
    - c. Compliance with recognized Testing Agency standards
    - d. Application of Testing Agency labels and seals
    - e. Notation of dimensions verified by field measurement
    - f. Notation of coordination requirements
  2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

## **1.6 SAMPLES**

## **1.7 QUALITY ASSURANCE DOCUMENTS**

- A. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the Manufacturer certifying compliance with specified requirements.
  1. Signature: Certification shall be signed by an officer of the Manufacturer or other individual authorized to contractually bind the Company.
- B. Inspection and Test Reports: The Contractor shall submit the required inspection and test reports from independent testing agencies as specified in this Section and in other Sections of the Contract Documents.
- C. Construction Photographs: The Contractor shall submit record construction photographs as specified in this Section and in other Sections of the Contract Documents.

1. The Contractor shall submit digital photographs. The Construction Administrator shall determine the quantity and naming convention at the preconstruction meeting.
2. The Contractor shall identify each photograph with project name, location, number, date, time, and orientation.
3. The Contractor shall submit progress photographs monthly unless specified otherwise. Photographs shall be taken one (1) week prior to submitting.
4. The Contractor shall take four (4) site photographs from differing directions and a minimum of five (5) interior photographs indicating the relative progress of the Work.

**1.8 OPERATING AND MAINTENANCE MANUALS AND WARRANTIES**

- A. The Contractor shall submit all required manufacturer’s operating instructions, maintenance/service manuals, and warranties in accordance with the General Conditions, Article 3.5, and Supplementary Conditions along with this and other Sections of the Contract Documents.

**PART 2 - PRODUCTS (Not Applicable)**

**PART 3 - EXECUTION**

**3.1 REQUIRED SUBMITTALS**

- A. Contractor shall submit the following information for materials and equipment to be provided under this contract.

<b>SPEC SECTION</b>	<b>TITLE</b>	<b>CATEGORY</b>
013200	Schedules	Construction Schedule
013200	Schedules	Schedule of Values
013200	Schedules	List of Subcontractors
013200	Schedules	Major Material Suppliers
032000	Concrete Reinforcing	Product Data Shop Drawings
033000	Cast-In-Place Concrete	Product Data Certification Test Report
042000	Unit Masonry	Product Data Certification
051200	Structural Steel Framing	Product Data Shop Drawings
061000	Rough Carpentry	Product Data
061600	Sheathing	Product Data

<b>SPEC SECTION</b>	<b>TITLE</b>	<b>CATEGORY</b>
066400	Plastic Paneling	Product Data
072500	Weather Barriers	Product Data
074113	Metal Roof Panels	Product Data Shop Drawings
074646	Fiber-Cement Siding	Product Data
076200	Sheet Metal Flashing and Trim	Product Data
079200	Joint Sealers	Product Data
081113	Hollow Metal Doors and Frames	Product Data Shop Drawings
087100	Door Hardware	Product Data
102800	Toilet, Bath, and Laundry Accessories	Product Data
310516	Aggregates For Earthworks	Product Data Certification
321123	Aggregate Base Course	Product Data Certification
321623	Sidewalks	Product Data Certification Test Report
329219	Seeding	Product Data
330110.58	Disinfection of Water Utility Piping Systems	Test Report
330505.31	Hydrostatic Testing	Test Report
330505.36	Vacuum Testing	Test Report
330505.41	Air Testing	Test Report
330505.43	Mandrel Testing	Test Report
330561	Concrete Manholes	Product Data Shop Drawings
330563	Concrete Vaults and Chambers	Product Data Shop Drawings
331413	Water Utility Distribution Piping	Product Data
331419	Valves and Hydrants for Water Utility Service	Product Data
333111	Sanitary Sewerage Gravity Sewer	Product Data

**END OF SECTION 013300**

## **SECTION 013513.28 - SITE SECURITY AND HEALTH REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUBMITTALS**

- A. List of required submittals:
  - 1. Materials Safety Data Sheets for all hazardous materials to be brought onsite.
  - 2. Schedule of proposed shutdowns, if applicable.
  - 3. A list of the names of all employees who will submit fingerprints for a background check, and the signed privacy documents identified below for each employee.

### **PART 2 - PRODUCTS (Not Applicable)**

### **PART 3 - EXECUTION**

#### **3.1 ACCESS TO THE SITE**

- A. The Contractor shall arrange with Facility Representatives to establish procedures for the controlled entry of workers and materials into the work areas at the Facility.
- B. The Contractor shall establish regular working hours with Facility Representatives. The Contractor must report changes in working hours or overtime to Facility Representatives and obtain approval twenty-four (24) hours ahead of time. The Contractor shall report emergency overtime to Facility Representatives as soon as it is evident that overtime is needed. The Contractor must obtain approval from Facility Representatives for all work performed after dark.
- C. The Contractor shall provide the name and phone number of the Contractor's employee or agent who is in charge onsite; this individual must be able to be contacted in case of emergency. The Contractor must be able to furnish names and address of all employees upon request.
- D. All construction personnel shall visibly display issued identification cards.

#### **3.2 FIRE PROTECTION, SAFETY, AND HEALTH CONTROLS**

- A. The Contractor shall take all necessary precautions to guard against and eliminate possible fire hazards.
  - 1. Onsite burning is prohibited.

2. The Contractor shall store all flammable or hazardous materials in proper containers located outside the buildings or offsite, if possible.
  3. The Contractor shall provide and maintain, in good order, during construction fire extinguishers as required by the National Fire Protection Association. In areas of flammable liquids, asphalt, or electrical hazards, 15-pound carbon dioxide or 20-pound dry chemical extinguishers shall be provided.
- B. The Contractor shall not obstruct streets or walks without permission from the Owner's Construction Representative and Facility Representatives.
  - C. The Contractor's personnel shall not exceed the speed limit of 15 mph while at the Facility unless otherwise posted.
  - D. The Contractor shall take all necessary, reasonable measures to reduce air and water pollution by any material or equipment used during construction. The Contractor shall keep volatile wastes in covered containers, and shall not dispose of volatile wastes or oils in storm or sanitary drains.
  - E. The Contractor shall keep the project site neat, orderly, and in a safe condition at all times. The Contractor shall immediately remove all hazardous waste, and shall not allow rubbish to accumulate. The Contractor shall provide onsite containers for collection of rubbish and shall dispose of it at frequent intervals during the progress of the Work.
  - F. Fire exits, alarm systems, and sprinkler systems shall remain fully operational at all times, unless written approval is received from the Owner's Construction Representative and the appropriate Facility Representative at least twenty-four (24) hours in advance. The Contractor shall submit a written time schedule for any proposed shutdowns.
  - G. For all hazardous materials brought onsite, Material Safety Data Sheets shall be on site and readily available upon request at least a day before delivery.
  - H. Alcoholic beverages or illegal substances shall not be brought upon the Facility premises. The Contractor's workers shall not be under the influence of any intoxicating substances while on the Facility premises.

### **3.3 SECURITY CLEARANCES AND RESTRICTIONS**

- A. **FMDC REQUIRED FINGERPRINTING FOR CRIMINAL BACKGROUND AND WARRANTS CHECK**
  1. All employees of the Contractor are required to submit fingerprints to the Missouri State Highway Patrol to enable the Office of Administration, Division of Facilities Management, Design and Construction (FMDC) to receive state and national criminal background checks on such employees. FMDC reserves the right to prohibit any employee of the Contractor from performing work in or on the premises of any facility owned, operated, or utilized by the State of Missouri for any reason.
  2. The Contractor shall ensure all of its employees submit fingerprints to the Missouri State Highway Patrol and pay for the cost of such background checks. The Contractor shall submit to FMDC via email to [FMDCSecurity@oa.mo.gov](mailto:FMDCSecurity@oa.mo.gov) a list of the names of the Contractor's employees who will be fingerprinted and a signed Missouri Applicant

Fingerprint Privacy Notice, Applicant Privacy Rights and Privacy Act Statement for each employee. All employees of the Contractor approved by FMDC to work at a State facility must obtain a contractor ID badge from FMDC prior to beginning work on-site, unless the Director of FMDC, at the Director's discretion, waives the requirement for a contractor ID badge. The Contractor and its employees must comply with the process for background checks and contractor ID badges found on FMDC's website at: <https://oa.mo.gov/fmdc-contractor-id-badges>.

3. Pursuant to section 43.540, RSMo, FMDC participates in the Missouri Rap Back and National Rap Back programs as of August 28, 2018. This means that the Missouri State Highway Patrol, Central Records Repository, and the Federal Bureau of Investigation will retain the fingerprints submitted by each of the Contractor's employees, and those fingerprints will be searched against other fingerprints on file, including latent fingerprints. While retained, an employee's fingerprints may continue to be compared against other fingerprints submitted or retained by the Federal Bureau of Investigation, including latent fingerprints.
4. As part of the Missouri and National Rap Back programs, FMDC will receive notification if a new arrest is reported for an employee whose fingerprints have been submitted for FMDC after August 28, 2018. If the employee is performing work on a State contract at the time of the arrest notification, FMDC will request and receive the employee's updated criminal history records. If the employee is no longer performing work on a State contract, FMDC will not obtain updated criminal records.
5. Pursuant to section 43.540, RSMo, the Missouri State Highway Patrol will provide the results of the employee's background check directly to FMDC. FMDC may NOT release the results of a background check to the Contractor or provide the Contractor any information obtained from a background check, either verbally or in writing. FMDC will notify the Contractor only whether an employee is approved to work on State property.
6. Each employee who submits fingerprints to the Missouri State Highway Patrol has a right to obtain a copy of the results of his or her background check. The employee may challenge the accuracy and completeness of the information contained in a background check report and obtain a determination from the Missouri State Highway Patrol and/or the FBI regarding the validity of such challenge prior to FMDC making a final decision about his or her eligibility to perform work under a State contract.
7. The Contractor shall notify FMDC via email to [FMDCSecurity@oa.mo.gov](mailto:FMDCSecurity@oa.mo.gov) if an employee is terminated or resigns from employment with the Contractor. If the Contractor does not anticipate performing work on a State contract in the future, the Contractor may request that FMDC remove its employees from the Rap Back programs. However, if removed from the Rap Back programs, employees will be required to submit new fingerprints should the contractor be awarded another State contract.
8. Upon award of a Contract, the Contractor should contact FMDC at [FMDCSecurity@oa.mo.gov](mailto:FMDCSecurity@oa.mo.gov) to determine if its employees need to provide a new background check. If a Contractor's employee has previously submitted a fingerprint background check to FMDC as part of the Missouri and National Rap Back programs, the employee may not need to submit another fingerprint search for a period of three to six years, depending upon the circumstances. The Contractor understands and agrees that FMDC may require more frequent background checks without providing any explanation to the Contractor. The fact that an additional background check is requested by FMDC does not indicate that the employee has a criminal record.

### **3.4 DISRUPTION OF UTILITIES**

- A. The Contractor shall give a minimum of seventy-two (72) hours written notice to the Construction Representative and the Facility Representative before disconnecting electric, gas, water, fire protection, or sewer service to any building.
- B. The Contractor shall give a minimum of seventy-two (72) hours written notice to the Construction Representative and Facility Representative before closing any access drives, and shall make temporary access available, if possible. The Contractor shall not obstruct streets, walks, or parking.

### **3.5 PROTECTION OF PERSONS AND PROPERTY**

#### **A. SAFETY PRECAUTIONS AND PROGRAMS**

- 1. The Contractor shall at all times conduct operations under this Contract in a manner to avoid the risk of bodily harm to persons or risk of damage to any property. The Contractor shall promptly take precautions which are necessary and adequate against conditions created during the progress of the Contractor's activities hereunder which involve a risk of bodily harm to persons or a risk of damage to property. The Contractor shall continuously inspect Work, materials, and equipment to discover and determine any such conditions and shall be solely responsible for discovery, determination, and correction of any such conditions. The Contractor shall comply with applicable safety laws, standards, codes, and regulations in the jurisdiction where the Work is being performed, specifically, but without limiting the generality of the foregoing, with rules regulations, and standards adopted pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 and applicable amendments.
- 2. All contractors, subcontractors and workers on this project are subject to the Construction Safety Training provisions 292.675 RSMo.
- 3. In the event the Contractor encounters on the site, material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), lead, mercury, or other material known to be hazardous, which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner's Representative and the Architect in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner's Representative and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless by written agreement of the Owner's Representative and the Contractor. "Rendered Harmless" shall mean that levels of such materials are less than any applicable exposure standards, including but limited to OSHA regulations.

#### **B. SAFETY OF PERSONS AND PROPERTY**

- 1. The Contractor shall take reasonable precautions for safety of, and shall provide protection to prevent damage, injury, or loss to:
  - a. clients, staff, the public, construction personnel, and other persons who may be affected thereby;
  - b. the Work and materials and equipment to be incorporated therein, whether in

- storage on or off the site, under care, custody, or control of the Contractor or the Contractor's Subcontractors of any tier; and
- c. other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.
2. The Contractor shall give notices and comply with applicable laws, standards, codes, ordinances, rules, regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury, or loss.
  3. The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, safeguards for safety and protection, including, but not limited to, posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.
  4. When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise the highest degree of care and carry on such activities under supervision of properly qualified personnel.
  5. The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in this Section caused in whole or in part by the Contractor, a Subcontractor of any tier, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable, and for which the Contractor is responsible under this Section, except damage or loss attributable solely to acts or omissions of Owner or the Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's other obligations stated elsewhere in the Contract.
  6. The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents, and the maintaining, enforcing and supervising of safety precautions and programs. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner's Representative and Architect. The Contractor shall hold regularly scheduled safety meetings to instruct Contractor personnel on safety practices, accident avoidance and prevention, and the Project Safety Program. The Contractor shall furnish safety equipment and enforce the use of such equipment by its employees and its subcontractors of any tier.
  7. The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.
  8. The Contractor shall promptly report in writing to the Owner all accidents arising out of or in connection with the Work which cause death, lost time injury, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately.
  9. The Contractor shall promptly notify in writing to the Owner of any claims for injury or damage to personal property related to the work, either by or against the Contractor.
  10. The Owner assumes no responsibility or liability for the physical condition or safety of the Work site or any improvements located on the Work site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or Contract Time concerning any failure by the Contractor or any Subcontractor to comply with the requirements of this Paragraph.

11. In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.
12. The Contractor shall maintain at his own cost and expense, adequate, safe and sufficient walkways, platforms, scaffolds, ladders, hoists and all necessary, proper, and adequate equipment, apparatus, and appliances useful in carrying on the Work and which are necessary to make the place of Work safe and free from avoidable danger for clients, staff, the public and construction personnel, and as may be required by safety provisions of applicable laws, ordinances, rules regulations and building and construction codes.

**END OF SECTION 013513.28**

## **SECTION 015000 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes requirements for construction facilities and temporary controls including temporary utilities, support facilities, security, and protection.
- B. Temporary utilities include, but are not limited to, the following:
  - 1. Temporary electric power and light
  - 2. Temporary heat
  - 3. Ventilation
  - 4. Telephone service
  - 5. Sanitary facilities, including drinking water
- C. Support facilities include, but are not limited to, the following:
  - 1. Field offices and storage sheds
  - 2. signs and bulletin boards
  - 3. Waste disposal services
  - 4. Rodent and pest control
- D. Security and protection facilities include, but are not limited to, to following:
  - 1. Temporary fire protection
  - 2. Barricades, warning signs, and lights
  - 3. Environmental protection

#### **1.3 SUBMITTALS**

#### **1.4 QUALITY ASSURANCE**

- A. Regulations: Comply with industry standards and applicable laws and regulations including, but not limited to, the following:
  - 1. Health and safety regulations
  - 2. Utility company regulations
  - 3. Police, fire department, and rescue squad rules
  - 4. Environmental protection regulations

- B. Standards: Comply with NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations”. ANSI A10 Series standards for “Safety Requirements for Construction and Demolition”, and NECA Electrical Design Library “Temporary Electrical Facilities”.
  - 1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 “National Electric Code”.
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

## **1.5 PROJECT CONDITIONS**

- A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist onsite.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. General: Provide new materials. If acceptable to the Designer, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. Lumber and Plywood: Comply with requirements in Division 6 Section “Rough Carpentry”.
  - 1. For job-built temporary office, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.
  - 2. For signs and directory boards, provide exterior-type, Grade B-B high-density concrete form overlay plywood of sized and thicknesses indicated.
  - 3. For fences and vision barriers, provide minimum 3/9” (9.5mm) thick exterior plywood.
  - 4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8” (16mm) thick exterior plywood.
- C. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of (15) or less. For temporary enclosures, provide translucent, nylon-reinforced laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
- D. Water: Provide potable water approved by local health authorities.

- E. Open-Mesh Fencing: Provide 0.120" (3mm) thick, galvanized 2" (50mm) chainlink fabric fencing 6' (2m) high with galvanized steel pipe posts, 1½" (38mm) ID for line posts and 2½" (64mm) ID for corner posts.

## 2.2 EQUIPMENT

- A. General: Provide new equipment. If acceptable to the Designer, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide ¾" (19mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100' (30m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110 to 120V plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage rating.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixture where exposed to moisture.
- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
- G. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
- H. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated re-circulation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- I. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers, or a combination of extinguishers of NFPA-recommended classes for the exposures.
  - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each Facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### **3.2 TEMPORARY UTILITY INSTALLATION**

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
  - 1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
  - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
  - 3. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Designer. Neither the Owner nor Designer will accept cost or use charges as a basis of claims for Change Order.
- B. Temporary Water Service: The Owner will provide water for construction purposes from the existing building system. All required temporary extensions shall be provided and removed by the Contractor. Connection points and methods of connection shall be designated and approved by the Construction Representative.
- C. Temporary Electric Power Service: The Owner will provide electric power for construction lighting and power tools. Contractors using such services shall pay all costs of temporary services, circuits, outlet, extensions, etc.
- D. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.
  - 1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
  - 2. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP gas or fuel-oil heaters with individual space thermostatic control.
  - 3. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.
- E. Temporary Toilets: Install self-contained toilet units. Use of pit-type privies will not be permitted. Comply with regulations and health codes for the type, number, location,

operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

1. Shield toilets to ensure privacy.
  2. Provide separate facilities for male and female personnel.
  3. Provide toilet tissue materials for each facility.
- F. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a health and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
1. Provide paper towels or similar disposable materials for each facility.
  2. Provide covered waste containers for used material.
  3. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
- G. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper supply.
1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45°F to 55°F (7°C to 13°C).
- H. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

### **3.3 SUPPORT FACILITIES INSTALLATION**

- A. General: Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.
1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
- B. Field Offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip office as follows:
1. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table, plan rack, and a 6-shelf bookcase.
  2. Equip with a water cooler and private toilet complete with water closet, lavatory, and medicine cabinet unit with a mirror.
- C. Storage Facilities: The Owner will provide storage onsite as designated by the Facility Representative or the Construction Representative. Areas for use by the Contractor for storage will be identified at the Pre-Bid Meeting.

- D. Construction Parking: Parking at the site will be provided in the areas designated at the Pre-Construction Meeting.
- E. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80°F (27°C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

### **3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION**

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Designer.
- B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonable predictable and controllable fire losses. Comply with NFPA 10 “Standard for Portable Fire Extinguishers” and NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations”.
  - 1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one (1) extinguisher on each floor at or near each usable stairwell.
  - 2. Store combustible materials in containers in fire-safe locations.
  - 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
  - 4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- C. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting including flashing red or amber lights.
  - 1. Storage: Where materials and equipment must be stored and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- D. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and minimize the possibility that air, waterways, and subsoil might be contaminated or
- E. polluted or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near the site.

### **3.5 OPERATION, TERMINATION AND REMOVAL**

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
- C. Termination and Removal: Unless the Designer requests that it be maintained longer, remove each temporary facility when the need has ended, when 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 the 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 the Contractor's property. The Owner reserves the right to take possession of project identification signs.

**END OF SECTION 015000**

## **SECTION 017400 – CLEANING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for cleaning during the Project.
- B. Environmental Requirements: Conduct cleaning and waste-disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.
  - 1. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
  - 2. Burning or burying of debris, rubbish, or other waste material on the premises is not permitted.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

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

### **PART 3 - EXECUTION**

#### **3.1 PROGRESS CLEANING**

- A. General
  - 1. Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.
  - 2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
  - 3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the jobsite.
  - 4. Provide adequate storage for all items awaiting removal from the jobsite, observing all requirements for fire protection and protection of the ecology.

- B. Site
  - 1. Daily, inspect the site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
  - 2. Weekly, inspect all arrangements of materials stored onsite. Re-stack, tidy, or otherwise service all material arrangements.
  - 3. Maintain the site in a neat and orderly condition at all times.
  
- C. Structures
  - 1. Daily, inspect the structures and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
  - 2. Weekly, sweep all interior spaces clean. "Clean" for the purposes of this paragraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and handheld broom.
  - 3. In preparation for installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.
  - 4. Following the installation of finish floor materials, clean the finish floor daily while work is being performed in the space in which finish materials have been installed. "Clean" for the purposes of this subparagraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Construction Representative, may be injurious to the finish of the finish floor material.

### 3.2 FINAL CLEANING

- A. General: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
  
- B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for the entire Project or a portion of the Project.
  - 1. Clean the Project Site, yard and grounds, in areas disturbed by construction activities including landscape development areas, of rubbish, waste material, litter, and foreign substances.
  - 2. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
  - 3. Remove petrochemical spills, stains, and other foreign deposits.
  - 4. Remove tools, construction equipment, machinery, and surplus material from the site.
  - 5. Remove snow and ice to provide safe access to the building.
  - 6. 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.

7. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
  8. Broom clean concrete floors in unoccupied spaces.
  9. Vacuum clean carpet and similar soft surfaces removing debris and excess nap. Shampoo, if required.
  10. Clean transparent material, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
  11. Remove labels that are not permanent labels.
  12. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
  13. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  14. Clean plumbing fixtures to a sanitary condition free of stains, including stains resulting from water exposure.
  15. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  16. Clean ducts, blowers, and coils if units were operated without filters during construction
  17. Clean food-service equipment to a sanitary condition, ready and acceptable for its intended use.
  18. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.
  19. Leave the Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests. Comply with regulations of local authorities.
- D. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.
- E. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of lawfully.

1. Where extra materials of value remain after Final Acceptance by the Owner, they become the Owner's property.

**END OF SECTION 017400**

## SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

### 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. See the notes sheet on the structural plans for related specifications and required shop drawings.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Form-facing material for cast-in-place concrete.
  - 2. Anchoring.
- B. Related Requirements:

#### 1.3 DEFINITIONS

- A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.
- B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site
  - 1. Review the following:
    - a. Special inspection and testing and inspecting agency procedures for field quality control.
    - b. Construction, movement, contraction, and isolation joints
    - c. Forms and form-removal limitations.
    - d. Anchor rod and anchorage device installation tolerances.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each of the following:
  - 1. Concealed surface form-facing material.

2. Form ties.
3. Form-release agent.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing and inspection agency.
- B. Field quality-control reports.

## 1.7 QUALITY ASSURANCE

- A. Testing and Inspection Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Concrete Formwork: Design, engineer, erect, and maintain formwork, in accordance with ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
  1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
  2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

### 2.2 FORM-FACING MATERIALS

- A. As-Cast Surface Form-Facing Material:
  1. Provide continuous, true, and smooth concrete surfaces.
  2. Furnish in largest practicable sizes to minimize number of joints.
  3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:
    - a. Plywood, metal, or other approved panel materials.
    - b. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
      - 1) APA HDO (high-density overlay).
      - 2) APA MDO (medium-density overlay); mill-release agent treated and edge sealed.
      - 3) APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
      - 4) APA Plyform Class I, B-B or better; mill oiled and edge sealed.

- B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.
  - 1. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces without spiral or vertical seams not exceeding specified formwork surface class.
  - 1. Provide forms with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

### 2.3 RELATED MATERIALS

- A. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- C. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- D. 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.
  - 2. Form release agent for form liners shall be acceptable to form liner manufacturer.
- E. 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.
  - 1. Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
  - 2. Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
  - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF FORMWORK

- A. Comply with ACI 301 (ACI 301M).
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M) and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes.

- C. Limit concrete surface irregularities as follows:
  - 1. Surface Finish-2.0: ACI 117 Class B, 1/4 inch (6 mm).
  - 2. Surface Finish-3.0: ACI 117 Class A, 1/8 inch (3.0 mm).
- D. Construct forms tight enough to prevent loss of concrete mortar.
  - 1. Minimize joints.
  - 2. Exposed Concrete: Symmetrically align joints in forms.
- E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
  - 1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
  - 2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 3. Install keyways, reglets, recesses, and other accessories, for easy removal.
- F. Do not use rust-stained, steel, form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.
  - 1. Provide and secure units to support screed strips
  - 2. Use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
  - 1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
  - 2. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches (305 mm).
- K. Construction and Movement Joints:
  - 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
  - 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 3. Place joints perpendicular to main reinforcement.
  - 4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
- L. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
  - 1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
  - 2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

- M. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- N. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- O. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
  - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
  - 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
  - 4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
  - 5. Clean embedded items immediately prior to concrete placement.

### 3.3 REMOVING AND REUSING FORMS

- A. Formwork for sides of pedestals, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
  - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
  - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work.
  - 1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
  - 2. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.
  - 1. Align and secure joints to avoid offsets.
  - 2. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
  - 1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.
  - 2. Inspect insulating concrete forms for shape, location, and dimensions of the concrete member being formed.

END OF SECTION 031000

## SECTION 032000 - CONCRETE REINFORCING

### 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. See the notes sheet on the structural plans for related specifications and required shop drawings and deferred submittals.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Steel reinforcement bars.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Each type of steel reinforcement.
  - 2. Bar supports.
  - 3. Mechanical splice couplers.
- B. Shop Drawings: Comply with ACI SP-066:
  - 1. Include placing drawings that detail fabrication, bending, and placement.
  - 2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
  - 3. For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.
- C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
  - 1. Location of construction joints is subject to approval of Architect.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Statements: For testing and inspection agency.
- B. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:
  2. Mechanical splice couplers.
- C. Field quality-control reports.
- D. Minutes of preinstallation conference.

#### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
1. Store reinforcement to avoid contact with earth.

### PART 2 - PRODUCTS

#### 2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420).

#### 2.2 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615/A615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
    - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- C. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch (1.2908 mm) in diameter.
1. Finish: Plain.

## 2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protection of In-Place Conditions:
  - 1. Do not cut or puncture vapor retarder.
  - 2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

### 3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
  - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
  - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch (25 mm), not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318 (ACI 318M).
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
  - 1. Stagger splices in accordance with ACI 318 (ACI 318M), see S001 notes.

### 3.3 JOINTS

- A. 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.
  - 2. Continue reinforcement across construction joints unless otherwise indicated.
  - 3. Do not continue reinforcement through sides of strip placements of floors and slabs.
- B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117 (ACI 117M).

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
  - 1. Steel-reinforcement placement.
- D. Manufacturer's Inspections: Engage manufacturer of structural thermal break insulated connection system to inspect completed installations prior to placement of concrete, and to provide written report that installation complies with manufacturer's written instructions.

END OF SECTION 032000

## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENT

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. See the notes sheet on the structural plans for related specifications and required shop drawings and deferred submittals.

#### 1.2 SUMMARY

A. Section Includes:

- 1. Concrete standards.
- 2. Concrete materials.
- 3. Admixtures.
- 4. Vapor retarders.
- 5. Floor and slab treatments.
- 6. Curing materials.
- 7. Accessories.
- 8. Repair materials.
- 9. Concrete mixture materials.
- 10. Concrete mixture class types.
- 11. Concrete mixing.

B. Related Requirements:

- 1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
- 2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

#### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement or blended hydraulic cement alone or in combination with one or more of the following:
  - 1. Fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. Water/Cementitious Materials (w/cm) Ratio: The ratio by weight of mixing water to cementitious materials.

## 1.4 ACTION SUBMITTALS

### A. Product Data:

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures:
  - a. Include limitations of use. Admixtures that do not comply with reference ASTM International requirements must be submitted with test data for approval.
5. Vapor retarders.
6. Floor and slab treatments.
7. Liquid floor treatments.
8. Curing materials.
9. Joint fillers.
10. Repair materials.

### B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Compressive strength at 28 days or other age as specified.
3. Compressive strength required at stages of construction.
4. Durability exposure classes for Exposure Categories F, S, W, and C.
5. Maximum w/cm ratio.
6. Slump or slump flow limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Intended placement method.
10. Submit adjustments to design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant changes.

### C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
  - a. Location of construction joints is subject to approval of the Architect.

### D. Concrete Schedule: For each location of each class of concrete indicated in "Concrete Mixture Class Types" Article, including the following:

1. Concrete class designation.
2. Location within Project.
3. Exposure class designation.
4. Formed surface finish designation and final finish.
5. Final finish for floors.
6. Floor treatment, if any.

## 1.5 INFORMATIONAL SUBMITTALS

### A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Testing Agency: Include documentation indicating compliance with ASTM E329 or ASTM C1077 and copies of applicable ACI certificates for testing technicians or ACI Concrete Construction Special Inspector - MH, ASCC.

### B. Material Certificates: For each of the following:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.
5. Bonding agents.
6. Adhesives.
7. Vapor retarders.
8. Semirigid joint filler.
9. Joint-filler strips.
10. Repair materials.

### C. Material Test Reports: For the following:

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures.

### D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances in accordance with ACI 117 and in compliance with ASTM E1155 (ASTM E1155M).

### E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC's Acceptance Criteria AC380.

### F. Preconstruction Test Reports: For each mix design.

### G. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

### A. Installer Qualifications: A qualified Installer who employs Project personnel qualified as an ACI-certified Concrete Flatwork Associate and Concrete Flatwork Finisher and a supervisor who is a certified ACI Advanced Concrete Flatwork Finisher/Technician or an ACI Concrete Flatwork Finisher with experience installing and finishing concrete.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.
- B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
- C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing that performs duties on behalf of the Architect/Engineer.
  1. Personnel performing laboratory tests to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Level 1. Testing agency laboratory supervisor tests to be an ACI-certified Concrete Laboratory Testing Technician, Level 2.
- D. Field Quality-Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
  1. Personnel conducting field tests on plastic concrete properties are to be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with policies from ACI CPP 610.1 or an equivalent certification program.

#### 1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
  1. Include the following information in each test report:
    - a. Admixture dosage rates.
    - b. Slump.
    - c. Air content.
    - d. Seven-day compressive strength.
    - e. 28-day compressive strength.
    - f. Evaluation of permeability-reducing admixtures.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

#### 1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) as follows:
  1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

2. When air temperature has fallen to, or is expected to fall below 40 deg F (4.4 deg C) during the protection period, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
  3. Do not use frozen materials or materials containing ice or snow.
  4. Do not place concrete in contact with surfaces less than 35 deg F (1.7 deg C), other than reinforcing steel.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:
1. Maintain concrete temperature at time of discharge to not exceed 95 deg F (35 deg C).
  2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

#### 1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder material and accessories for sheet vapor retarders and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.
1. Warranty Period: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 CONCRETE STANDARDS

- A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.

#### 2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I gray.
2. Pozzolans: ASTM C618, Class C, F, or N.

C. Normal-Weight Aggregates:

1. Coarse Aggregate: ASTM C33/C33M, Class 3S.
2. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
3. Fine Aggregate: ASTM C33/C33M.

## 2.3 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C260/C260M.
- B. Chemical Admixtures: Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
  - 2. Retarding Admixture: ASTM C494/C494M, Type B.
  - 3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
  - 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
  - 6. Admixtures with special properties, with documentation of claimed performance enhancement, ASTM C494/C494M, Type S.
- C. Mixing Water for Concrete Mixtures and Water Used to Make Ice: ASTM C1602/C1602M.

## 2.4 VAPOR RETARDERS

- A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A not less than 15 mils. Include manufacturer's recommended thickness and adhesive or pressure-sensitive tape.

## 2.5 FLOOR AND SLAB TREATMENTS

- A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing 3/8-inch (10-mm).
- B. Slip-Resistive Aluminum Granule Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of not less than 95 percent fused aluminum-oxide granules.
- C. Emery Dry-Shake Floor Hardener: Pigmented, factory-packaged, dry combination of portland cement, graded emery aggregate, and plasticizing admixture; with emery aggregate consisting of no less than 60 percent of total aggregate content.
  - 1. Color: As indicated by manufacturer's designation.

## 2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
  - 1. Color:
    - a. Ambient Temperature Below 50 deg F (10 deg C): Black.
    - b. Ambient Temperature between 50 and 85 deg F (10 and 29 deg C): Any color.
    - c. Ambient Temperature Above 85 deg F (29 deg C): White.

- C. Water: Potable water that does not cause staining of the surface.
- D. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

## 2.7 ACCESSORIES

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C881/C881M, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:
  - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- D. Floor Slab Protective Covering: 8 ft. (2438 mm) wide cellulose fabric.

## 2.8 CONCRETE MIXTURE MATERIALS

- 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, in accordance with ACI 301 (ACI 301M).
  - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland or hydraulic cement in concrete assigned to Exposure Class F3 as follows:
  - 1. Fly Ash or Other Pozzolans: 15 percent by mass.
  - 2. Total of Fly Ash or Other Pozzolans 15 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
  - 1. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

## 2.9 CONCRETE MIXTURE CLASS TYPES

- A. Footings and pedestals: Normal-weight concrete.
  - 1. Exposure Class: ACI 318 (ACI 318M) Class F2
  - 2. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
  - 3. Slump Limit: See S001 notes .
  - 4. Air Content:

- a. Exposure Classes F2 and F3: 6.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch (19-mm) nominal maximum aggregate size.
- B. Interior Slabs-on-Grade: Normal-weight concrete.
  - 1. Exposure Class: ACI 318 (ACI 318M) Class F0
  - 2. Minimum Compressive Strength: 4000 psi (27.6 MPa at 28 days).
  - 3. Minimum Cementitious Materials Content: 540 lb/cu yd.
  - 4. Slump Limit: See S001 notes.
  - 5. Air Content:
    - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

## 2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and furnish delivery ticket.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.
  - 1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
  - 2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
  - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions:
  - 1. Before placing concrete, verify that installation of concrete forms, accessories, reinforcement, and embedded items is complete and that required inspections have been performed.
  - 2. Do not proceed until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

### 3.3 TOLERANCES

- A. Comply with ACI 117 (ACI 117M).

### 3.4 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
  1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

### 3.5 INSTALLATION OF VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
  1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
  2. Face laps away from exposed direction of concrete pour.
  3. Lap vapor retarder over footings and grade beams not less than 6 inches (150 mm), sealing vapor retarder to concrete.
  4. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
  5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
  6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
  7. Protect vapor retarder during placement of reinforcement and concrete.
    - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches (150 mm) on all sides and sealing to vapor retarder.
- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

### 3.6 INSTALLATION OF CAST-IN-PLACE CONCRETE

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
  1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.

2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
  - C. Water addition in transit or at the Project site must be in accordance with ASTM C94/C94M and must not exceed the permitted amount indicated on the concrete delivery ticket.
  - 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.
    1. If a section cannot be placed continuously, provide construction joints as indicated.
    2. Deposit concrete to avoid segregation.
    3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
    4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301 (ACI 301M).
      - a. Do not use vibrators to transport concrete inside forms.
      - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer.
      - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
      - d. 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. Do not place concrete floors and slabs in a checkerboard sequence.
    2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
    3. Maintain reinforcement in position on chairs during concrete placement.
    4. Screenshot slab surfaces with a straightedge and strike off to correct elevations.
    5. Level concrete, cut high areas, and fill low areas.
    6. Slope surfaces uniformly to drains where required.
    7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
    8. Do not further disturb slab surfaces before starting finishing operations.

### 3.7 INSTALLATION OF JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
  1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.

2. Place joints perpendicular to main reinforcement.
    - a. Continue reinforcement across construction joints unless otherwise indicated.
  3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  4. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3 mm). Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch (3-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
  2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints:
1. Install dowel bars and support assemblies at joints where indicated on Drawings.
  2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
- F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

### 3.8 APPLICATION OF FINISHING FLOORS AND SLABS

- A. Scratch Finish, if required, see arch plans and the following:
1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
  2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch (6 mm) in one direction.
  3. Finish surfaces to the following tolerances, in accordance with ASTM E1155 (ASTM E1155M), for a randomly trafficked floor surface:

a. Slabs on Ground:

Retain floor flatness ( $F_F$ ) and floor levelness ( $F_L$ ) values required for Project from first four subparagraphs below, or revise values to suit type of floor. ACI 302.1R suggests values in first subparagraph be used for carpeted slabs; those in second for thin floor coverings; and those in third for very flat floors for high-speed forklifts, air pallets, and ice and roller rinks. Those in fourth subparagraph are common for polished concrete floors.

- 1) Specified overall values of flatness,  $F_F$  50; and of levelness,  $F_L$  35; with minimum local values of flatness,  $F_F$  40; and of levelness,  $F_L$  24.

B. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with a fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

### 3.9 APPLICATION OF FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 (ACI 301M) Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
  - a. Patch voids larger than 3/4 inch (19 mm) wide or 1/2 inch (13 mm) deep.
  - b. Remove projections larger than 1/4 inch (6 mm).
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 (ACI 117M), Class B.
  - e. Locations: Apply to concrete surfaces exposed to public view

### 3.10 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling in:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to match color and texture with in-place construction exposed to view.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

### 3.11 APPLICATION OF CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 (ACI 301M) for cold weather protection during curing.
2. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h (1 kg/sq. m x h), calculated in accordance with ACI 305R, before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period as follows:
  - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
  - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
  - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
  - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
  - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
    - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
    - 2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Begin curing after finishing concrete.
2. Interior Concrete Floors:
  - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
    - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
      - a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
      - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
    - 2) 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 (300 mm), and sealed by waterproof tape or adhesive.

- a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
  - b) Cure for not less than seven days.
- 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following not in cold weather:
- a) Water.
  - b) Continuous water-fog spray.

b. Floors To Receive Curing Compound:

- 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
- 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
- 3) Maintain continuity of coating, and repair damage during curing period.
- 4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

c. Floors To Receive Curing and Sealing Compound:

- 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
- 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
- 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

### 3.12 INSTALLATION OF JOINT FILLING

- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints.
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

### 3.13 INSTALLATION OF CONCRETE SURFACE REPAIRS

- A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.
  2. Remove and replace concrete that cannot be repaired and patched to meet specification requirements.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks in excess of 0.01 inch (0.25 mm) spalls, air bubbles exceeding surface finish limits, honeycombs, rock pockets, fins and other projections on the surface exceeding surface finish limits, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete.
    - a. Limit cut depth to 3/4 inch (19 mm).
    - b. Make edges of cuts perpendicular to concrete surface.
    - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
    - d. Fill and compact with patching mortar before bonding agent has dried.
    - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
    - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    - b. Compact mortar in place and match surrounding surface.
  3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance, as determined by Architect.
- D. Repairing Unformed Surfaces:
1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
    - a. Correct low and high areas.
    - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width.
  3. After concrete has cured at least 14 days, correct high areas by grinding.
  4. Correct localized low areas during, or immediately after, completing surface-finishing operations by adding patching mortar.
    - a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
    - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
    - b. Feather edges to match adjacent floor elevations.
  6. Correct other low areas scheduled to remain exposed with repair topping.
    - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations.
    - b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  7. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete.
    - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around.
    - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
    - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
    - d. Place, compact, and finish to blend with adjacent finished concrete.
    - e. Cure in same manner as adjacent concrete.
  8. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar.
    - a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
    - b. Dampen cleaned concrete surfaces and apply bonding agent.
    - c. Place patching mortar before bonding agent has dried.
    - d. Compact patching mortar and finish to match adjacent concrete.
    - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.14 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency to be responsible for providing curing facility for initial curing of strength test specimens on-site and verifying that test specimens are cured in accordance with standard curing requirements in ASTM C31/C31M.
  2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
  3. Testing agency to report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
    - a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301 (ACI 301M), including the following as applicable to each test and inspection:
      - 1) Project name.
      - 2) Name of testing agency.
      - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
      - 4) Name of concrete manufacturer.
      - 5) Date and time of inspection, sampling, and field testing.
      - 6) Date and time of concrete placement.
      - 7) Location in Work of concrete represented by samples.
      - 8) Date and time sample was obtained.
      - 9) Truck and batch ticket numbers.
      - 10) Design compressive strength at 28 days.
      - 11) Concrete mixture designation, proportions, and materials.
      - 12) Field test results of fresh concrete, including slump or slump flow, air content, temperature and density.
      - 13) Information on storage and curing of samples at the Project site, including curing method and maximum and minimum temperatures during initial curing period.
      - 14) Type of fracture and compressive break strengths at seven days and 28 days.
  4. Provide a space and source of power or other resources for curing and access to test specimens by the testing agency.
- C. Delivery Tickets: comply with ASTM C94/C94M.
- D. Inspections:
1. Headed bolts and studs.
  2. Verification of use of required design mixture.
  3. Concrete placement, including conveying and depositing.
  4. Curing procedures and maintenance of curing temperature.
  5. Verification of concrete strength before removal of shores and forms from beams and slabs.
  6. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:

1. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing is to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M:
  - a. One test at point of delivery for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - b. Perform additional tests as needed.
3. Slump Flow: ASTM C1611/C1611M:
  - a. One test at point of delivery for each composite sample when strength test specimens are cast, but not less than one test for each day's pour of each concrete mixture.
  - b. Perform additional tests as needed.
4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete.
  - a. One test for each composite sample when strength test specimens are cast, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C1064/C1064M:
  - a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample when strength test specimens are cast.
6. Compression Test Specimens: ASTM C31/C31M:
  - a. Cast, and field cure three standard cylindrical specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C39/C39M.
  - a. Test one laboratory cured specimens at seven days and one set of two specimens at 28 days.
  - b. Test one field-cured specimens at seven days and one set of two specimens at 28 days.
  - c. A compressive-strength test to 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 to 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 of standard cured cylinders equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
10. 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.

11. Additional Tests:

- a. Testing and inspecting agency to 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.
- b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
  - 1) Acceptance criteria for concrete strength to be in accordance with ACI 301 (ACI 301M), Section 1.7.6.3.

12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 (ASTM E1155M) within 48 hours of completion of floor finishing and promptly report test results to Architect.

### 3.15 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using floor slab protective covering.

END OF SECTION 033000

## SECTION 042000 - UNIT MASONRY

### 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. See the notes sheet on the structural plans for related specifications and required shop drawings.

#### 1.2 SUMMARY

##### A. Section Includes:

- 1. Concrete masonry units.
- 2. Lintels.
- 3. Mortar and grout materials.
- 4. Reinforcement.
- 5. Ties and anchors.
- 6. Embedded flashing.
- 7. Accessories.
- 8. Mortar and grout mixes.

##### B. Products Installed but not Furnished under This Section:

- 1. Cast-stone trim in unit masonry.

##### C. Related Requirements:

- 1. Section 031000 "Concrete Forms and Accessories" for installing dovetail or channel slots for masonry-veneer anchors.
- 2. Section 076200 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.
- 3. Section 089516 "Wall Vents" for wall vents (brick vents).

#### 1.3 ALLOWANCES

- A. See Section 012100 "Allowances" for description of allowances affecting items specified in this Section.

#### 1.4 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
  - 1. Masonry Units: Indicate sizes, profiles, coursing, and locations of special shapes.
  - 2. Reinforcing Steel: Indicate bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315R. Indicate elevations of reinforced walls.
  - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type of the following:
  - 1. Masonry units.
    - a. Include material test reports substantiating compliance with requirements.
  - 2. Integral water repellent used in CMUs.
  - 3. Cementitious materials. Include name of manufacturer, brand name, and type.
  - 4. Mortar admixtures.
  - 5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
  - 6. Grout mixes. Include description of type and proportions of ingredients.
  - 7. Reinforcing bars.
  - 8. Joint reinforcement.
  - 9. Anchors, ties, and metal accessories.
- B. Qualification Statements: For testing agency.
- C. Delegated design engineer qualifications.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
  - 1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
  - 2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined in accordance with TMS 602.
- F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

## 1.7 QUALITY ASSURANCE

### A. Qualifications:

1. Installers: All masonry flashing installers must complete the International Masonry Institute Flashing Upgrade training course.
2. Testing Agency Qualifications: Qualified in accordance with ASTM C1093 for testing indicated.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## 1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  1. Extend cover a minimum of 24 inches (610 mm) down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  2. Protect sills, ledges, and projections from mortar droppings.
  3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

## PART 2 - PRODUCTS

### 2.1 SOURCE LIMITATIONS

- A. Obtain exposed masonry units, cementitious mortar components, and mortar aggregate from single manufacturer.
- B. For exposed masonry units and cementitious mortar components, obtain each color and grade from single source with resources to provide materials of consistent quality in appearance and physical properties.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
  1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) in accordance with TMS 602.

### 2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed work and will be within 20 ft. (6 m) vertically and horizontally of a walking surface.

## 2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide square-edged units for outside corners unless otherwise indicated.
- B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.
  - 1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested in accordance with ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, will show no visible water or leaks on the back of test specimen.
- C. CMUs: ASTM C90, lightweight unless otherwise indicated.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of as indicated on plans.
  - 2. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less than nominal dimensions.
  - 3. Exposed Faces: Provide color and texture matching what is called out in the drawings.
- D. Decorative CMUs: ASTM C90, lightweight.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of as indicated on plans.
  - 2. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph above.
  - 3. Pattern and Texture: Standard pattern, ground-face finish and Standard pattern, split-face finish
  - 4. Colors: As indicated in the drawings (CMU Color Swatches on A-3)
- E. Pre-faced CMUs: ASTM C90, lightweight hollow units, with manufacturer's standard smooth resinous facing complying with ASTM C744.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of as indicated on plans.
  - 2. Size: Manufactured to dimensions specified in "CMUs" Paragraph above.
  - 3. Colors and Patterns: As indicated in the drawings (CMU Color Swatches on A-3)

## 2.5 LINTELS

- A. Solid Concrete Masonry Lintels: ASTM C1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated.
- B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

## 2.6 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
  - 1. Alkali content will not be more than 0.1 percent when tested in accordance with ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C91/C91M.
- E. Mortar Cement: ASTM C1329/C1329M.
- F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.
- G. Aggregate for Mortar: ASTM C144.
  - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
  - 2. For joints less than 1/4 inch (6.4 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
  - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
- H. Aggregate for Grout: ASTM C404.
- I. Epoxy Pointing Mortar: ASTM C395, epoxy-resin-based material formulated for use as pointing mortar for glazed or pre-faced masonry units (and approved for use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.
- J. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- K. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water from same manufacturer.
- L. Water: Potable.

## 2.7 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420).

- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.
  - 1. Interior Walls and Exterior: Hot-dip galvanized carbon steel.
  - 2. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
  - 3. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
  - 4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (406 mm) o.c.
  - 5. Provide in lengths of not less than 10 ft. (3 m), with prefabricated corner and tee units.
- D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

## 2.8 ACCESSORIES

- A. See architectural plans.

## 2.9 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
  - 2. Use portland cement-lime mortar unless otherwise indicated.
  - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
  - 1. For reinforced masonry, use Type M or Type S,  $f'c = 1,800$  psi
- D. Grout for Unit Masonry: Comply with ASTM C476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602 for dimensions of grout spaces and pour height.
  - 2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.1.2 for specified 28-day compressive strength indicated, but not less than 2000 psi
  - 3. Provide grout with a slump of 8 to 11 inches as measured in accordance with ASTM C143/C143M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
  - 2. Verify that foundations are within tolerances specified.
  - 3. Verify that reinforcing dowels are properly placed.
  - 4. Verify that substrates are free of substances that impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested in accordance with ASTM C67/C67M. Allow units to absorb water so they are damp but not wet at time of laying.

### 3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
  - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (13 mm) or minus 1/4 inch (6.4 mm).

2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (13 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6.4 mm) in a story height or 1/2 inch (13 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), or 1/2-inch (13-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 ft. (3.2 mm in 3 m), 1/4 inch in 20 ft. (6.4 mm in 6 m), or 1/2-inch (13-mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), 3/8 inch in 20 ft. (10 mm in 6 m), or 1/2-inch (13-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 ft. (3.2 mm in 3 m), 1/4 inch in 20 ft. (6.4 mm in 6 m), or 1/2-inch (13-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), 3/8 inch in 20 ft. (10 mm in 6 m), or 1/2-inch (13-mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), or 1/2-inch (13-mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.6 mm) except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3.2 mm), with a maximum thickness limited to 1/2 inch (13 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3.2 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (10 mm) or minus 1/4 inch (6.4 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.6 mm) from one masonry unit to the next.

### 3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (102-mm) horizontal face dimensions at corners or jambs.

- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (102-mm) horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches (610 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
  - 1. Install compressible filler in joint between top of partition and underside of structure above.
  - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors, and push tubes down into grout to provide 3/4-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
  - 3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.

### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay CMUs as follows:
  - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
  - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
  - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
  - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
  - 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

- C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
  - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
  - 2. Allow cleaned surfaces to dry before setting.
  - 3. Wet joint surfaces thoroughly before applying mortar.
  - 4. Rake out mortar joints for pointing with sealant.
- D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch (6.4 mm) and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.
- E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

### 3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (152 mm).
  - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
  - 2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
  - 3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

### 3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
  - 1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
  - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.

### 3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
  - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
  - 2. Install preformed control-joint gaskets designed to fit standard sash block.
  - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
  - 4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.
  - 5. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch (10 mm) for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."
- C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.
  - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

### 3.9 LINTELS

- A. Install steel lintels where indicated.
- B. Provide masonry lintels where indicated and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are indicated without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches (203 mm) at each jamb unless otherwise indicated.

### 3.10 WEEP HOLES

- A. See architectural plans for weep holes specifications and installation requirements.

### 3.11 REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
  - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
  2. Limit height of vertical grout pours to not more than 60 inches.

### 3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements will be at Contractor's expense.
- B. Inspections: Special inspections in accordance with the Level as indicated in the Schedule of Special Inspections in TMS 402.
1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
  2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
  3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140/C140M for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.
- G. Grout Test (Compressive Strength): For each mix provided, in accordance with ASTM C1019.

### 3.13 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent

construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  - 5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
  - 6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
  - 7. Clean masonry with a proprietary acidic masonry cleaner applied according to manufacturer's written instructions.

#### 3.14 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Not used
- C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

## SECTION 051200 - STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. See the notes sheet on the structural plans for related specifications and required shop drawings and deferred submittals.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Structural-steel materials.
  - 2. Shrinkage-resistant grout.
  - 3. Prefabricated building columns.
  - 4. Shear stud connectors.

#### 1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

#### 1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

#### 1.5 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication of structural-steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Include embedment Drawings.

3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
  5. Identify members and connections of the seismic-load-resisting system.
  6. Indicate locations and dimensions of protected zones.
  7. Identify demand-critical welds.
  8. Identify members not to be shop primed.
- B. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide in accordance with AWS D1.1/D1.1M for each welded joint whether prequalified or qualified by testing, including the following:
1. Power source (constant current or constant voltage).
  2. Electrode manufacturer and trade name, for demand-critical welds.
- C. Delegated Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator, shop-painting applicators, professional engineer, and testing agency.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural-steel materials, including chemical and physical properties.
- E. Product Test Reports: For the following:
1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
  2. Direct-tension indicators.
  3. Tension-control, high-strength, bolt-nut-washer assemblies.
  4. Shear stud connectors.
  5. Shop primers.
  6. Non shrink grout
- F. Source quality-control reports.
- G. Field quality-control reports.

## 1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
- B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.
  - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds are to pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G are to be considered separate processes for welding personnel qualification.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
  - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
  - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
  - 1. ANSI/AISC 303.
  - 2. ANSI/AISC 341.
  - 3. ANSI/AISC 360.
  - 4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Connection Design Information:
  - 1. Option 1 for the moment connections: Connection designs have been completed and connections indicated on the Drawings.

2. Option 2: Fabricator's experienced steel detailer selects or completes connections in accordance with ANSI/AISC 303.
  - a. Select and complete shear connections using details and tables provided in the drawings.

## 2.2 STRUCTURAL-STEEL MATERIALS

- A. Plate and Bar: ASTM A572/A572M, Grade 50 (Grade 345).
- B. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C structural tubing.
- C. Welding Electrodes: Comply with AWS requirements.

## 2.3 RODS

- A. Unheaded Anchor Rods: ASTM F1554, Grade 55, weldable.
  1. Configuration: Straight.
  2. Nuts: ASTM A563 (ASTM A563M) heavy hex carbon steel.
  3. Plate Washers: ASTM A36/A36M carbon steel.
  4. Washers: ASTM F436 (ASTM F436M), Type 1, hardened carbon steel.
  5. Finish: As specified on S001 notes.

## 2.4 SHRINKAGE-RESISTANT GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
  1. Camber structural-steel members where indicated.
  2. Fabricate beams with rolling camber up.
  3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
  4. Mark and match-mark materials for field assembly.
  5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 2.
- D. Welded-Steel Door Frames: See architectural plans.
- E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
  1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## 2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

## 2.7 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
  1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
  2. Galvanize columns attached to structural-steel frame and located in exterior walls.

## 2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
  1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
  2. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E165/E165M.

- b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
  - c. Ultrasonic Inspection: ASTM E164.
  - d. Radiographic Inspection: ASTM E94/E94M.
3. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
  - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.
  - 1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Weld plate washers to top of baseplate.
  - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.

- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
  - 1. Joint Type: Snug tightened.
- B. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

### 3.5 INSTALLATION OF PREFABRICATED BUILDING COLUMNS

- A. Install prefabricated building columns to comply with ANSI/AISC 360, manufacturer's written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

### 3.6 REPAIR

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting:
  - 1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
    - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

- C. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

### 3.7 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:

- 1. Verify structural-steel materials and inspect steel frame joint details.
- 2. Verify weld materials and inspect welds.
- 3. Verify connection materials and inspect high-strength bolted connections.

- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

- 1. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.

- a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

- 1) Liquid Penetrant Inspection: ASTM E165/E165M.
- 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
- 3) Ultrasonic Inspection: ASTM E164.
- 4) Radiographic Inspection: ASTM E94/E94M.

- 2. Shear Stud Connectors: In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

- a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
- b. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

END OF SECTION 051200

## SECTION 061000 – ROUGH CARPENTRY

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Roofing nailers.
- B. Fire retardant treated wood materials.
- C. Concealed wood blocking, nailers, and supports.
- D. Miscellaneous wood nailers, furring, and grounds.

#### 1.2 RELATED REQUIREMENTS

- A. Section 033000 – Cast-in-Place Concrete: Setting anchors in concrete.
- B. Section 076200 – Sheet Metal Flashing and Trim: Sill flashings.

#### 1.3 REFERENCE STANDARDS

- A. ASTM D2898 – Standard Practice for Accelerated Weathering of Fire Retardant Treated Wood for Fire Testing; 2010 (Reapproved 2017).
- B. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- C. PS 20 – American Softwood Lumber Standard; 2025.
- D. SPIB (GR) – Standard Grading Rules; 2021.

#### 1.4 SUBMITTALS

- A. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

## 1.6 WARRANTY

- A. Correct defective work within a two-year period commencing on Date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
  - 2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
  - 3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee ([www.alsc.org](http://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. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Lumber: S4S, No. 2 or Standard Grade.
  - 2. Boards: Standard or No. 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 (100 mm) and seal.
- B. Install sill gasket under sill plate bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

- C. Coordinate installation of rough carpentry member 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. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- C. Provide the following specific nonstructural framing and blocking:
  - 1. Grab bars.
  - 2. Towel and bath accessories.
  - 3. Wall paneling and trim.

### 3.4 ROOF RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

### 3.5 CLEANING

- A. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 061000

## 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 Specifications Sections apply to this Section.
- B. See the notes sheet on the structural plans for related specifications and required shop drawings and deferred submittals.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Wall sheathing.
  - 2. Roof sheathing.
- B. Related Requirements:
  - 1. Section 072500 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

#### 1.3 ACTION SUBMITTALS

- A. Product Data:
  - 1. Wall sheathing.
  - 2. Roof sheathing.
- B. Product Data Submittals: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
  - 3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5516.
  - 4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
  - 5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.
- C. Shop Drawings: For air-barrier and water-resistant glass-mat gypsum sheathing assemblies.

1. Show locations and extent of sheathing, accessories, and assemblies specific to Project conditions.
2. Include details for sheathing joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
3. Include details of interfaces with other materials that form part of air barrier.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing and inspecting agency.
- B. Product Certificates: From air-barrier and water-resistant glass-mat gypsum sheathing manufacturer, certifying compatibility of sheathing accessory materials with Project materials that connect to or that come in contact with the sheathing.
- C. Product Test Reports: For each air-barrier and water-resistant glass-mat gypsum sheathing assembly, indicating compliance with specified requirements, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For the following, from ICC-ES:
  1. Wood-preservative-treated plywood.
  2. Fire-retardant-treated plywood.
  3. Foam-plastic sheathing.
  4. Air-barrier and water-resistant glass-mat gypsum sheathing.
- E. Field quality-control reports.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of air-barrier and water-resistant glass-mat gypsum sheathing.
  1. Installer is to be licensed by ABAA in accordance with ABAA's Quality Assurance Program and is to employ ABAA-certified installers and supervisors on Project.
- B. Testing Agency Qualifications:
  1. For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
  2. For testing and inspecting agency providing tests and inspections related to air-barrier and water-resistant glass-mat gypsum sheathing: an independent agency, qualified in accordance with ASTM E329 for testing indicated, and certified by Air Barrier Association of America, Inc.

## 1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on field mockups.

## 1.7 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 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- B. Weather barrier and Water-Resistant Glass-Mat Gypsum Sheathing Performance: Air-barrier and water-resistant glass-mat gypsum sheathing assembly, and seals with adjacent construction, are to be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies are to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, tie-ins to other installed air barriers, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

### 2.2 WALL SHEATHING

- A. Glass-Mat Gypsum Sheathing, Walls: ASTM C1177/C1177M.
  - 1. Type and Thickness: Regular, 1/2 inch (13 mm) thick.
- B. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing: See architectural plans.

### 2.3 ROOF SHEATHING

- A. Oriented-Strand-Board Sheathing, Roofs: DOC PS 2, Exposure 1, Structural I sheathing.
  - 1. Span Rating: Not less than 32/16.
  - 2. Nominal Thickness: Not less than 5/8 inch (16 mm).

## 2.4 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 sheathing, provide fasteners of Type 304 stainless steel.
  - 2. For roof sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117.
- 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 Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. 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 (0.835 mm) thick, use screws that comply with ASTM C1002.
  - 2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C954.
- G. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117. Provide washers or plates if recommended by sheathing manufacturer.

## 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 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.

2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
  3. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
  - E. Coordinate wall and 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.
  - F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
  - G. 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 INSTALLATION OF WOOD STRUCTURAL PANEL

- 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. Roof Sheathing:
    - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
    - b. Space panels 1/8 inch (3 mm) apart at edges and ends.

### 3.3 INSTALLATION OF GYPSUM SHEATHING

- A. Comply with GA-253 and with manufacturer's written instructions.
- B. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing: See architectural plan.

### 3.4 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.
- B. Testing and Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.

- C. Inspections: Air-barrier and water-resistant glass-mat gypsum sheathing, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
  2. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
  3. Termination mastic has been applied on cut edges.
  4. Strips and transition strips have been firmly adhered to substrate.
  5. Compatible materials have been used.
  6. Transitions at changes in direction and structural support at gaps have been provided.
  7. Connections between assemblies (sheathing and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
  8. All penetrations have been sealed.

END OF SECTION 061600

## SECTION 066400 – PLASTIC PANELING

### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES

- A. Plastic panel ceiling assemblies.

#### 1.2 RELATED REQUIREMENTS

- A. Section 061000 – Rough Carpentry.
- B. Section 079200 – Joint Sealants.

#### 1.3 REFERENCE STANDARDS.

- A. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- B. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2022.
- C. ASTM G21 – Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

#### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate liner panel installation requirements with layout of stud framing and furring supporting members.

#### 1.5 SUBMITTALS

- A. Shop Drawings:
  - 1. For each ceiling panel layout, indicate:
    - a. Reflected Ceiling Plans: Dimensioned locations of panels and penetrations. Include field measurements indicating extents of paneling.
    - b. Drawing Scale: 1/4 inch to 1 foot (1:50), minimum.
  - 2. Details: Include panel-to-trim connections.
    - a. Drawing Scale: 1-1/2 inches to 1 foot (1:10), minimum.

- B. Samples: For each wall and ceiling panel type, two samples, 6 inches by 6 inches (150 mm by 150 mm) in size, indicating specified color and texture.
- C. manufacturer's Instructions: For each panel type and associated trim, provide installation instructions.
- D. Installer's qualification statement.
- E. Maintenance Data: Panel maintenance and cleaning recommendations.
- F. Executed warranty.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in manufacturer's original, unopened packaging, with labels clearly identifying product name and manufacturer.
- B. Store products in clean, dry, interior areas in accordance with manufacturer's instructions.
- C. Store plastic panels and trim flat.

#### 1.7 FIELD CONDITIONS

- A. Ambient Field-Cutting Conditions: Before field-cutting panels in temperatures below 40 degrees F (4.4 degrees C), warm space to 60 degrees F (16 degrees C) minimum. Maintain temperature for 24 hours before, during, and after field-cutting.
- B. Ambient Conditions for Installation: When ambient temperatures are below 40 degrees F (4.4 degrees C), warm space to 60 degrees F (16 degrees C) minimum. Maintain temperature for 24 hours before, during, and after installation.
- C. Ambient Conditions for Installation: When ambient temperatures are above 70 degrees F (21 degrees C), cool space to 60 degrees F (16 degrees C). Maintain temperature for 24 hours before, during, and after installation.

#### 1.8 WARRANTY

- A. Manufacturer Warranty: Provide 10-year manufacturer warranty for products free from manufacturing defects. Complete forms in Owner's name and register with manufacturer.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

- A. Plastic Paneling:
  - 1. Trusscore: [www.trusscore.com](http://www.trusscore.com)

### 2.2 PLASTIC PANELING

- A. Material: 100 percent virgin PVC (polyvinyl chloride), exterior grade.
- B. Surface Burning Requirements, Interior Use: Flame spread index of 25 or less and smoke-development index of 450 or less; Class A classification when tested in accordance with ASTM E84.
- C. Fungi Resistance: No visible growth, when tested in accordance with ASTM G21.

### 2.3 ACCESSORIES

- A. Plastic Spacers: Rigid nylon spacers, same thickness as panel.
  - 1. Size: 3/4-inch (19 mm) outside diameter; 1/4-inch (6.4 mm) inside diameter.
- B. Threaded Fasteners: Type and size as recommended by paneling manufacturer for substrate, application, and corrosion resistance.
  - 1. High Corrosion Risk: Stainless steel ASTM F593 Type 316.
- C. Adhesives: Type recommended by panel manufacturer for application; not containing formaldehyde or volatile organic compounds.
  - 1. Where visible in finished work, tint adhesive to match exposed panel surface.
- D. Joint Sealants: Type recommended by paneling manufacturer for application.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Verify field measurements are as indicated on shop drawings.
- B. Verify substrates are prepared to receive plastic paneling.
- C. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

- D. Verify mechanical, electrical, and other building components affecting work of this section are placed and ready to receive work of this section.

### 3.2 PREPARATION

- A. Surface Preparation: Clean substrate surfaces prior to installing paneling.

### 3.3 INSTALLATION – GENERAL

- A. Maintain manufacturer recommended gap tolerances between panels and adjacent abutments.
- B. Field-cut panels in accordance with manufacturer's written instructions. Make straight and square cuts; do not damage panels.

### 3.4 INSTALLATION – PLASTIC CEILING LINER PANELS

- A. Install panels and trim in accordance with manufacturer's written instructions and approved shop drawings.
- B. Horizontally Installed Liner Panels: Install panels level within specified tolerances.
- C. Ceiling Panel Installation: Install panels level within specified tolerances.
- D. Install threaded fasteners into nailing fins with gaps between fasteners and nailing fins and without overtightening in accordance with manufacturer recommendations.

### 3.5 TOLERANCES

- A. Maximum Variation from True Position: 1/4 inch (6.4 mm).
- B. Maximum Variation from Plumb: 1/4 inch in 10 feet (2 mm in 1 m).
- C. Maximum Variation from Level: 1/4 inch in 10 feet (2 mm in 1 m).

### 3.6 CLEANING

- A. Clean exposed surfaces of panels and trim in accordance with manufacturer's instructions.

3.7 PROTECTION

- A. Protect installed plastic paneling from subsequent construction operations.

END OF SECTION 066400

## SECTION 072500 – WEATHER BARRIERS

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES:

- A. Water-resistive barriers.

#### 1.2 RELATED REQUIREMENTS

- A. Section 076200 – Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

#### 1.3 DEFINITIONS

- A. Weather Barriers: Materials or assemblies forming water-resistive barriers, air barriers, vapor retarders, or combination of one or more assemblies.
- B. Water-Resistive Barriers: Materials or assemblies installed behind exterior wall coverings; designed to prevent liquid water from further penetration into exterior wall assembly.

#### 1.4 REFERENCE STANDARDS

- A. AATCC Test Method 127 – Test Method for Water Resistance: Hydrostatic Pressure; 2018, with Editorial Revision (2019).
- B. ASTM C1338 – Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2019 (Reapproved 2022).
- C. ASTM C1371 – Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers; 2015 (Reapproved 2022).
- D. ASTM D226/D226M – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017 (Reapproved 2023).
- E. ASTM D412 – Standard Test Methods for Vulcanize Rubber and Thermoplastic Elastomers – Tension; 2016 (Reapproved 2021).
- F. ASTM D751 – Standard Test Methods for Coated Fabrics; 2019.
- G. ASTM D779 – Standard Test Method for Determining the Water Vapor Resistance of Sheet Materials in Contact with Liquid Water by the Dry Indicator Method; 2016.

- H. ASTM D903 – Standard Test Method for peel or Stripping Strength of Adhesive Bonds; 1998 (Reapproved 2017).
- I. ASTM D1970/D1970M – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
- J. ASTM D3330/D3330M – Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape; 2004 (Reapproved 2018).
- K. ASTM D5590 – Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay; 2017 (Reapproved 2021).
- L. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies; 2024.
- M. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- N. ASTM E96/E96M – Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- O. ASTM E1677 – Standard Specification for Air Barrier (AB) Material or Assemblies for Low-Rise Framed Building Walls; 2023.
- P. ASTM E2178 – Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.
- Q. ASTM E2556/E2556M – Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment; 2010 (Reapproved 2016).
- R. ICC (IBC) – International Building Code; Most Recent Addition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- S. ICC-ES AC38 – Acceptance Criteria for Water-Resistive Barriers; 2016, with Editorial Revision (2021).
- T. ICC-ES AC148 – Acceptance Criteria for Flexible Flashing Materials; 2017, with Editorial Revision (2021).
- U. ICC-ES AC212 – Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing; 2015, with Editorial Revision (2020).
- V. NFPA 285 – Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2025.

## 1.5 SUBMITTALS

- A. Product Data: Provide data on material characteristics.
- B. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

## 1.6 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

## PART 2 – PRODUCTS

### 2.1 WATER-RESISTIVE BARRIERS

- A. Description: Materials installed behind exterior wall coverings; designed to prevent liquid water from further penetration into exterior wall assembly. Primary materials include mechanically applied sheets; accessory materials include flashings and seam tapes.
- B. Regulatory Requirements: For use in ICC (IBC) construction Types I, II, III, and IV buildings greater than 40 feet (12.2 m) in height.
  - 1. Comply with NFPA 285 wall assembly requirements in accordance with local building code and authorities having jurisdiction (AHJ).
- C. Plastic Sheet: Polymeric-based sheet complying with requirements of ICC-ES AC38, Grade D, with 60-minute water resistance; polyethylene sheet is not permitted.
  - 1. Water Resistance: Withstand hydrostatic head of 157 inches (400 cm), minimum, for at least five hours; pass test method in accordance with AATCC Test Method 127.
  - 2. Products:
    - a. National Shelter Products, Inc; DRYline LP:  
[www.nationalshelter.com/#sle](http://www.nationalshelter.com/#sle).
    - b. Substitutions: Submit to Architect for approval.
- D. Water-Resistive Barrier Building Wrap: Mechanically fastened building wrap.
  - 1. Hydrostatic Pressure Resistance: Greater than 200 inches (500 cm) when tested in accordance with AATCC Test Method 127.
  - 2. Water Resistance: Exceeds 1 hour when tested in accordance with ASTM D779.

3. Water Vapor Permeance: 9 to 15 perms (510 to 860 ng/(Pa s sq m)) when tested in accordance with ASTM E96/E96M, Procedure A.
- E. Water-Resistive Barrier, Composite: Tear-Resistant polyester sheet with UV-resistant acrylic coating.
1. Air Permeance: 0.18 cfm/sq ft (0.9 L/(s sq m)), maximum, when tested in accordance with ASTM E2178.
  2. Water Vapor Permeance: 200 perms (11,400 ng/(Pa s sqm)), minimum, when tested in accordance with ASTM E96/E96M using Procedure A – Desiccant Method, at 73.4 degrees F (23 degrees C).
  3. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 210 days of 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. Seam and Perimeter Tape: As recommended by sheet manufacturer.
  6. Products:
    - a. Dorken Systems Inc; DELTA-FASSADE S: [www.dorken.com/#sle](http://www.dorken.com/#sle).
    - b. Substitutions: Submit for Architect approval.
- F. Drainable, Water-Resistive Commercial Barrier Membrane: Nonwoven, polypropylene membrane with fiber-layer drainage plane.
1. Thickness: 20 mils, 0.02 inch (0.51 mm).
  2. Basis Weight: 3.8 oz/sq yd (130 g/sq m).
  3. Drainage Efficiency: 96.7 percent, when tested in accordance with ASTM E2273.
  4. Hydrostatic Pressure Resistance: Greater than 200 inches (500 cm), when tested in accordance with AATCC Test Method 127.
  5. Water Vapor Permeance: 10 perms (570 ng/(Pa s sq m)), when tested in accordance with ASTM E96/E96M, Procedure A.

## 2.2 ACCESSORIES

- A. Seal and Perimeter Tapes: As recommended by water-resistive barrier manufacturer.
- B. Flashings and Sealants: As recommended by water-resistive barrier manufacturer for application.
- C. Metal Flashings: See Section 076200.

- D. Sealant for Cracks and Joints in Substrates: Resilient elastomeric joint sealant compatible with substrates and weather barrier materials.
1. Application: Apply at 30 to 40 mil, 0.030 to 0.040 inch (0.76 to 1.02 mm) nominal thickness.
  2. Color: Green.
  3. Products:
    - a. Rubber Polymer Company; Rub-R-Wall Mastic: [www.rpcinfo.com/#sle](http://www.rpcinfo.com/#sle).
    - b. Substitutions: Submit to Architect for approval.
- E. Primer: Liquid applied polymer.
1. Color: Green.
  2. Products:
    - a. Rubber Polymer Company; Rub-R-Wall Aqua Mastic: [www.rpcinfo.com/#sle](http://www.rpcinfo.com/#sle).
    - b. Substitutions: Submit to Architect for approval.
- F. Flexible Flashing: Self-adhering sheet flashing complying with ASTM D1970/D1970M; waive slip resistance requirement if not installed on roof.
1. Width: 3 inches (76.2 mm).
  2. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 30 days of weather exposure.
  3. Products:
    - a. DuPont de Nemours, Inc; FlexWrap: [www.dupont.com/building/#sle](http://www.dupont.com/building/#sle).
    - b. DuPont de Nemours, Inc; StraightFlash: [www.dupont.com/building/#sle](http://www.dupont.com/building/#sle).
    - c. Henry Company; FortiFlash: [www.henry.com/#sle](http://www.henry.com/#sle).
    - d. Henry Company; FortiFlex Butyl: [www.henry.com/#sle](http://www.henry.com/#sle)
    - e. Henry Company; FortiFlash Butyl: [www.henry.com/#sle](http://www.henry.com/#sle)
    - f. National Shelter Products, Inc; Dryline ATX Self-Adhering Flashing; [www.nationalshelter.com/#sle](http://www.nationalshelter.com/#sle).
    - g. SIGA Cover Inc; SIGA-Wigluv: [www.siga.swiss/global\\_en/#sle](http://www.siga.swiss/global_en/#sle).
    - h. W. R. Meadows, Inc; Air-Sheild Butyl Flashing: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
    - i. Substitutions: Submit to Architect for approval.

- G. Stainless Steel Flashing: Flexible flashing with 2 mil, 0.002 inch (0.051 mm) thick Type 304 stainless steel sheet, 8 mil, 0.008 inch (0.203 mm) of butyl adhesive and siliconized release liner.
1. Roll Length: 50 feet (15.2 m) long.
  2. Width: 4 inches (102 mm) wide.
  3. Overlap joints at least 2 inch (51 mm).
  4. Products:
    - a. Momentive Performance Materials, Inc/GE Silicones; GE Elemax SS Flashing: [www.siliconeforbuilding.com/#sle](http://www.siliconeforbuilding.com/#sle).
    - b. Substitutions: Submit to Architect for approval.
- H. Flashing Tape: Special reinforced film with high-performance adhesive.
1. Application: Window and door opening flashing tape.
  2. Width: As required for application.
  3. Primer: Tape manufacturer's recommended product.
  4. Products:
    - a. Protecto Wrap Company; Protecto Super Stick Building Tape: [www.protectowrap.com/#sle](http://www.protectowrap.com/#sle).
    - b. Substitutions: Submit to Architect for approval.

### 2.3 Fasteners

- A. Air- and Moisture-Sealing Insulation Fasteners: Preassembled fastener units consisting of sealing washer, screw, and gasketing tube.
1. Length as required for thickness of insulation material and penetration of deck substrate.
  2. Thread and tip types as required for substrate material.
  3. Products:
    - a. TruFast Walls, a Division of Altenloh, Brinck & Co. US, Inc; Grip-Deck TubeSeal: [www.trufastwalls.com/#sle](http://www.trufastwalls.com/#sle).
    - b. Substitutions: Submit to Architect for approval.
- B. Self-Sealing Washers: Solid plastic, 2 inch (25 mm) diameter washers; seals building-wrap air barriers against air penetration.

1. Products:
  - a. TruFast Walls, a Division of Altenloh, Brinck & Co. US, Inc; Thermal-Grip Flat Washer: [www.trufastwalls.com/#sle](http://www.trufastwalls.com/#sle).
  - b. Substitutions: Submit to Architect for approval.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that surfaces and conditions comply with requirements of this section.

### 3.2 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation/
- B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

### 3.3 INSTALLATION

- A. Install materials in accordance with manufacturer's installation instructions.
- B. Apply sealants within recommended temperature range in accordance with manufacturer's installation instructions.
- C. Mechanically Fastened Sheets:
  1. Install sheets in shingle fashion to shed water, align horizontally.
  2. Overlap seams as recommended by manufacturer, 6 inches (152 mm), minimum.
  3. Overlap at outside and inside corners as recommended by manufacturer, 12 inches (305 mm), minimum.
  4. Attach to framed construction with fasteners extending through sheathing into framing, and space fasteners at 12 to 18 inches (305 to 460 mm) on center along each framing member supporting sheathing.
  5. Install water-resistive barrier over jamb flashings.
  6. Install head flashings under water-resistive barrier.
  7. At framed openings with frames having nailing flanges, extend sheet into opening over flanges; at head of opening, seal sheet over glange and flashing.

### 3.4 FIELD QUALITY CONTROL

- A. Owner's inspection and Testing: Cooperate with Owner's testing agency.
  - 1. Allow access to work areas and staging.
  - 2. Notify Owner's testing agency in writing of schedule for work of this section to allow sufficient time for testing and inspection.
  - 3. Do not cover work of this section until testing and inspection is accepted.

### 3.5 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.
- B. Do not leave paper- or felt-based barriers exposed to weather for longer than one week.

END OF SECTION 072500

## SECTION 074113 - METAL ROOF PANELS

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Architectural metal roof panel system.

#### 1.2 RELATED REQUIREMENTS

- A. Section 061000- Rough Carpentry: Roof sheathing.

#### 1.3 REFERENCE STANDARDS

- A. ASTM E84-Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- B. ASTM E1592-Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2017).
- C. ASTM E1646-Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 1995 (Reapproved 2018).
- D. ASTM E1680-Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems; 2016 (Reapproved 2022).
- E. ICC-ES AC188- Acceptance Criteria for Roof Underlayments; 2023.
- F. UL580-Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

#### 1.4 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product used.
- B. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions. 1. Show work as field- fabricated or field-assembled.
- C. Verification Samples: For each roofing system specified, submit samples of minimum size 12 by 12 inches (305 by 305 mm), representing actual roofing metal, thickness, profile, color, and texture. 1. Include typical fastening detail.
- D. Test Reports: Indicate compliance of metal roofing system to specified requirements.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section and with at least five years of documented experience.

- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience and approved by manufacturer.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Provide strippable plastic protection on prefinished roofing panels; remove plastic protection film prior to installation.
- B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

#### 1.7 FIELD CONDITIONS

- A. Do not install metal roof panels when ambient air, surface, or wind chill temperatures are below 45 degrees F (7 degrees C).

#### 1.8 WARRANTY

- A. Finish Warranty: Provide 20-year manufacturer warranty on film integrity, and 20-year manufacturer warranty against fading and chalking of finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Architectural Metal Roof Panel Manufacturers:
  - 1. Berridge Manufacturing Company; Tee-Lock Panel: [www.berridge.com](http://www.berridge.com).

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
  - 1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed  $L/180$  of span length (L) when tested in accordance with ASTM E1592.
    - a. Dead Loads: Weight of roofing system.
    - b. Live Loads: As required by ASCE 7.
  - 2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
  - 3. Wind Uplift: Class 90 wind uplift resistance of UL 580.

4. Air Infiltration: When tested according to ASTM E1680.
  - a. Tee-Lock Assembly: Less than 0.01 cfm/sq ft (0.18 cu m/hr/sq m) at air pressure differential of 6.24 lbf/sq ft (300 Pa).
5. Water Penetration: No water penetration when tested in accordance with procedures and recommended test pressures of ASTM E1646; perform test immediately following air infiltration test.
6. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 120 degrees F (67 degrees C).

### 2.3 ARCHITECTURAL METAL ROOFPANELS

- A. Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Metal Panels: Factory-formed panels with factory-applied finish.
  1. Steel Panels:
    - a. Acrylic-coated, aluminum-zinc alloy-coated steel complying with ASTM A792/A792M, Grade 40; minimum AZ55 (AZM165) coating.
    - b. Steel Thickness: Minimum 24 gauge, 0.024 inch (0.61 mm).
  2. Profile: Standing seam; concealed fastener system for field-seaming with special tool.
    - a. Tee-Lock Assembly: 2-3/8-inch (62 mm) minimum seam height.
  3. Texture: Smooth.
  4. Width: Maximum panel coverage.

### 2.4 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard 0.029-inch stainless steel floating twopiece clips for aluminum Zee-Lock panels, engineered to meet performance requirements, including anticipated thermal movement.

### 2.5 SECONDARY FRAMING

- A. Miscellaneous Secondary Framing: Light gauge steel framing incidental to structural supports; fabricated from steel sheet.
- B. Framing Connectors: Factory-made, formed steel sheet, ASTM A653/A653M SS Grade 40, with G90 (Z275) hot-dip galvanized coating and factory-punched holes.

### 2.6 FABRICATION

- A. Panels: Provide factory- or field-fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
- B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel

movements.

## 2.7 FINISHES

- A. Fluoropolymer Coil-Coating System: Manufacturer's standard multicoat metal coil coating system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of coil-coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch (0.023 mm), inclusive of primer and top coat after film thickness; color and gloss as selected from manufacturer's standards.

## 2.8 ACCESSORIES

- A. Miscellaneous Sheet Metal Items: Provide caps, closure strips, downspouts, flashings, gutters, moldings, and trim of same material, thickness, and finish as used for roofing panels.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion-resistant finish, combination steel and closed-cell foam.
- C. Sealants:
  - 1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
- D. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, stainless steel.
  - 1. Pop Rivets for Flashing and Trim: Stainless steel.
  - 2. Low Temperature Flexibility: Comply with ASTM D1970/D1970M.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.
- B. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A. Broom-clean wood sheathing prior to installation of roofing system.
- B. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to ensure completed roof is free of leaks.
- C. Coordinate installation of waterproof membrane over roof sheathing with Section 061000.
- D. Remove protective film from surface of roof panels immediately prior to installation; strip film carefully to avoid damage to prefinished surfaces.
- E. Separate dissimilar metals by applying bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by metal roof panel manufacturer.

- F. At locations where metal is in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

### 3.3 INSTALLATION

- A. Overall: Install roofing system in accordance with approved shop drawings and metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor components of roofing system in place allowing for thermal and structural movement.
  - 1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
  - 2. Minimize field cutting of panels. Where field cutting required, use methods that do not distort panel profiles. Use of torches for field cutting prohibited.
- B. Accessories: Install necessary components required for complete roofing assembly, including caps, closure strips, downspouts, flashings, gutters, moldings, rib closures, ridge closures, similar roof accessory items, and trim.
- C. Roof Panels: Install metal roof panels in accordance with manufacturer's installation instructions, minimizing transverse joints except at junction with penetrations.
  - 1. Form weathertight standing seams incorporating concealed clips using automatic mechanical seaming device approved by panel manufacturer.
  - 2. Provide concealed clips at panel joints.
  - 3. Provide sealant tape or other approved joint sealer at lapped panel joints.
  - 4. Install sealant or sealant tape at end laps and side joints as recommended by metal roof panel manufacturer.

### 3.4 CLEANING

- A. Use only cleaning materials listed on manufacturer's website.
- B. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to finish.

### 3.5 PROTECTION

- A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.
- B. Touchup, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION 074113

## SECTION 074646 - FIBER-CEMENT SIDING

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Fiber-cement siding.

#### 1.2 RELATED REQUIREMENTS

- A. Section 072500 - Weather Barriers: Water-resistive barrier under siding.
- B. Section 079200 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.
- C. Section 061600 - Sheathing: Siding substrate.

#### 1.3 REFERENCE STANDARDS

- A. ASTM C1186 - Standard Specification for Flat Fiber-Cement Sheets; 2022, with Editorial Revision (2023).
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- C. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024.

#### 1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data sheets on each product to be used, including:
  - 1. Manufacturer's requirements for related materials to be installed by others.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Installation methods, including nail patterns.
- B. Manufacturer's qualification statement.
- C. Installer's qualification statement.
- D. Maintenance Instructions: Periodic inspection recommendations and maintenance procedures.
- E. Warranty: Submit copy of manufacturer's warranty, made out in Owner's name, showing that it has been registered with manufacturer.
- F. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store materials in manufacturer's unopened packaging, with labels intact, until ready for installation.
- B. Store materials under dry and waterproof cover, well ventilated, and elevated above grade on a flat surface.
- C. Protect materials from harmful environmental elements, construction dust, and other potentially detrimental conditions.

## 1.7 FIELD CONDITIONS

- A. Do not install panels when air temperature or relative humidity are outside manufacturer's limits.

## 1.8 WARRANTY

- A. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.
- B. Manufacturer Warranty: Provide manufacturer warranty for years as indicated under Fiber- Cement Siding article sub-headings for "Warranty". Complete forms in Owner's name and register with manufacturer.

## PART 2 PRODUCTS

### 2.1 FIBER-CEMENT SIDING

- A. Lap Siding: Individual horizontal boards made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
  - 1. Style: Standard lap style.
  - 2. Texture: Simulated cedar grain.
  - 3. Length: 12 feet (3.7 m), nominal.
  - 4. Width (Height): 5-1/4 inches (133 mm).
  - 5. Thickness: 5/16 inch (8 mm), nominal.
  - 6. Finish: Factory applied topcoat.
  - 7. Color: White.
  - 8. Warranty: 50 year limited; transferable.
  - 9. Products:
    - a. James Hardie Building Products, Inc: [www.jameshardie.com](http://www.jameshardie.com).
    - b. Substitutions: Submit to Architect for Approval.
- B. Soffit Panels: Panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
  - 1. Texture: Smooth.
  - 2. Length: 96 inches (2440 mm), nominal.
  - 3. Width: 48 inches (1220 mm).
  - 4. Thickness: 5/16 inch (7.9 mm), nominal.

5. Finish: Factory applied topcoat.
6. Color: White.
7. Manufacturer: Same as siding.

## 2.2 ACCESSORIES

- A. Furring Strips, Metal: Galvanized metal channels.
- B. Trim: Same material and texture as siding.
- C. Metal Trim: Extruded aluminum alloy 6063-T5 temper.
  1. Finish: Clear anodized.
  2. Termination Profile Trim:
    - a. Type: As indicated on drawings.
- D. Fasteners: Galvanized or corrosion resistant; length as required to penetrate, 1-1/4 inches (31.8 mm), minimum.
- E. Exterior Soffit Vents One piece, perforated, ASTM A653/A653M galvanized steel with G90 coating, with edge suitable for direct application to gypsum board and manufactured especially for soffit application, and provide continuous vent.
- F. Sealant: Elastomeric, polyurethane or silyl-terminated polyether/polyurethane, and capable of being painted.
- G. Finish Paint: Latex house paint acceptable to siding manufacturer; primer recommended by paint manufacturer.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine substrate, clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Verify that water-resistant barrier has been installed over substrate completely and correctly; see Section 072500.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A. Protect surrounding areas and adjacent surfaces during execution of this work.
- B. Install Sheet Metal Flashing:
  1. Above door and window trim and casings.
  2. Above horizontal trim in field of siding.

### 3.3 INSTALLATION

- A. Install siding in accordance with manufacturer's instructions and recommendations.
  1. Read warranty and comply with terms necessary to maintain warranty coverage.

2. Use trim details as indicated on drawings.
  3. Touch up field cut edges before installing.
  4. Pre-drill nail holes if necessary to prevent breakage.
- B. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
  - C. Do not install siding less than 6 inches (152 mm) from ground surface, or closer than 1 inch (25.4 mm) to roofs, patios, porches, and other surfaces where water may collect.
  - D. Exterior Soffit Vents: Install in accordance with manufacturer's written instructions and at locations indicated on drawings; provide vent area as indicated on drawings.
  - E. After installation, seal joints except lap joints of lap siding; seal around penetrations, and paint exposed cut edges.

#### 3.4 CLEANING

- A. Clean faced panels in accordance with manufacturer's maintenance instructions, using cleaning materials and methods acceptable to manufacturer.

#### 3.5 PROTECTION

- A. Protect installed products until Date of Substantial Completion.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 074646

## SECTION 076200 - SHEET METAL FLASHING AND TRIM

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, exterior penetrations, and other items required by construction.
- B. Sealants for joints within sheet metal fabrications.

#### 1.2 REFERENCE STANDARDS

- A. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- C. ASTM D1876 - Standard Test Method for Peel Resistance of Adhesives (T-Peel Test); 2008 (Reapproved 2023).
- D. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

#### 1.3 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

#### 1.4 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Maintain one copy of each document on site.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Sheet Metal Flashing and Trim:
  - 1. Berridge Manufacturing Company; [www.berridge.com](http://www.berridge.com) or equal.

#### 2.2 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum

24-gauge, 0.0239-inch (0.61 mm) thick base metal.

- B. Anodized Aluminum: ASTM B209/B209M, 3005 alloy, H12 or H14 temper; 0.032 inch (0.81 mm) thick; clear anodized finish.
  - 1. Color Anodized Finish: AAMA 611, AA-M12C22A42/44, Class I, integrally or electrolytically colored anodic coating not less than 0.7 mil, 0.0007 inch (0.018 mm) thick.
    - a. Color: As indicated on drawings.

### 2.3 PREFINISHED ALUMINUM SHEETS

- A. Aluminum Sheet Substrates: ASTM B209/B209M, alloy and temper as recommended by manufacturer for application.

### 2.4 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18-inch (450 mm) long legs; seam for rigidity, seal with sealant.
- F. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing gravel. Return and brake edges.

### 2.5 GUTTERS AND DOWNSPOUTS

- A. Gutters: SMACNA (ASMM) Rectangular profile.
- B. Downspouts: Rectangular profile.
- C. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with ICC (IPC).
- D. Accessories: Profiled to suit gutters and downspouts.
  - 1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
  - 2. Gutter Supports: Brackets.
  - 3. Downspout Supports: Brackets.
- E. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3,000 psi (21 MPa) at 28 days, with minimum 5 percent air entrainment.
- F. Downspout Extenders: Same material and finish as downspouts.
- G. Seal metal joints.

### 2.6 FLASHING

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

## 2.7 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer Type: Zinc chromate.
- C. Concealed Sealants: Non-curing butyl sealant.
- D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

### 3.2 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch (0.38 mm).

### 3.3 INSTALLATION

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Secure gutters and downspouts in place with concealed fasteners.
- E. Set splash pads under downspouts.

END OF SECTION 076200

## SECTION 079200 - JOINT SEALANTS

### PART 1 GENERAL

#### 1.1 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).
- B. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).
- C. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2020a.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- F. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).
- G. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).
- H. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2022.
- I. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2023.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- K. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.
- L. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).
- M. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

#### 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's technical datasheets for each product to be used; include 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. Backing material recommended by sealant manufacturer.
  - 4. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
  - 5. Substrates the product should not be used on.
  - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
  - 7. Sample product warranty.
  - 8. Certification by manufacturer indicating that product complies with specification requirements.
- B. Product Data for Accessory Products: Submit manufacturer's technical data sheet for

each product to be used, including physical characteristics, installation instructions, and recommended tools.

- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Executed warranty.

### 1.3 QUALITY ASSURANCE

- A. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
  - 1. Adhesion Testing: In accordance with ASTM C794.
  - 2. Compatibility Testing: In accordance with ASTM C1087.
  - 3. Allow sufficient time for testing to avoid delaying the work.
  - 4. Deliver sufficient samples to manufacturer for testing.
  - 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
- B. Field Quality Control Plan:
  - 1. Visual inspection of entire length of sealant joints.
  - 2. Nondestructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
    - a. If any failures occur in the first 10 linear feet (3 linear m), continue testing at 12 inches (305 mm) intervals at no extra cost to Owner.
  - 3. Field testing agency's qualifications.
  - 4. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- C. Field Adhesion Test Procedures:
  - 1. Allow sealants to fully cure as recommended by manufacturer before testing.
  - 2. Have a copy of the test method document available during tests.
  - 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
  - 4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
  - 5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
  - 6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.

- D. Nondestructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
- E. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
  - 1. Sample: At least 18 inches (457 mm) long.
  - 2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch (25.4 mm) by that percentage; if adhesion failure occurs before the 1-inch mark is that distance from the substrate, the test has failed.
  - 3. If either adhesive or cohesive failure occurs before minimum elongation, take necessary measures to correct conditions and retest; record each modification to products or installation procedures.

#### 1.4 WARRANTY

- A. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Spray-Applied Sealants:
  - 1. CertainTeed Corporation; [www.certainteed.com](http://www.certainteed.com).
- B. Nonsag Sealants:
  - 1. Adfast USA Inc; [www.adfastcorp.com](http://www.adfastcorp.com).
  - 2. Adhesives Technology Corporation; [www.atcepoxy.com](http://www.atcepoxy.com).
  - 3. Bostik Inc; [www.bostik-us.com](http://www.bostik-us.com).
  - 4. Dow; [www.dow.com](http://www.dow.com).
  - 5. Everkem Diversified Products, Inc; [www.everkemproducts.com](http://www.everkemproducts.com).
  - 6. Franklin International, Inc; [www.titebond.com](http://www.titebond.com).
  - 7. Henry Company; [www.henry.com](http://www.henry.com).
  - 8. Hilti, Inc; [www.hilti.com](http://www.hilti.com).
  - 9. Master Builders Solutions; [www.master-builders-solutions.com/en-us](http://www.master-builders-solutions.com/en-us).
  - 10. Momentive Performance Materials, Inc (formerly GE Silicones); [www.momentive.com](http://www.momentive.com).
  - 11. Pecora Corporation; [www.pecora.com](http://www.pecora.com).
  - 12. QUIKRETE Companies; [www.quikrete.com](http://www.quikrete.com).
  - 13. Sherwin-Williams Company; [www.sherwin-williams.com](http://www.sherwin-williams.com).
  - 14. Sika Corporation; [usa.sika.com](http://usa.sika.com).
  - 15. Specified Technologies Inc; [www.stifirestop.com](http://www.stifirestop.com).
  - 16. Tremco Commercial Sealants & Waterproofing; [www.tremcosealants.com](http://www.tremcosealants.com).
  - 17. W. R. Meadows, Inc; [www.wrmeadows.com](http://www.wrmeadows.com).

- B. Self-Leveling Sealants:
  - 1. Adhesives Technology Corporation; [www.atcepoxy.com](http://www.atcepoxy.com).
  - 2. Bostik Inc; [www.bostik-us.com](http://www.bostik-us.com).
  - 3. Dayton Superior Corporation; [www.daytonsuperior.com](http://www.daytonsuperior.com).
  - 4. Dow; [www.dow.com](http://www.dow.com).
  - 5. Master Builders Solutions; [www.master-builders-solutions.com/en-us](http://www.master-builders-solutions.com/en-us).
  - 6. Pecora Corporation; [www.pecora.com](http://www.pecora.com).
  - 7. QUIKRETE Companies; [www.quikrete.com](http://www.quikrete.com).
  - 8. Sherwin-Williams Company; [www.sherwin-williams.com](http://www.sherwin-williams.com).
  - 9. Sika Corporation; [usa.sika.com](http://usa.sika.com).
  - 10. W. R. Meadows, Inc; [www.wrmeadows.com](http://www.wrmeadows.com).

## 2.2 JOINT SEALANT APPLICATIONS

- A. Scope:
  - 1. Exterior Joints:
    - a. Seal the following joints:
      - 1. Wall expansion and control joints.
      - 2. Joints between doors, windows, and other frames or adjacent construction.
      - 3. Joints between different exposed materials.
  - 2. Interior Joints:
    - a. Seal the following joints:
      - 1. Joints between door frames and window frames and adjacent construction.
  - 3. Do Not Seal:
    - a. Intentional weep holes in masonry.
    - b. Joints indicated to be covered with expansion joint cover assemblies.
    - c. Joints where sealant installation is specified in other sections.

## 2.3 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

## 2.4 NONSAG JOINT SEALANTS

- A. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M, A, G, and O; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 50 percent, minimum.
  - 2. Nonstaining to Porous Stone: Nonstaining 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.
  - 4. Color: Match adjacent finished surfaces.
  - 5. Service Temperature Range: Minus 20 to 180 degrees F (Minus 29 to 82 degrees C).
  - 6. Products:
    - a. Adfast USA Inc; Adseal LM 4600 Series: [www.adfastcorp.com](http://www.adfastcorp.com).
    - b. Adfast USA Inc; Adseal DWS 4580 Series: [www.adfastcorp.com](http://www.adfastcorp.com).

- c. Dow; DOWSIL 756 SMS Building Sealant: [www.dow.com](http://www.dow.com).
  - d. Dow; DOWSIL 790 Silicone Building Sealant: [www.dow.com](http://www.dow.com).
  - e. Dow; DOWSIL 791 Silicone Weatherproofing Sealant: [www.dow.com](http://www.dow.com).
  - f. Dow; DOWSIL 795 Silicone Building Sealant: [www.dow.com](http://www.dow.com).
  - g. Momentive Performance Materials, Inc/GE Silicones; SCS9000 SilPruf NB - Non- Staining Silicone Weatherproofing Sealant: [www.siliconeforbuilding.com](http://www.siliconeforbuilding.com).
  - h. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): [www.pecora.com](http://www.pecora.com).
  - i. Pecora Corporation; Pecora 864 NST (Non-Staining Technology): [www.pecora.com](http://www.pecora.com).
  - j. Sika Corporation; Sikasil WS-290: [usa.sika.com](http://usa.sika.com).
  - k. Sika Corporation; Sikasil WS-295: [usa.sika.com](http://usa.sika.com).
  - l. Tremco Commercial Sealants & Waterproofing; Spectrem 1: [www.tremcosealants.com](http://www.tremcosealants.com).
  - m. Tremco Commercial Sealants & Waterproofing; Spectrem 2: [www.tremcosealants.com](http://www.tremcosealants.com).
  - n. Tremco Commercial Sealants & Waterproofing; Spectrem 3: [www.tremcosealants.com](http://www.tremcosealants.com).
  - o. Tremco Commercial Sealants & Waterproofing; Spectrem 4- TS: [www.tremcosealants.com](http://www.tremcosealants.com).
  - p. Tremco Commercial Sealants & Waterproofing; Tremsil 200: [www.tremcosealants.com](http://www.tremcosealants.com).
  - q. Tremco Commercial Sealants & Waterproofing; Tremsil 400: [www.tremcosealants.com](http://www.tremcosealants.com).
  - r. Tremco Commercial Sealants & Waterproofing; Tremsil 600: [www.tremcosealants.com](http://www.tremcosealants.com).
- B. Silicone Sealant: ASTM C920, Grade NS, Uses M, A, G, and O; not expected to withstand continuous water immersion or traffic.
- 1. Movement Capability: Plus and minus 25 percent, minimum.
  - 2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
  - 3. Color: Match adjacent finished surfaces.
  - 4. Cure Type: Mildew-resistant acetoxo-curing.
  - 5. Service Temperature Range: Minus 65 to 180 degrees F (Minus 54 to 82 degrees C).
  - 6. Products:
    - a. Adfast USA Inc; ADSEAL Production 4550 Series: [www.adfastcorp.com](http://www.adfastcorp.com).
    - b. Dow; DOWSIL 999-A Building and Glazing Sealant: [www.dow.com](http://www.dow.com).
    - c. Dow; DOWSIL 758 Silicone Weather Barrier Sealant: [www.dow.com](http://www.dow.com).
    - d. Dow; DOWSIL 791 Weatherproofing Sealant: [www.dow.com](http://www.dow.com).
    - e. Dow; DOWSIL 795 Silicone Building Sealant: [www.dow.com](http://www.dow.com).
    - f. Everkem Diversified Products, Inc; EvoSeal MS: [www.everkemproducts.com](http://www.everkemproducts.com).
    - g. Franklin International, Inc; Titebond 100% Silicone Sealant: [www.titebond.com](http://www.titebond.com).
    - h. Henry Company; Moistop Sealant: [www.henry.com](http://www.henry.com).
    - i. Momentive Performance Materials, Inc/GE Silicones; SCS2000

- SilPruf - Silicone Sealant and Adhesive:  
www.siliconeforbuilding.com.
      - j. Momentive Performance Materials, Inc/GE Silicones; SCS2700 SilPruf LM (Low Modulus) - Silicone Weatherproofing Sealant:  
www.siliconeforbuilding.com.
      - k. Momentive Performance Materials, Inc/GE Silicones; SSG4600 UltraGlaze - Silicone Structural Glazing Adhesive:  
www.siliconeforbuilding.com.
      - l. Pecora Corporation; Pecora 860: www.pecora.com.
      - m. Pecora Corporation; Pecora 890FTS (Field Tintable Smooth):  
www.pecora.com.
      - n. Pecora Corporation; Pecora 890FTS-TXTR (Field Tintable Textured):  
www.pecora.com.
      - o. Sherwin-Williams Company; Silicone Rubber All Purpose Sealant:  
www.sherwin-williams.com.
      - p. Sika Corporation; Sikasil GP: usa.sika.com.
      - q. Sika Corporation; Sikasil WS-290: usa.sika.com.
      - r. Sika Corporation; Sikasil WS-295: usa.sika.com.
      - s. Sika Corporation; Sikasil WS-305 EU: usa.sika.com.
      - t. Sika Corporation; Sikasil WS-305 AM: usa.sika.com.
      - u. Sika Corporation; Sikasil-N Plus US: usa.sika.com.
- C. 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.
  - 2. Products:
    - a. Adfast USA Inc; ADSEAL KB 4800 Series: www.adfastcorp.com.
    - b. Everkem Diversified Products, Inc; TruSil 100:  
www.everkemproducts.com.
    - c. Pecora Corporation; Pecora 898 NST (Non-Staining Technology):  
www.pecora.com.
    - d. Sika Corporation; Sikasil N Plus US: usa.sika.com.
    - e. Sika Corporation; Sikasil GP: usa.sika.com.
- D. Polymer Sealant: ASTM C920; single component, cured sealant is paintable and mold/mildew resistant, low odor and VOC, and ultraviolet (UV) resistant.
  - 1. Adheres to wet surfaces.
  - 2. Color: White.
  - 3. Products:
    - a. Adfast USA Inc; ADSEAL DWSP 1940 Series: www.adfastcorp.com.
    - b. DAP Products Inc; DYNAFLEX 800 Sealant: www.dapspecline.com.
    - c. SIGA Cover Inc; SIGA-Meltell: www.siga.swiss/global\_en.
- E. 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 50 percent, minimum.
  - 2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
  - 3. Color: Match adjacent finished surfaces.
  - 4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).

5. Products:
  - a. Mapei Corporation; Mapeflex P1 FT: [www.mapei.com](http://www.mapei.com).
  - b. Master Builders Solutions; MasterSeal NP1: [www.master-builders-solutions.com/en-us](http://www.master-builders-solutions.com/en-us).
  - c. Pecora Corporation; DynaTrol II: [www.pecora.com](http://www.pecora.com).
  - d. Pecora Corporation; DynaFlex: [www.pecora.com](http://www.pecora.com).
  - e. Polycoat Products: [www.polycoatusa.com](http://www.polycoatusa.com).
  - f. Sherwin-Williams Company; Stampede-1/-TX Polyurethane Sealant: [www.sherwin-williams.com](http://www.sherwin-williams.com).
  - g. Sherwin-Williams Company; Stampede 2NS Polyurethane Sealant: [www.sherwin-williams.com](http://www.sherwin-williams.com).
  - h. Sika Corporation; Sikaflex-1A: [usa.sika.com](http://usa.sika.com).
  - i. Sika Corporation; Sikaflex-15 LM: [usa.sika.com](http://usa.sika.com).
  - j. Sika Corporation; Sikaflex-2c NS EZ Mix+: [usa.sika.com](http://usa.sika.com).
  - k. Sika Corporation; Sikaflex NP 1: [usa.sika.com](http://usa.sika.com).
  - l. Sika Corporation; Sikaflex NP 2: [usa.sika.com](http://usa.sika.com).
  - m. Sika Corporation; Sikaflex TX1: [usa.sika.com](http://usa.sika.com).
  - n. Tremco Commercial Sealants & Waterproofing; Dymonic 100: [www.tremcosealants.com](http://www.tremcosealants.com).
  - o. Tremco Commercial Sealants & Waterproofing; Vulkem 116: [www.tremcosealants.com](http://www.tremcosealants.com).
  - p. W. R. Meadows, Inc; POURTHANE NS: [www.wrmeadows.com](http://www.wrmeadows.com).
- F. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multicomponent; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface.
  1. Movement Capability: Plus and minus 35 percent, minimum.
  2. Water Compatibility: Non-Potable.
  3. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
  4. Color: Match adjacent finished surfaces.
  5. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
  6. Products:
    - a. Sika Corporation; Sikaflex-1A: [usa.sika.com](http://usa.sika.com).
    - b. Sika Corporation; Sikaflex-2c NS EZ Mix+: [usa.sika.com](http://usa.sika.com).
    - c. Sika Corporation; Sikaflex NP 1: [usa.sika.com](http://usa.sika.com).
    - d. Sika Corporation; Sikaflex NP 2: [usa.sika.com](http://usa.sika.com).

## 2.5 ACCESSORIES

- A. Sealant Backing Materials, General: Materials placed in joint before applying sealants; assists sealant performance and service life by developing optimum sealant profile and preventing three-sided adhesion; type and size recommended by sealant manufacturer for compatibility with sealant, substrate, and application.
- 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.
- C. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant

- manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
  - 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
  - 2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
  - 3. Record each test on Preinstallation Adhesion Test Log as indicated.
  - 4. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Architect.
  - 5. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

### 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.

### 3.3 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying 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. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- G. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete

slab.

#### 3.4 FIELD QUALITY CONTROL

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet (30 linear m), notify Architect immediately.
- C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

#### 3.5 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width, i.e., at low temperature in thermal cycle. Report failures immediately and repair them.

END OF SECTION 079200

## SECTION 081113 - HOLLOW METAL DOORS 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. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Light frames and glazing installed in hollow metal doors.

##### B. Related Sections:

1. Division 01 Section "General Conditions".
2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
3. Division 08 Section "Door Hardware".
4. Division 26 "Electrical" Sections for electrical connections including conduit and wiring for door controls and operators installed on frames with factory installed electrical knock out boxes.

##### C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. 10. SDI-113 Standard Practice for Determining the Steady-State Thermal Transmittance of Steel Door & Frame Assemblies.
10. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.

11. ASTM C1199 - Standard Test Method for Measuring the Steady-State Thermal Transmittance of Fenestration Systems Using Hot Box Methods
12. ASTM E1423 - Practice for Determining Steady State Thermal Transmittance of Fenestration Systems.
13. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Doors Under Specified Pressure Differences Across the Specimens.
14. ASTM E1332 - Standard Classification for Determination of Outdoor-Indoor Transmission Class.
15. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
16. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
17. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
18. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
19. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
20. NFRC 102 - Procedure for Measuring the Steady State Thermal Transmittance of Fenestration Systems.
21. NFRC 400 - Procedure for Determining Fenestration Product Air Leakage.
22. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
23. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
  1. Elevations of each door design.
  2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
  3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  4. Locations of reinforcement and preparations for hardware.
  5. Details of anchorages, joints, field splices, and connections.
  6. Details of accessories.
  7. Details of moldings, removable stops, and glazing.
  8. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
  1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

## 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
  - 1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
  - 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
  - 3. Smoke Control Door Assemblies: Comply with NFPA 105.
    - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
- E. Energy Efficient Exterior Openings: Comply with minimum thermal ratings, based on SDI-113, ASTM C1363, ASTM C1199 and ASTM E1423. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.
  - 1. Thermal Performance (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with SDI-113, ASTM C1363, ASTM C1199 and ASTM E143 and meet or exceed the following requirements:
    - a. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.34, R-Value 2.92, including insulated door, thermal-break frame and threshold.
  - 2. Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM E283 to meet or exceed the following requirements:
    - a. Rate of leakage of the door assembly shall not exceed 0.25 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).
- F. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and

frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
  - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

#### 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

#### 1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:

1. CECO Door Products (C).
2. Curries Company (CU).

## 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

## 2.3 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  1. Design: Flush panel.
  2. Core Construction: Manufacturer's thermally enhanced QMax core. Where indicated provide doors fabricated as thermal-rated assemblies with a minimum thermal rating of 0.35 BTU/hr-ft<sup>2</sup>-F.
  3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
  4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
  5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
  6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  1. Design: Flush panel.
  2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.

3. Core Construction: Manufacturer's standard vertical steel-stiffener core. Minimum 22 gauge steel-stiffeners at 6 inches on-center construction attached by spot welds spaced not more than 5" on centers. Spaces between stiffeners filled with fiberglass insulation (minimum density 0.8#/cubic ft.).
  - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
4. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Manufacturers Basis of Design:

1. Curries Company (CU) - Polystyrene Core - 707 Series.
2. Curries Company (CU) - QMax Core - 707 Series.
3. Curries Company (CU) - Steel-Stiffened - 747 Series.

## 2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16" positive thermal break and integral vinyl weatherstripping.
- C. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
  1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
  3. Manufacturers Basis of Design:
    - a. Curries Company (CU) - Series.
    - b. Curries Company (CU) - Mercury 3 Thermal Break TQ Series.
- D. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
  1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
  3. Manufacturers Basis of Design:

- a. Curries Company (CU) - CM Series.
  - b. Curries Company (CU) - M Series.
- E. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- F. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

## 2.5 FRAME ANCHORS

- A. Jamb Anchors:
- 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
  - 2. Existing Masonry Type: Provide steel pipe spacers welded to plate reinforcing at jamb stops or hat shaped formed strap spacers welded to jamb near the stop. Drill jamb stop and strap spacers for flat head bolts to pass through frame and spacers.
  - 3. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.6 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.
- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.
- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.
- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

## 2.7 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.8 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
  - 1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
  - 2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
  - 3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
  - 4. Electrical Raceways: Provide hollow metal doors to receive electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware". Wire nut connections are not acceptable.
- D. Hollow Metal Frames:
  - 1. Shipping Limitations: 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.
  - 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
    - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
  - 3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
  - 4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
  - 5. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
  - 6. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.

7. Electrical Knock Out Boxes: Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; including but not limited to, electric through wire transfer hardware, electrical raceways and wiring harnesses, door position switches, electric strikes, magnetic locks, and jamb mounted card readers as specified as follows:
    - a. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
    - b. Conduit to be coordinated and installed in the field (Division 26) from middle hinge box and strike box to door position box.
    - c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Section "Door Hardware".
    - d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.
  8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
  9. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches on-center 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 1 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.
      - 3) Five anchors per jamb from 90 to 96 inches high.
      - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
      - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
  10. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
  11. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.
- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "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-template, 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.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

## 2.9 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
  1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.
- E. Verify tolerances against manufacturers installations instructions for tornado and hurricane storm shelter openings.

### 3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
  - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
  - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
  - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
  - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Non-Fire-Rated Standard Steel Doors:
    - a. Jamb and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in hollow metal manufacturer's written instructions.

### 3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION 081113

## SECTION 087100 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. 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. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
  - 1. ANSI/BHMA Certified Product Standards - A156 Series.
  - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
  - 3. ANSI/UL 294 - Access Control System Units.
  - 4. UL 305 - Panic Hardware.
  - 5. ANSI/UL 437- Key Locks.

### 1.3 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.

#### 1.4 CLOSEOUT SUBMITTALS

- A. 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 Procedures.
- B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

#### 1.5 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. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 5 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.
- D. 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.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
  - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
- F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- G. 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.
- H. 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
- I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

#### 1.6 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".

#### 1.7 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.

## 1.8 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. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

### 2.2 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
  - 1. Quantity: Provide the following hinge quantity:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
  - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
    - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
  - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

- a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
  - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
4. Hinge Options: Comply with the following:
- a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.
5. Manufacturers:
- a. McKinney (MK) - TA/T4A Series, 5-knuckle.

### 2.3 CONTINUOUS HINGES

- A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-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. Manufacturers:.
- a. Pemko (PE).

### 2.4 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
- 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
  - 2. Furnish dust proof strikes for bottom bolts.
  - 3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
  - 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
  - 5. Manufacturers:
    - a. Burns Manufacturing (BU).
    - b. Door Controls International (DC).
    - c. Rockwood (RO).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units 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. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
6. Manufacturers:
  - a. Burns Manufacturing (BU).
  - b. Hiawatha, Inc. (HI).
  - c. Rockwood (RO).

## 2.5 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.
  1. Manufacturers:
    - a. Sargent Manufacturing (SA).
    - b. No Substitution.
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
  1. Threaded mortise cylinders with rings and cams to suit hardware application.
  2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
  4. Tubular deadlocks and other auxiliary locks.
  5. 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.
  6. Keyway: Match Facility Standard.
- C. Keying System: Each type of lock and cylinders to be factory keyed.
  1. Supplier shall conduct a "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. Existing System: Field verify and key cylinders to match Owner's existing system.
- D. 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).

E. 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.

## 2.6 KEY CONTROL

A. 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. Manufacturers:
  - a. Lund Equipment (LU).
  - b. MMF Industries (MM).
  - c. Telkee (TK).

## 2.7 CYLINDRICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed cylindrical locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide locksets with functions and features as follows:
  - a. Meets ANSI/BHMA A156.41 for single motion egress.
  - b. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
  - c. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
  - d. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.13 requirements to 20 million cycles or greater.
  - e. Exceeds ANSI/BHMA A156.2 requirements by 2.6 times for 3,100 in-lb. abusive locked lever torque with no entry while maintaining egress.
  - f. Exceeds ANSI/BHMA A156.2 requirements by 8 times for 1,600 lbs. offset lever pull with no entry for protection against attacks.
  - g. Exceeds ANSI/BHMA A156.3 requirements by 2 times for latch retraction with 100 lb. preload while maintaining operation in warped doors.
  - h. Exceeds ANSI/BHMA A156.3 requirements by 20 times for no access with minimum 100 vertical impacts for protection against vandalism attempts.
  - i. Independent return springs allow lock to exceed ANSI/BHMA A156.2 Grade 1 cycle requirements without lever sag.
  - j. Ten-year limited warranty for mechanical functions.

2. Manufacturers:
  - a. Sargent Manufacturing (SA) - 10X Line.
  - b. Corbun Russwin (CR) – CLX3300

## 2.8 DEADLOCKS AND LATCHES

- 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. Manufacturers:
  - a. Sargent Manufacturing (SA) - 4870 Series.

## 2.9 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.

## 2.10 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the

- proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
  5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
  6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
  7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
  8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
  9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
  10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
  11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

## 2.11 SURFACE 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.
  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. 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 Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
  4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  6. 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 (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed 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 body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

1. Large body cast iron surface mounted door closers shall have a 30-year warranty.
2. Manufacturers:
  - a. Sargent Manufacturing (SA) - 281 Series.
  - b. Norton (NO) – 7500
  - c. Corbin Russwin (CR) – DC8000

## 2.12 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 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. Manufacturers:
  - a. Burns Manufacturing (BU).
  - b. Hager Companies (HA).
  - c. Hiawatha, Inc. (HI).
  - d. Rockwood (RO).

## 2.13 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 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. Manufacturers:

- a. Burns Manufacturing (BU).
- b. Hager Companies (HA).
- c. Hiawatha, Inc. (HI).
- d. Rockwood (RO).

- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed 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. Manufacturers:

- a. Norton Rixson (RF).
- b. Rockwood (RO).
- c. Sargent Manufacturing (SA).

## 2.14 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. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

- 1. National Guard Products (NG).
- 2. Pemko (PE).

3. Reese Enterprises, Inc. (RE).

## 2.15 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.

## 2.16 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.

## 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. DHI TDH-007-20: Installation Guide for Doors and Hardware.
  - 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. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. 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 (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
  - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

### 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. Quantities listed are for each pair of doors, or for each single door.
  - 2. The supplier is responsible for handing and sizing all products.
  - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
- B. Manufacturer's Abbreviations:
  - 1. MK - McKinney
  - 2. PE - Pemko
  - 3. SA - SARGENT
  - 4. RO - Rockwood
  - 5. RF - Rixson

## Hardware Sets

### Set: 1.0

Doors: 117

Description: STOREROOM LOCK CPS CLOSER GASKET WF

3 Hinge, Full Mortise	T4A3786/T4A4786 NRP FT 4-1/2" x 4-1/2"	US26D	MK 087100
1 Storeroom or Closet Lock	10XG04 LMW	626	SA 087100
1 Surface Closer	CPS7500	689	NO 087100
1 Kick Plate	K1050 10" x 2" LDW 4BE CSK	US32D	RO 087100
1 Threshold	2005AT	689	PE 087100
1 Gasketing	2891AS	689	PE 087100
1 Sweep	3452AV	689	PE 087100

### Set: 2.0

Doors: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116

Description: STOREROOM LOCK w/ INDICATOR CPS CLOSER GASKET WF

3 Hinge, Full Mortise	T4A3786/T4A4786 NRP FT 4-1/2" x 4-1/2"	US26D	MK 087100
1 Storeroom or Closet Lock	10XG04 LMW	626	SA 087100
1 Indicator Deadbolt	468 V54	626	SA 087100
1 Surface Closer	CPS7500	689	NO 087100
1 Kick Plate	K1050 10" x 2" LDW 4BE CSK	US32D	RO 087100
1 Threshold	2005AT	689	PE 087100
1 Gasketing	2891AS	689	PE 087100
1 Sweep	3452AV	689	PE 087100

END OF SECTION 087100

## SECTION 102800 – TOILET, BATH, AND LAUNDRY ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Commercial shower and bath accessories.
- C. Diaper changing stations.

#### 1.2 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures; 2011 (Reaffirmed 2022).
- C. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2021.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
- E. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2022.
- F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- G. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

#### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

#### 1.4 SUBMITTALS

- A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- B. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

#### A. Under-Lavatory Pipe Supply Covers:

1. Plumberex Specialty Products, Inc; [www.plumberex.com](http://www.plumberex.com).
2. Substitutions: Submit to Architect for approval

#### B. Diaper Changing Stations:

1. American Specialties, Inc; [www.americanspecialties.com](http://www.americanspecialties.com).
2. Bradley Corporation; [www.bradleycorp.com](http://www.bradleycorp.com).
3. Diaper Deck & Company; [www.diaperdeck.com](http://www.diaperdeck.com).
4. Foundations Worldwide, Inc; [www.foundations.com](http://www.foundations.com).
5. Koala Kare Products; [www.koalabear.com](http://www.koalabear.com).
6. Saniflow Hand Dryer Corporation; [www.saniflowcorp.com](http://www.saniflowcorp.com).
7. Safe-Strap Company, Inc; [www.diaperdepot.com](http://www.diaperdepot.com).
8. Substitutions: Submit to Architect for approval.

### 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. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.
- C. Adhesive: Two component epoxy type, waterproof.
- D. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

### 2.3 COMMERCIAL TOILET ACCESSORIES

#### A. Toilet Paper Dispenser: Double roll, surface mounted, for cored or coreless type rolls.

1. Products:
  - a. Refer to Accessory Schedule in Drawings (A-1)
  - b. Substitutions: Submit to Architect for approval

#### B. Paper Towel Dispenser: Folded paper type, thermoplastic polymer, surface-mounted, with viewing slots on sides as refill indicator and tumbler lock.

1. Capacity: 500 multifold minimum.
2. Products:
  - a. Refer to Accessory Schedule in Drawings (A-1)
  - b. Substitutions: Submit to Architect for approval.

- C. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gauge refill indicator, tumbler lock.
1. Minimum Capacity: 40 ounces (1.183 liters).
  2. Products:
    - a. Refer to Accessory Schedule in Drawings (A-1)
    - b. Substitutions: Submit to Architect for approval.
- D. Mirrors: Stainless steel framed, 1/4 inch (6 mm) thick annealed float glass; ASTM C1036.
1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
  2. Size: As indicated on drawings.
  3. Frame: 0.05 inch (1.3 mm) angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
  4. Backing: Full-mirror sized, minimum 0.03 inch (0.8 mm) galvanized steel sheet and nonabsorptive filler material.
  5. Products:
    - a. Refer to Accessory Schedule in Drawings (A-1)
    - b. Substitutions: Submit to Architect for approval.
- E. Grab Bars: Stainless steel, smooth surface.
1. Standard Duty Grab Bars:
    - a. Push/Pull Point Load: 250 pound-force (1112 N), minimum.
    - b. Dimensions: 1-1/4 inch (32 mm) outside diameter, minimum 0.05 inch (1.3 mm) wall thickness, exposed flange mounting, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
    - c. Finish: Satin.
    - d. Length and Configuration: As indicated on drawings.
    - e. Products:
      - 1) Refer to Accessory Schedule in Drawings (A-1)
      - 2) Substitutions: Submit to Architect for approval.
- F. 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. Products:
    - a. Refer to Accessory Schedule in Drawings (A-1)
    - b. Substitutions: Submit to Architect for approval.

## 2.4 COMMERCIAL SHOWER AND BATH ACCESSORIES

- A. Folding Shower Seat: Wall-mounted surface; welded tubular seat frame, structural support members, swing-down legs, hinges, and mechanical fasteners of Type 304 stainless steel, L-shaped, right hand seat.
1. Seat: Phenolic or polymeric composite one-piece seat or seat slats, of color as selected.
  2. Size: ADA Standards compliant.

3. Products:
  - a. Refer to Accessory Schedule in Drawings (A-1)
  - b. Substitutions: Submit to Architect for approval.
- B. Towel Pin: Stainless steel, 3 inch (75 mm) extension from wall; rectangular-shaped bracket and backplate for concealed attachment, satin finish.

## 2.5 DIAPER CHANGING STATIONS

- A. 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. Color: As selected.
  4. Minimum Rated Load: 250 pounds (113.4 kg).
  5. Products:
    - a. Refer to Accessory Schedule in Drawings (A-1)
    - b. Substitutions: Submit to Architect for approval.

## 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.
- D. Verify that field measurements are as indicated on drawings.
- E. See Section 061000 – Rough Carpentry for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

### 3.2 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

### 3.3 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.

- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated. See drawings for height information.

#### 3.4 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION 102800

## SECTION 220000 - PLUMBING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Provisions of the General Requirements, Division 1, are a part of this section.

#### 1.2 WORK INCLUDED

- A. Piping
  - 1. Sanitary waste and vent.
  - 2. Hot and cold water.
- B. Plumbing fixtures and trim.
- C. Drawings of Record
- D. Prior to bidding, all Contractors shall visit the site and become familiar with all existing conditions, which will affect construction procedures and scope of work required as part of this Section.

#### 1.3 RELATED WORK

- A. Painting by Painting Contractor.
- B. Cutting and patching.
- C. Excavation and backfill.

#### 1.4 CODES AND STANDARDS

- A. International Plumbing Code.
- B. National Fire Protection Association.
- C. American Society of Mechanical Engineers.
- D. International Approval Service.
- E. American Society for Testing of Materials
- F. American Society of Heating, Refrigerating, and Air Conditioning Engineers.
- G. International Building Code.

## 1.5 SHOP DRAWINGS

- A. Shop drawings shall be submitted to the Architect for approval. The Contractor shall be responsible for quantities and dimensions. The Contractor shall check all shop drawings prior to submission to the Architect.

## PART 2 – PRODUCTS

### 2.1 PIPING MATERIALS

- A. All sanitary waste piping and vent piping shall be Schedule 40 PVC plastic pipe and fittings, except waste piping outside the building shall be SDR-35.
- B. All hot and cold water piping above grade shall be Type L, hard copper. Below grade shall be Type K copper, ASTM B 88, wrought copper fittings, bridgit, lead-free solder.

### 2.2 HANGERS/SUPPORTS

- A. All hangers 1/2" through 6", Elcen Figure 89 or 389, galvanized steel or copper plated steel, all thread rod with concrete insert, lag screw, or other approved anchorage means.
- B. Supports shall be Roof Top Blox with Securing Brackets RTB-01/SCB-07.

### 2.3 VALVES

- A. Ball valves (all valves unless noted on Drawings) shall be Watts 6000 Series ball valves, 2-piece bronze, or equal by Nibco or Crane.
- B. All bathroom groups shall have isolation valves on both the cold and hot water supplies. Locate valves as required. If valves are installed within a wall, provide an access door as required.

### 2.4 PIPE INSULATION

- A. Shall be 1/2" thick Armaflex. Insulate all above grade hot water and cold water piping.

### 2.5 PLUMBING FIXTURES

- A. All fixtures shall be of one manufacturer unless specified. See drawings.
- B. Vitreous china fixtures shall be twice fired, all exposed surfaces covered with opaque glaze. Cast iron fixtures shall be finished inside with acid resisting porcelain enamel. All exposed trim shall be heavy polished chrome plated brass. Determine quantity of fixtures and equipment from drawings.

## 2.6 CLEANOUTS

- A. Approved equal by Zurn or Wade. Install maximum of 50 feet on centers, at base of all stacks, and at all 90 degree bends in waste piping. Cover for cleanouts shall be coordinated with wall and floor finish.

## 2.7 OTHER EQUIPMENT

- A. All other equipment (Water Heaters, Pumps, Water Coolers, etc.) shall be as scheduled on drawings.

## 2.8 SUBSTITUTIONS

- A. All substitutions must be pre-approved by the architect prior to bidding. See Division 1 for substitution process.

## PART 3 – EXECUTION

### 3.1 INSTALLATION INSTRUCTIONS

- A. All material and equipment shall be installed as recommended by manufacturer. These specifications shall not be construed to vary from manufacturer's written installation instructions without written approval from manufacturer.
- B. It shall be the responsibility of this Contractor to visit the site & coordinate with the other trades for clearance, elevations, etc., before installation of any material. Where conflicts exist, the Architect shall be notified before installing material. Changes required in work specified in this Section caused by neglect to do so shall be made at no cost to the Owner.
- C. Arrange with Contractors of other trades for installation of built-in items, blocking, and additional necessary supports.

### 3.2 PIPE ROUTING

- A. All piping shall be concealed except where approved by Architect.
- B. All piping shall be run parallel and/or perpendicular to building lines and shall be neatly grouped. Piping shall be on warm side of insulation.
- C. See Drawings for general routing of pipes and see details of drawings for specific pipe routing.
- D. Join all copper piping with Bridgit Lead-Free solder and non-corrosive flux Nodorode, or equal clean surfaces to be solder bright.
- E. Provide a union or flange connection at each piece of equipment such as water heaters, accessible fixtures etc. so the equipment can be removed or serviced without disturbing remainder of system, draining system or cutting piping.

- F. Make all connections between copper and ferrous pipe in domestic water and other open type systems with dielectric unions.

### 3.3 PLUMBING FIXTURE INSTALLATION

- A. Provide all fixtures and equipment with compression stops in addition to the faucets.
- B. Provide all grounds and supports for the fixtures and other equipment. Arrange with contractors of other trades for installation of built-in items, blocking, and additional necessary supports.
- C. Grout behind all wall hung plumbing fixtures with hard white durable plaster materials to eliminate all voids and cracks and provide sufficient plane bearing surface for mounting.
- D. Caulk behind all standard wall hung fixtures with G.E. "Silicone Sanitary Sealant" or other approved mildew resistant, paintable, non-hardening sealant.

### 3.4 PIPE SUPPORT INSTALLATION

- A. Vertical pipe of the following materials shall be supported at intervals not more than the distance prescribed in the following:
  - 1. Copper Tube: At each story, but not more than ten (10) foot intervals.
  - 2. Plastic Pipe: At each story, and at midpoint between floors.
  - 3. Threaded Pipe: At each story, but not more than (10) foot intervals.
- B. Horizontal pipe of the following materials shall be supported at intervals not more than the distances prescribed in the following:

1. Copper Tube (1¼ inch or less):	At six (6) foot intervals.
2. Copper Tube (1½ inch and over):	At ten (10) foot intervals.
3. Plastic Pipe (3 inch or less):	At four (4) foot intervals.
4. Plastic Pipe (4 inches and over):	At five (5) foot intervals.
5. Threaded Pipe:	At twelve (12) foot intervals.
- C. Piping shall be so anchored as to take the load off the stack at the base.
- D. Hangers and strapping material shall be of similar materials as the piping to avoid galvanic action.
- E. Provide additional hangers at each turn and where concentrated loads such as valves, risers, etc. occur.
- F. Trapeze Hangers shall not be permitted.
- G. Provide pipe covering protection saddles.
- H. Construct rigid structural steel anchors to secure piping to building construction where required to stabilize piping.

- I. Furnish and install all supplementary steel angles, channels, beams, etc.; where hanger location falls between joists, purlins or beams; for hanging loads exceeding capacity of a single joist, etc. Safety factor of all such assemblies shall be 5 to 1 minimum.
- J. Support all piping and equipment from building construction with adequate hangers, claps, rods inserts.
- K. All supporting methods and devices must be approved by the Architect prior to installation. No overloading of any beam, joist, slab, device, etc. will be allowed. Welding to and drilling of structural members must be approved by the Architect. Coordinate support locations with other Contractors.

### 3.5 WATER HEATER INSTALLATION

- A. Furnish and install ASME rated temperature-pressure relief valve with temperature sensing element directly inserted into tank. Pipe relief full size to drain using copper piping.
- B. Furnish and install cutoff valves and dielectric unions in hot and cold connections to all water heaters.

### 3.6 FLOOR DRAIN INSTALLATION

- A. This contractor shall be responsible for proper setting and elevation of all floor drains to provide proper slopes and avoid water puddling on floors.

### 3.7 ACCESS DOORS

- A. Furnish and install access doors over all concealed valves, and other concealed components requiring service and not accessible from utility spaces. All access doors shall be as manufactured by Inland Steel Products Co. "Milcor" styles as required to match construction and as approved by Architect.

### 3.8 EXCAVATION AND BACKFILL

- A. Contractor shall perform all excavation and backfill required for all plumbing work. Cutting of any concrete required by the excavation shall be done by the General Contractor. Any rock shall be excavated 3" below the laying depth, and the trench shall be filled in 6" layers and mechanically compacted. Flooding or puddling not permitted. All piping which will be under concrete or roads, shall be backfilled in accordance with Architects specifications.

### 3.9 WATERPROOFING

- A. Plumbing work piercing weatherproof construction shall be made weatherproof by use of Architect approved materials and methods.

### 3.10 TESTS AND ADJUSTMENTS

- A. Fixtures and equipment shall not be concealed or covered until they have been inspected and approved by the Architect, who shall be notified when the work is ready for inspection. All work shall be completed installed, tested as required by this Section, and leak-tight before inspection if requested. All tests shall be repeated to the satisfaction of those making the inspection.
  - 1. All waste and vent piping shall be filled with water to the highest point in each system with all air removed. The lines shall be flushed by removing the test plug. Piping concealed shall be subjected to not less than 10' head. Stand piping installed for head test shall be min. 2" diameter.
  - 2. Sewer piping and storm water piping shall be filled with water to its highest point.
  - 3. Water piping shall be flushed out, tested at 100# PSI for 24 hours, then left under pressure of supply main for the balance of construction period.
  - 4. Plumbing fixtures shall be filled with water and checked for leaks or retarded flow.
  - 5. All flush valves, key stops, valves and similar equipment shall be adjusted and balanced to provide for the proper operation of the various systems.
  - 6. Each piece of plumbing equipment and the entire plumbing system shall be adjusted and readjusted as required to ensure proper functioning and shall be left in 1st-class operating condition.

### 3.11 EXPANSION

- A. Contractor shall provide for min. 1-1/2" expansion per 100 linear ft. of piping by installing swing joints and/or expansion compensators.

### 3.12 STERILIZATION OF WATER DISTRIBUTION SYSTEM

- A. When the new water distribution system has been flushed thoroughly, it shall be sterilized in accordance with the requirements of the Health Department having jurisdiction or, in the absence of such, by the following:
  - 1. Introduce chlorine or a solution of calcium or sodium hypochlorite, filling the lines slowly and applying the sterilizing agent at a rate of 50 parts per million of chlorine as determined by residual chlorine tests at the ends of the lines. Open and close all valves and hydrants while the system is being chlorinated.
  - 2. After the sterilizing agent has been applied for 24 hours, test for residual chlorine that is indicated, repeat the sterilization process.

### 3.13 CUTTING, PATCHING AND PIERCING

- A. Obtain written permission of the Architect before cutting or piercing structural members. If, in the process of the mechanical work, ducts, piping or equipment need to be installed in an area after it has been completed, the area shall be left in the same condition it was originally. Patching and/or refinishing will be determined by the Architect.

### 3.14 ACCESS

- A. Equipment, valves and devices shall be mounted in a manner which provides adequate maintenance, inspection access and work space. Where access is required for adjustment, cleanout, inspection of maintenance and such access is not otherwise available, access panels shall be furnished and installed. Panels shall be selected by the Architect.

### 3.15 BUILDING OPENINGS FOR ADMISSION OR INSTALLATION OF EQUIPMENT

- A. The Contractor shall ascertain from his examination of the Architectural and Structural Drawings whether any special temporary or permanent openings in the building for the admission or installation of apparatus furnished under this Contract will be necessary and he shall notify the General Contractor accordingly. He shall pay all cost of making such openings in case of failure to give this notification in time for the General Contractor to arrange for same during construction.

### 3.16 CUTTING, SLEEVES, INSERTS, ANCHOR BOLTS AND ESCUTCHEONS

- A. In placing sleeves, inserts, anchor bolts and any other material to be embedded in masonry and concrete or built into the structure, the Contractor shall cooperate with all other trades and shall consult with the Architect in regard to their exact location whenever there is any interference with structural members.
- B. The Contractor will be held responsible for locating and maintaining in proper position, sleeves, inserts and anchor bolts supplied and/or set in place by him. In the event that failure to do so requires cutting and patching of finished work, it shall be done at the Contractor's expense.
- C. All pipe passing through floors, walls or partitions shall be provided with sleeves having an internal diameter 1" larger (unless specifically indicated otherwise) than the outside diameter of the pipe.
- D. Sleeves through outside walls shall be Schedule 40 black steel pipe. Sleeves shall extend 1/2" beyond each side of the wall. The space between the sleeve and the pipe shall be packed and made watertight with a waterproof compound.
- E. Sleeves through interior partitions shall be 22-gauge galvanized sheet steel set flush with finished surface of partitions.
- F. Inserts shall be individual or strip type of pressed steel construction with accommodation for removable nuts and threaded rods up to 3/4" in diameter, permitting lateral adjustment. Individual inserts shall have an opening at the top to allow reinforcing rods to be passed through the insert body and shall be similar to Fee and Mason Fig. 188 or equal for equipment suspension and Fig. 9000 or equal for pipe suspension.
- G. Where sleeves or inserts are placed in interior walls or partitions, the openings shall be completely sealed with Fiberglass to prevent sound transmission. Where sleeves are placed in fire rated walls and floors, they shall be packed with high temperature mineral wool and non-flammable sealant.
- H. Furnish and install escutcheons where uninsulated pipes pass through finished walls, floors or ceilings. Escutcheons shall be chrome plated brass, firmly secured to the pipes and of sufficient

outside diameter to amply cover the sleeved openings for the pipes. Escutcheon plates shall be as manufactured by Crane Company or equal.

### 3.17 SOUND AND VIBRATION

- A. All pumps, motors etc. shall be mounted so as to be isolated from the building by approved sound insulation means. All noises and hums of motors, fan etc. shall be so absorbed that the operation will not be heard except in the immediate vicinity of the equipment.

### 3.18 CLEANING OF EQUIPMENT AND REMOVAL OF RUBBISH

- A. All equipment furnished or installed by this Division shall be thoroughly cleaned. At the completion of the work, the Contractor shall remove from the buildings and the premises all rubbish and debris resulting from his operations and shall leave all material and equipment furnished by him and the space occupied by them absolutely ready for use.
- B. Under no circumstances shall rubbish be allowed to accumulate in the building or on the premises. All dirt and rubbish resulting from this Division's work shall be removed by this Division from time to time and as often as directed by the Architect and Owner's representative.

### 3.19 RECORD DOCUMENTS

- A. Blue-line or black-line copy of Drawings shall be kept by this Contractor at the job site at all times for the sole purpose of recording horizontal and vertical location of all concealed and underground plumbing, referenced to permanent visible structures. At completion of job, neatly record all dimensions on a reproducible drawing and submit for approval of Architect.

END OF SECTION 220000

## SECTION 260000 - ELECTRICAL

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Provisions of the General Requirements, Division 1, are a part of this section.

#### 1.2 WORK INCLUDED

- A. Wiring.
- B. Conductors and Conduit.
- C. Panels and Fused Disconnects.
- D. Wiring Devices, Light Fixtures, Lamps, Ballasts, Fuses.
- E. Wiring for Equipment Furnished by Others.
- F. Grounding.
- G. Drawings of Record.
- H. Prior to bidding, all Contractors shall visit the site and become familiar with all existing conditions, which will affect construction procedures and scope of work required as part of this Section.

#### 1.3 CODES AND STANDARDS

- A. National Fire Protection Association – National Fire Code.
- B. National Electric Code.
- C. Building Officials and Code Administrators International, Inc.
- D. Underwriter’s Laboratories.
- E. National Electric Safety Code.

#### 1.4 SHOP DRAWINGS

- A. Shop drawings shall be submitted to the Architect for approval. The Contractor shall be responsible for quantities and dimensions. The Contractor shall check all shop drawings prior to submission to the Architect.

## 1.5 WORK

- A. The Contractor shall follow the drawings in the layout of his work and shall consult general construction drawings, mechanical drawings and all other drawings for this project to determine all conditions affecting the electrical work. The drawings are not to be scaled and the Contractor shall verify spaces in which the electrical work is to be installed.
- B. The Contractor shall take measurements and make layouts as required for the proper installation of the work and coordination with all other work on the project.

## 1.6 RELATED WORK

- A. Mechanical Equipment.
- B. Painting by Painting Contractor.

## PART 2 – PRODUCTS

### 2.1 WIRE AND CABLE

- A. Low Voltage Wire and Cable
  - 1. All wire and cable installed under this contract shall be Southwire, Anaconda, Triangle or approved equal, complete with non-fading type color coding system as set forth by National Electric Code. General interior wiring shall have 600-volt insulation, THHN. Wiring in wet and damp locations shall be THWN.
  - 2. Wire shall be soft annealed copper conforming to current requirements of National Electrical Code, and shall be Brown & Sharp (B&S), or American Wire Gauge (AWG) gauges unless specifically indicated on the Drawings. NO ALUMINUM WIRE SHALL BE USED. Wire smaller than #12 gauge shall not be used.

### 2.2 CONNECTORS

- A. Shall be "Scotch Lok" for up to #8 wire and Weaver, or approved equal, split bolt or set screw type connectors for #6 wire and larger.

### 2.3 CONDUIT

- A. EMT electrical metallic tubing, Republic "Electriunite", National, Triangle.
- B. Rigid galvanized conduit, Republic "Galvanite", National, Triangle, with threaded fittings.
- C. Flexible metal conduit, "Greenfield".
- D. Carlon, or approved equal, Schedule 40 non-metallic conduit and fittings.
- E. Metal Clad (Type MC) cable and fittings manufactured by AFC, or approved equal.

## 2.4 OUTLET, JUNCTION AND PULL BOXES

- A. Outlet boxes shall be galvanized or sherardized, one-piece pressed steel of sectional type or non metallic (Carlton), of size most suitable for the outlet used. Boxes shall be equipped with plaster rings, extension rings, bar hangers and fixture studs as may be required. Junction or pull boxes, either flush or surface mounted, as indicated or required, shall be of adequate sizes to accommodate the conductors installed therein. Junction and pull boxes shall comply with the National Electrical Code as to construction.

## 2.5 LIGHTING AND POWER PANELBOARDS AND FUSES

- A. Power panels and lighting panels shall be circuit breaker type, Siemens, Square D, GE, or equal. See Drawings.
- B. Fuses shall be Bussmann as follows or as noted on Drawings. Fuses 60 amps and above shall be NEMA class L Hi-cap "KRP-C" fuses with time delay. Fuses feeding circuit breaker panels shall be Limitron fuses, "KTN" for 250 volts. Fuses on power feeders shall be Fusetron Dual-Element fuses in the 0–60-amp sizes, "FRN" for 250 volts, and Low-Peak Dual Element fuses in the 70-to-600-amp sizes, "LPN" for 250 volts.
- C. Panels shall be for connection to 4-wire, 120/208 volt, grounded neutral, 3 phase power.
- D. Cabinets shall conform to NEMA standards, and be constructed of code gauge galvanized sheet steel with single door flush or surface trim as indicated on the Drawings.
- E. Cabinet trim shall have gray lacquer finish.
- F. Panels shall have aluminum bus bars, ground bars, and neutrals.

## 2.6 WALL SWITCHES

- A. Shall be Leviton #1120 series, or approved equal, 20-amp, 120/277-volt, grounding clip. Single pole or 3-way as indicated in the drawings. Color as selected by Architect.

## 2.7 DUPLEX CONVENIENCE OUTLETS

- A. Shall be Leviton #5362, or approved equal, 20-amp grounding type. Ground fault receptacles shall be Leviton #7899-LW Series. Side wire only.

## 2.8 SPECIAL OUTLETS

- A. Shall be by Leviton as required and as shown on drawings, complete with wall plates, same color as duplex receptacles.

## 2.9 SWITCH AND RECEPTACLE PLATES

- A. Shall be Leviton #80700 series to match switch, receptacle, or special outlet as required or approved equal.

## 2.10 FUSED DISCONNECTS

- A. Shall be Square D, general duty, single throw, externally operated safety switches, fuses and of poles, volts and ampere ratings for the load shown in NEMA-1 or NEMA-3R enclosures, as required.

## 2.11 LIGHT FIXTURES

- A. All light fixtures shall be as scheduled on drawings or approved equal. To be considered as equal, fixtures must have equal features, components, quality of construction, and photometrics.

## 2.12 SUBSTITUTIONS

- A. All substitutions must be pre-approved by the architect prior to bidding. See Division 1 for substitution process.

## PART 3 – EXECUTION

### 3.1 MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS

- A. All materials shall be installed as recommended by manufacturer. Nothing in these specifications shall be construed to vary from manufacturer's written installed instructions without written approval from manufacturer.
- B. It shall be the responsibility of this Contractor to coordinate with the other trades for clearance, elevations, etc., before installation of any material. Where conflicts exist, the Architect shall be notified before installing material. Changes required in work specified in this section caused by neglect to do so shall be made at no cost to the Owner or Architect.
- C. The Contractor shall verify the voltage phase full-load current and exact location of all electrical equipment before rough-in.
- D. Arrange with Contractors of other trades for installation of built-in items, blocking, and additional necessary supports.

### 3.2 WIRE AND CABLE INSTALLATION

- A. Unless specifically indicated on Drawings, all wire and cable installed in ordinarily dry locations above base slab shall be Type THHN. Unless specifically indicated on Drawings, all wire installed below grade in slab or grade or in areas subjected to possible condensation, moisture, or weather shall be Type THWN.

- B. All wiring shall be in conduit, or shall be type MC cable. See "Conduit" below.
- C. All wiring shall be continuous between boxes with out any splices in conduit or frame spaces.
- D. All 120-volt 20-amp lighting and receptacle circuits requiring more than 100' of conductor (one way) shall be #10 conductors.

### 3.3 CONDUIT INSTALLATION

- A. Conduit for general use concealed inside building as shown on Drawings shall be EMT or type MC cable.
- B. All conduit for installation exposed or exterior to structure, or within concrete construction or as shown on Drawings, shall be rigid galvanized or Schedule 40 PVC as approved by Architect.
- C. Conduit smaller than 1/2" shall not be used. Flexible conduit (Greenfield) may be used in short lengths (maximum 6') for fixture connections, motor connections and other special connections as approved by Architect.
- D. Conduit shall be concealed in finished spaces, except where noted otherwise on Drawings. All exposed conduit shall be as approved by Architect and shall be installed in a neat and workmanlike manner with conduit runs parallel to building lines.
- E. Conduit shall run continuous between outlets, boxes and cabinet, and each conduit run shall have not more than three 90-degree bends between termination points. Conduit shall bend without crimping or flattening to provide a smooth and even turn with bend radius as great as possible, never shorter than that used in corresponding trade elbow. Conduit bends in which interior enamel has flaked will not be permitted.
- F. Conduit shall be supported individually by use of bolted metal clamp type hangers at intervals not exceeding 8'-0' with each hanger rigidly attached to building construction. Vertical conduit supports, where required, shall be clamps attached to structure in an approved manner.
- G. Conduit ends shall be reamed and all burrs removed prior to installation, and all conduit shall be kept clean and dry during construction by use of caps and plug. Junction or pull boxes shall be installed as required to facilitate ease of wire pulling. Insulating bushings shall be provided on all conduits at points where entering metal enclosures to prevent abrasion and damage to insulation of wire and cable.
- H. Type MC cable installed in ceiling plenums shall be supported to prevent contact with T-bar ceilings.

### 3.4 OUTLET, JUNCTION AND PULL BOX INSTALLATION

- A. The size of each box shall be determined by the number of wires and conduits, or size of conduit entering the box, but shall be not less than 3 1/4" octagon or 4" square with ring.
- B. All single to four-gang outlet boxes required in unplastered masonry walls shall be 3 1/2" deep solid type with square corners. All plaster and masonry rings or boxes shall be flush or not more than 1/4" behind the finished surfaces.

- C. All boxes shall be securely anchored to masonry or frame construction.

### 3.5 LOCATIONS OF OUTLETS AND EQUIPMENT

- A. The Contractor shall coordinate his work with that of other trades in order to provide a proper installation of electrical equipment in keeping with the intent of the Drawings and Specifications. Minor changes relative to the location of electrical equipment may be made by Owner's Representative to comply with structural and building requirements as determined in the course of construction.

### 3.6 HEIGHT OF OUTLETS

- A. All heights measured from finished floor line to centerline of device.
  - 1. Receptacle (general) 48"
  - 2. Receptacle (special) as noted on Drawings
  - 3. Thermostats 5'-0"
  - 4. Wall Switches 4'-0"

### 3.7 PANEL AND CIRCUIT DIRECTORY

- A. Provide a typewritten and laminated directory on inside of cabinet door on all panels designating rooms, outlets and equipment served by each branch circuit of the panel. Panelboards shall be securely anchored to wall by Electrical Contractor.

### 3.8 GROUNDING

- A. The complete new electrical installation, including metallic boxes and equipment shall be permanently and effectually grounded in accordance with all code requirements, whether or not such connections are specifically shown and/or specified.
- B. Every branch and feeder conduit shall contain a green insulated code sized grounding conductor. Care shall be taken to keep the system neutral conductor separate from the equipment ground except at the point of system derivation.

### 3.9 CUTTING AND PATCHING

- A. Contractor shall perform all cutting and patching as required for all electrical work inside and outside of building.
- B. All conduit penetrations of rated walls will be sealed.

### 3.10 WIRING OF EQUIPMENT FURNISHED BY OTHERS

- A. Electrical Contractor shall do all power wiring except factory prewired equipment.

- B. Furnish and install disconnects at all equipment not furnished with disconnect. Coordinate with HVAC Contractor to ensure all equipment has a properly sized electrical disconnect at the unit.
- C. Starters and thermal protective devices not a factory mounted integral part of equipment furnished by Division 23, shall be furnished by the HVAC Contractor but installed and wired by the Electrical Contractor.

### 3.11 LIGHTING FIXTURE INSTALLATION

- A. This Contractor shall furnish and install all lighting fixtures and lamps as required. Material, equipment or services necessary to complete the installation of these fixtures, but not specifically mentioned, shall be furnished as though specified. All fixtures and lamps shall be properly cleaned and adjusted after installation. All adjustable lighting fixtures shall be carefully positioned by this Contractor in the presence of the Architect or his representative.

### 3.12 DRAWINGS OF RECORD

- A. A blue-line or black-line copy of Drawing shall be kept at the job site at all times for the sole purpose of recording horizontal and vertical location of all below grade electrical wiring, referenced to permanent visible structures. At completion of job, neatly record all dimensions and submit for approval by Architect.

### 3.13 CLEAN UP

- A. Upon completion of work under this Section, all unnecessary equipment, materials, rubbish, etc., shall be removed from project site and surrounding area leaving site in a safe and cleared condition.

### 3.14 EQUIPMENT LABEL INSTALLATION

- A. Front cover of each panel, fused disconnect, and other electrical equipment shall have a mechanically attached name plate indicating name/number of panel and second nameplate on subpanels indicating "Fed from (panel #)". Panel nameplates shall have 3/4" letters and secondary nameplates shall have 1/2" letters. Seton #818-2, or approved equal, 1/2" x 4".

### 3.15 MATERIALS AND WORKMANSHIP

- A. Only new, clean and perfect equipment, apparatus, materials and supplies of latest design and manufacture shall be incorporated in the work in order to assure an electrical system of high quality.
- B. All materials shall be new, shall bear the Underwriters Label of Approval and shall be installed according to manufacturer's specifications or as directed by the Architect. The Contractor shall assume responsibility for proper installation of materials in the space available.

### 3.16 ERECTION OF APPARATUS

- A. All work shall be done under the supervision of the Contractor who shall provide foremen to lay out all work. All work shall be laid out with due regard for proper working clearances about electrical equipment and the space requirements of the other Contractors. The Contractor shall immediately report to the Architect any conflict or difficulties in regard to the installation.
- B. Lighting fixtures, motor switches or controllers, switches, boxes, panels, and other electrical apparatus shall be set, mounted, positioned, coupled, connected, assembled or otherwise erected or constructed as recommended by the manufacture or designer thereof, unless approved by the Architect for erection in some other manner.
- C. Where crowded locations exist and where there is a possibility of conflict between the trades, the Contractor shall coordinate the exact locations of electrical work with the other trades. After consultation and agreement between the trades, the location shall be approved by the Architect before installation of the work.
- D. Equipment of a type that requires replacement, servicing, adjusting, or maintenance shall be located to allow easy access and space for removal of internal assemblies if required.

### 3.17 CUTTING, PATCHING AND PIERCING

- A. Obtain written permission of the Architect before cutting or piercing structural members. If, in the process of the electrical work, circuits or equipment need to be installed in an area after it has been completed, the area shall be left in the same condition it was originally. Patching and/or refinishing will be determined by the Owners Representative. Sleeves through floors and walls to be black iron pipe flush with walls, ceilings or finished floors, sized to accommodate the raceway.
- B. Use care in piercing waterproofing. After the part piercing the waterproofing has been set in place, seal opening and make completely watertight.
- C. Provide chrome-plated spring-clipped escutcheon plates where exposed pipe passes through finished walls, floors or ceilings. Cover sleeves and entire opening made for the pipe with escutcheon plates. Provide air and watertight conduit openings through floor slabs, masonry walls and continuous partitions. Tightly caulk space between conduit and building materials with non flammable sealant.

### 3.18 ACCESS

- A. Equipment, valves and devices shall be mounted in a manner which provides adequate maintenance, inspection access and work space. Where access is required for adjustment, cleanout, inspection of maintenance and such access is not otherwise available, access panels shall be furnished by Division 26. Panels shall be selected by the Architect.

### 3.19 CLEANING OF EQUIPMENT AND REMOVAL OF RUBBISH

- A. All fixtures, panelboards, motors and all other electrical equipment furnished or installed by the Contractor shall be thoroughly cleaned. At the completion of his work, the Contractor shall

remove from the buildings and the premises all rubbish and debris resulting from his operations and shall leave all material and equipment furnished by him and the space occupied by them absolutely ready for use.

- B. Under no circumstances shall rubbish be allowed to accumulate in the building or on the premises. All dirt and rubbish resulting from the Contractor's work shall be removed by this Division from time to time and as often as directed by the Architect and Owner's representative.

### 3.20 PAINTING

- A. All items not provided with a corrosion-resistant finish shall be painted. All electrical control equipment, panels and supporting framework shall have a light gray enamel finish which may be the manufacturer's standard gray, if acceptable to the Architect. Where the finish becomes scratched or marred, it shall be touched up or repainted to match the original finish as directed by the Architect. Particular caution shall be exercised so as not to obscure the nameplate data.
- B. All painting other than touch-up of factory finishes shall be by Division 9.

### 3.21 TESTS

- A. The entire system shall be tested, demonstrated and explained to such personnel as the Architect shall designate. The Contractor will be required to make the following checks and tests with his instruments as required:
  - 1. The correctness of lighting circuits to be in conformance with branch circuiting shown on the panel covers after construction.
  - 2. Motors shall be checked for proper direction of rotation and corrected if necessary.
  - 3. Grounds shall be checked and the resistance to ground shall not be more than 10 Ohms.
  - 4. This Contractor shall balance phase currents of all distribution panelboards within +/-10 percent variation between average phase currents and measured individual phase currents.

### 3.22 GUARANTEE

- A. The Contractor shall guarantee by his acceptance of this Contract that all work installed will be free from any and all defects in workmanship and/or materials and that all apparatus will develop capacities and characteristics specified. If, during a period of one year, or as otherwise specified, from date of Certificate of Completion and acceptance of work, any such defect in workmanship, material or performance appears, the Contractor will without cost to the Owner, remedy such defects within a reasonable time as specified in notice from the Architect. In default thereof, the Owner may have work performed and charge the total cost to the Contractor.

### 3.23 MAINTENANCE SCHEDULE AND OPERATING INSTRUCTIONS

- A. After the project is completed, Contractor shall be required to furnish four (4) copies of instruction sheets to the Owner for the proper maintenance of electrical equipment and systems furnished and installed by him.

- B. The Contractor shall be required to instruct Owner's operating personnel in the proper operation of electrical systems.
- C. Contractor shall turn over to the Owner all spare parts furnished by manufacturer and those specifically called for in the Specifications. All spare parts shall be properly identified as to the catalog number, manufacturer and the equipment for which they are used.

### 3.24 MANUFACTURER'S GUARANTEE AND WARRANTY

- A. Manufacturer's equipment guarantee shall be obtained for at least one year. When manufacturer's standard guarantee is for a longer period, or if longer period is called for in the Specifications, this period shall apply and such items, if defective, shall be replaced in accordance with the terms written in the manufacturer's specifications.
- B. Manufacturer's certificates of warranty shall be provided for all major pieces of equipment and such written certificates shall be turned over to the Owner prior to the final acceptance of the Project.

### 3.25 ELECTRICAL CIRCUITRY FOR EQUIPMENT

- A. The electrical circuits, components, and controls for all equipment are selected and sized, based on the equipment specified. If substitutions and/or equivalent equipment are furnished, it shall be the responsibility of all parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the electrical characteristics and requirements of that furnished to that specified and/or shown. If greater capacity or more materials or labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then it shall be the responsibility of the parties involved in providing the substitute and/or equivalent items of equipment to provide all compensation for additional charges made for the proper rough-in, circuitry and connections for the equipment furnished. No additional charges shall be made to the Base Bid price or to the Owner.
- B. Before rough-in of circuitry or connecting to equipment, the Contractor shall verify the electrical characteristics and requirements of the equipment being furnished, and for that specified and shown on drawings.

### 3.26 OPERATING INSTRUCTIONS AND MAINTENANCE DATA

- A. Upon completion and acceptance of the work by the Owner, the Contractor shall provide four (4) sets of 8 1/2" x 11" typed operating and maintenance instructions. Sample maintenance instructions will be provided by Engineer upon request. Contractor shall also include wiring diagrams of all controls in each set of maintenance instructions.

END OF SECTION 260000

## SECTION 310513 - SOILS FOR EARTHWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Subsoil materials.
2. Topsoil materials.

##### B. Related Requirements:

1. Section 310516 - Aggregates for Earthwork: Coarse and fine aggregate materials.
2. Section 312213 - Rough Grading: Removal of topsoil, rough grading, and filling associated with contouring of Site.
3. Section 312316 - Excavation: Excavating as required for building foundations and utilities within building perimeter.
4. Section 312316.13 - Trenching: Excavating as required for building foundations and utilities within building perimeter.
5. Section 312323 - Fill: Backfilling as required at building perimeter and Site structures to subgrade elevations.
6. Section 329219 - Seeding: Fertilizing, seeding, hydroseeding, mulching, and maintenance.

#### 1.2 REFERENCE STANDARDS

##### A. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

##### B. ASTM International:

1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
3. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
4. 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. Section 013300 - Submittal Procedures: Requirements for submittals.

- B. Product Data: Submit name of imported materials source.
- C. Supplier's Certificate: Certify that products meet or exceed specified requirements.
- D. Source Quality-Control Submittals: Indicate results of laboratory tests and inspections.

#### 1.4 QUALITY ASSURANCE

- A. Furnish each subsoil and topsoil material from single source throughout Work.
- B. Perform Work according to Geotechnical Engineering Report.
- C. Maintain a copy of each standard affecting Work of this Section on Site.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

##### A. Subsoil:

1. Type S1: Comply with the Geotechnical Engineering Report.
2. Type S2:
  - a. Excavated and reused material, Imported borrow, Select or local borrow.
  - b. Graded.
  - c. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
  - d. Comply with ASTM D2487 Group Symbol CL, SM, or SC.

##### B. Topsoil:

1. Type S3: Comply with the Geotechnical Engineering Report.
2. Type S4:
  - a. Excavated and reused material, Select, Imported, or Unclassified.
  - b. Graded and single screened.
  - c. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter.
  - d. Comply with ASTM D2487 Group Symbol SM, ML, OH, or PT.

##### C. Testing and Analysis:

1. Subsoil Material: Comply with AASHTO T 180, ASTM D698, ASTM D1557, or ASTM D6938.
2. Topsoil Material: Comply with AASHTO T 180, ASTM D698, ASTM D1557, ASTM D6938.
3. If tests indicate materials do not meet specified requirements, change material and retest.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

#### A. Excavation:

1. Excavate subsoil and topsoil from designated areas.
2. Strip topsoil to full depth of topsoil in designated areas.
3. Remove excess excavated materials, subsoil, and topsoil not intended for reuse from Site.
4. Remove excavated materials not meeting requirements for subsoil and topsoil materials from Site.

#### B. Stockpiling:

1. Stockpile excavated material meeting requirements for subsoil and topsoil materials.
2. Stockpile materials on Site at locations as indicated or designated by Architect/Engineer.
3. Stockpile in sufficient quantities to meet Project schedule and requirements.
4. Separate differing materials with dividers or stockpile apart to prevent intermixing of soil types or contamination.
5. Direct surface water away from stockpile to prevent erosion or deterioration of materials.
6. Stockpile unsuitable materials and prevent erosion and leaching until they are disposed.

### 3.2 CLEANING

#### A. Stockpile:

1. Remove stockpile and leave area in clean and neat condition.
2. Grade Site surface to prevent freestanding surface water.

END OF SECTION 310513

## SECTION 310516 - AGGREGATES FOR EARTHWORK

### 1.1 SUMMARY

#### A. Section Includes:

1. Coarse-aggregate materials.
2. Fine-aggregate materials.

#### B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Fill and grading materials.
2. Section 312213 - Rough Grading: Removal of topsoil, rough grading, and filling associated with contouring of Site.
3. Section 312316 - Excavation: Excavating as required for building foundations and utilities within building perimeter.
4. Section 312316.13 - Trenching: Excavating as required for building foundations and utilities within building perimeter.
5. Section 312323 - Fill: Backfilling as required at building perimeter and Site structures to subgrade elevations.
6. Section 321123 - Aggregate Base Courses: Subbase and base course for placement under asphalt or concrete paving, unit paving, or placed and left exposed.
7. Section 331413 - Water Utility Distribution Piping: Pipe materials, fittings, valves, meters, and backflow preventers.
8. Section 333111 - Sanitary Sewerage Gravity Piping: Pipe materials and accessories normally encountered with gravity sanitary building piping.

### 1.2 REFERENCE STANDARDS

#### A. American Association of State Highway and Transportation Officials:

1. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.
2. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

#### B. ASTM International:

1. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
4. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
5. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

6. 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. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit name of imported materials source.
- C. Supplier's Certificate: Certify that products meet or exceed specified requirements.
- D. Source Quality-Control Submittals: Indicate results of laboratory tests and inspections.

### 1.4 QUALITY ASSURANCE

- A. Furnish each coarse and/or fine aggregate materials from single source throughout Work.
- B. Perform Work according to the Geotechnical Engineering Report or the Missouri Department of Transportation Standard Specifications for Highway Construction.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Coarse Aggregate:
  1. Type A1: Type 1 Base Aggregate
    - a. Type 1 base rock, crushed limestone and shall not contain deleterious material such as shale or disintegrated stone in excess of 15%.
    - b. Percent Passing According to Sieve Size.
      - 1) 1": 100.
      - 2) 1/2": 60-90.
      - 3) No. 4: 35-60.
      - 4) No. 30: 10-35.
  2. Type A2: Type 2 Base Aggregate, Compacted Granular Base
    - a. Type 2 base rock, crushed stone, limestone screening, sand and gravel, chat, sandstone, or combinations of these materials, with or without soil binder as may be required.
    - b. Percent Passing According to Sieve Size.
      - 1) 1-1/2": 100.
      - 2) No. 40: 15-50.
      - 3) No. 200: Not More Than 35.
  3. Type A3: Pipe Bedding and Trench Backfill

- a. Clean, crushed limestone or crushed natural gravel.
  - b. Percent Passing According to Sieve Size:
    - 1) 1": 100.
    - 2) 1/2": 55-90.
    - 3) No. 4: 8-40.
    - 4) No. 10: 0-15.
    - 5) No. 200: 0-4.
4. Type A4: Drainage Fill
- a. Description: Pea Gravel.
  - b. Stone: Natural and washed.
  - c. Quality: Free of clay, shale, and organic matter.
  - d. Grading:
    - 1) Comply with ASTM C136/C136M, ASTM D2487; Group Symbol GM or GC,
    - 2) Minimum Size: 1/4 inch.
    - 3) Maximum Size: 5/8 inch.

B. Fine Aggregate:

1. Type A5
- a. Description: Natural river or bank sand, washed.
  - b. Quality: Free of silt, clay, loam, friable or soluble materials, and organic matter.
  - c. Grading:
    - 1) Comply with ASTM C136/C136M, ASTM D2487; Group Symbol SW, SP, SM, or SC.
    - 2) Percent Passing According to Sieve Size:
      - a) No. 4: 100.
      - b) No. 14: 10 to 100.
      - c) No. 50: 5 to 90.
      - d) No. 100: 4 to 30.
      - e) No. 200: 0.

## 2.2 SOURCE QUALITY CONTROL

A. Testing and Analysis:

- 1. Coarse-Aggregate Material: Comply with AASHTO T 180, ASTM C136/C136M, ASTM D698, ASTM D1557, ASTM D4318, or ASTM D6938.
- 2. Fine Aggregate Material - Testing and Analysis: Perform according to AASHTO T 180 ASTM C136/C136M, ASTM D698, ASTM D1557, ASTM D4318, or ASTM D6938.
- 3. If tests indicate materials do not meet specified requirements, change material and retest.

B. Certificate of Compliance:

1. If supplier is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at source conforms to Contract Documents.
2. Specified source tests are not required for Work performed by approved supplier.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

#### A. Excavation:

1. Excavate aggregate materials from Site locations as indicated.
2. Remove excess materials not intended for reuse from Site.
3. Remove materials not meeting requirements for coarse aggregate and fine aggregate from Site.

#### B. Stockpiling:

1. Stockpile materials on Site at locations as indicated or designated.
2. Stockpile excavated material meeting requirements for coarse-aggregate and fine-aggregate materials.
3. Stockpile in sufficient quantities to meet Project schedule and requirements.
4. Separate different aggregate materials with dividers or stockpile apart to prevent intermixing of aggregate types or contamination.
5. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
6. Stockpile unsuitable materials and prevent erosion and leaching until they are disposed.

### 3.2 CLEANING

#### A. Stockpile:

1. Remove stockpile and leave area in clean and neat condition.
2. Grade Site surface to prevent freestanding surface water.

END OF SECTION 310516

## **SECTION 311000 - SITE CLEARING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Removing surface debris.
  - 2. Removing designated paving, curb, and sidewalks.
  - 3. Removing designated trees, shrubs, and other plant life.
  - 4. Removing abandoned utilities.
  - 5. Excavating topsoil.
  
- B. Related Sections:
  - 1. Section 312213 - Rough Grading.

### **PART 2 - UTION**

#### **2.1 EXAMINATION**

- A. Verify existing plant life designated to remain is tagged or identified.
- B. Identify waste or salvage area for placing removed materials.

#### **2.2 PREPARATION**

- A. Call Missouri One Call System, Inc. at 1-800-344-7483 (1-800-DIG-RITE) or 811 not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.

#### **2.3 PROTECTION**

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Protect benchmarks, survey control points and existing structures from damage or displacement.

## **2.4 CLEARING**

- A. Clear areas required for access to site and execution of Work to minimum depth of 6 inches.
- B. Remove trees and shrubs within marked areas as indicated. Remove stumps, main root ball and root system.
- C. Clear undergrowth and deadwood, without disturbing subsoil.
- D. Apply herbicide to remaining stumps to inhibit growth.

## **2.5 REMOVAL**

- A. Remove debris, rock, and extracted plant life from site.
- B. Remove paving, curbs, and, sidewalk as indicated on Drawings. Neatly saw cut edges at right angle to surface.
- C. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.
- D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- E. Do not burn or bury materials on site. Leave site in clean condition.

## **2.6 TOPSOIL EXCAVATION**

- A. Excavate topsoil from areas to be excavated, relandscaped, or regraded, marked areas, without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion. Stockpile material until disposal.
- D. Remove excess topsoil not intended for reuse, from site.

**END OF SECTION 311000**

## SECTION 312213 - ROUGH GRADING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Excavating topsoil.
2. Excavating subsoil.
3. Cutting, grading, filling, and soil compaction.

##### B. Related Sections:

1. Section 310513 - Soils for Earthwork: Soils for fill.
2. Section 310516 - Aggregates for Earthwork: Aggregates for fill.
3. Section 311000 - Site Clearing: Excavating topsoil.
4. Section 312316 - Excavation: Building excavation.
5. Section 312316.13 - Trenching: Trenching and backfilling for utilities.
6. Section 312323 - Fill: General building area backfilling.

#### 1.2 REFERENCES

##### A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

##### B. ASTM International:

1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
3. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

### 1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Materials Source: Submit name of imported materials suppliers.

### 1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C136, ASTM D2419, ASTM D2434, or applicable standard.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Topsoil: Type S3 and S4 as specified in Section 310513.
- B. Subsoil Fill: Type S1 and S2 as specified in Section 310513.
- C. Granular Fill: Type A1, A2, A3, and A4 as specified in Section 310516.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify site conditions.
- B. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.

### 3.2 PREPARATION

- A. Call Local Utility Line Information service not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove and/or relocate utilities.

- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- F. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

### 3.3 TOPSOIL EXCAVATION

- A. Excavate topsoil without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site and protect from erosion.
- D. Remove excess topsoil not intended for reuse, from site.

### 3.4 SUBSOIL EXCAVATION

- A. Excavate subsoil from as shown on plans and/or Geotechnical Engineering Report.
- B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.
- C. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key placed fill material to slope to provide firm bearing.
- D. Remove excess subsoil not intended for reuse, from site.
- E. Stockpile subsoil in area designated on site.

### 3.5 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Place fill material in continuous layers and compact to the Geotechnical Engineering Report.
- C. Maintain optimum moisture content of fill materials to attain required compaction density.
- D. Make grade changes gradual. Blend slope into level areas.
- E. Repair or replace items indicated to remain damaged by excavation or filling.

### 3.6 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

### 3.7 FIELD QUALITY CONTROL

- A. Perform laboratory material tests in accordance with ASTM D1557, ASTM D698, AASHTO T180, or applicable standard.
- B. Perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Tests: 1 test per 2,500 sq. ft. per lift or layer unless otherwise directed.

### 3.8 SCHEDULES

- A. Subsoil Fill:
  - 1. Compact uniformly to minimum 95 percent of maximum density unless otherwise notified.
- B. Topsoil Fill:
  - 1. Compact uniformly to minimum 90 percent of maximum density unless otherwise notified.

END OF SECTION 312213

## SECTION 312316 - EXCAVATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Soil densification.
2. Excavating for building foundations.
3. Excavating for paving, roads, and parking areas.
4. Excavating for slabs on grade.
5. Excavating for Site structures.
6. Excavating for landscaping.

##### B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Stockpiling of fill and grading materials.
2. Section 310516 - Aggregates for Earthwork: Stockpiling of coarse- and fine-aggregate materials.
3. Section 312213 - Rough Grading: Topsoil and subsoil removal from Site surface.
4. Section 312316.13 - Trenching: Excavating as required for building foundations and utilities within building perimeter.
5. Section 312323 - Fill: Backfilling at building perimeter and Site structures, and fill under slabs on grade, pavement, and landscaped areas.
6. Section 331413 - Water Utility Distribution Piping: Pipe materials, fittings, valves, meters, and backflow preventers.
7. Section 333111 - Sanitary Sewerage Gravity Piping: Pipe materials and accessories normally

#### 1.2 REFERENCE STANDARDS

- A. Local utility standards when working within 24 inches of utility lines.

#### 1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.

##### B. Shop Drawings:

1. Indicate soil densification grid for each size and configuration footing requiring soil densification.
2. Excavation Protection Plan:
  - a. Describe sheeting, shoring, and bracing materials and installation, as required, to protect excavations and adjacent structures and property.

- b. Submit signed and sealed Shop Drawings with design calculations and assumptions to support plan.
- C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

## PART 2 - PRODUCTS

- 2.1 Not Used.

## PART 3 - EXECUTION

### 3.1 PREPARATION

#### A. Utility Service Locator:

1. Call local utility service-line information not less than three working days before performing Work.
2. Request that underground utilities be located and marked within and immediately surrounding construction areas.
3. Identify required lines, levels, contours, and data.

#### B. Existing Utilities:

1. Notify utility company to remove and relocate utilities.
2. Protect from damage utilities indicated to remain.

#### C. Protect plant life, lawns, and other features designated to remain as portion of final landscaping.

#### D. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

#### E. Do not close or obstruct roadways, sidewalks, hydrants without permits.

#### F. Erect and maintain temporary barriers and security devices at indicated locations, including warning signs, warning lights, and similar measures, for protection of public, Owner, and existing improvements indicated to remain.

### 3.2 EXCAVATION

#### A. Underpin adjacent structures which may be damaged by excavation Work.

#### B. Excavate subsoil to accommodate building foundations, slabs on grade, paving, site structures, and construction operations.

#### C. Excavate to working elevation for piling Work.

- D. Compact disturbed load-bearing soil in direct contact with foundations to original bearing capacity, as specified in Section 312323 – Fill and Section 312316.13 - Trenching.
- E. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- F. Trim excavation and remove loose matter.
- G. Removal of Deleterious Materials:
  - 1. Remove lumped subsoil, boulders, and rock up to 1/3 cu. yd., measured by volume or as directed by the Engineer
  - 2. Remove larger material as specified in Section 312323 – Fill.
  - 3. Remove excess and unsuitable material from Site.
- H. Notify Architect/Engineer of unexpected subsurface conditions.
- I. Correct over-excavated areas as directed by Architect/Engineer.
- J. Remove excavated material from Site.
- K. Stockpile subsoil in area designated on Site.
- L. Repair or replace items indicated to remain that have been damaged by excavation.

### 3.3 PROTECTION

- A. Prevent displacement or loose soil from falling into excavation, and maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that may be created by earth operations.

END OF SECTION 312316

## SECTION 312316.13 - TRENCHING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Excavating trenches for utilities.
2. Compacted fill from top of utility bedding.
3. Backfilling and compaction.

##### B. Related Sections:

1. Section 033000 - Cast-In-Place Concrete: Concrete materials.
2. Section 310513 - Soils for Earthwork: Soils for fill.
3. Section 310516 - Aggregates for Earthwork: Aggregates for fill.
4. Section 312213 - Rough Grading: Topsoil and subsoil removal from site surface.
5. Section 312316 - Excavation: General building excavation.
6. Section 312323 - Fill: General backfilling.
7. Section 331413 - Water Utility Distribution Piping: Water piping and bedding.
8. Section 333111 - Sanitary Sewerage Gravity Piping: Sanitary sewer piping and bedding.

#### 1.2 REFERENCES

##### A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

##### B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

### 1.3 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit, or cable.

### 1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- C. Product Data: Submit data for geotextile fabric indicating fabric and construction.
- D. Materials Source: Submit name of imported fill materials suppliers.

### 1.5 FIELD MEASUREMENTS

- A. Verify field measurements prior to execution.

### 1.6 COORDINATION

- A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

## PART 2 - PRODUCTS

### 2.1 FILL MATERIALS

- A. Subsoil Fill: Type S1 and S2 as specified in Section 310513.
- B. Granular Fill: Type A1, A2, A3, and A4 as specified in Section 310516.

## PART 3 - EXECUTION

### 3.1 LINES AND GRADES

- A. Lay pipes to lines and grades indicated on Drawings.
  - 1. Architect/Engineer or Owner reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- B. Use laser-beam instrument with qualified operator to establish lines and grades.

### 3.2 PREPARATION

- A. Call Local Utility Line Information service not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum locations.
- C. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Maintain and protect above and below grade utilities indicated to remain.
- F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

### 3.3 TRENCHING

- A. Excavate subsoil required for utilities to utility service.
- B. Remove lumped subsoil, boulders, and rock up of 1/6 cubic yard, measured by volume or as directed by the Engineer.
- C. Do not advance open trench more than 200 feet ahead of installed pipe.
- D. Cut trenches to width indicated on Drawings or sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.
- E. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe or other utilities.
- F. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.
- G. Cut out soft areas of subgrade not capable of compaction in place. Backfill with suitable fill material and compact to density equal to or greater than requirements for subsequent backfill material.
- H. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill as directed by Architect/Engineer.
- I. Remove excess subsoil not intended for reuse, from site.
- J. Stockpile subsoil in area designated on site.

### 3.4 SHEETING AND SHORING

- A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
- B. Design sheeting and shoring to be removed at completion of excavation work.
- C. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- D. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

### 3.5 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Place fill material in continuous layers and compact.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Do not leave more than 25 feet of trench open at end of working day.
- F. Protect open trench to prevent danger to Owner and the public.

### 3.6 TOLERANCES

- A. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.
- B. Top Surface of General Backfilling: Plus or minus 2 inches required elevations.

### 3.7 FIELD QUALITY CONTROL

- A. Perform laboratory material tests in accordance with ASTM D1557, ASTM D698, AASHTO T180 or applicable standard.
- B. Perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.
- D. Frequency of Tests: 1 test per 500 linear feet of trench.

3.8 PROTECTION OF FINISHED WORK

- A. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION 312316.13

## SECTION 312323 - FILL

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Backfilling building perimeter to subgrade elevations.
2. Backfilling site structures to subgrade elevations.
3. Fill under slabs on grade.
4. Fill under paving.
5. Fill for over-excavation.

##### B. Related Requirements:

1. Section 033000 - Cast-in-Place Concrete: Concrete materials.
2. Section 310513 - Soils for Earthwork: Soils for fill.
3. Section 310516 - Aggregates for Earthwork: Aggregates for fill.
4. Section 312213 - Rough Grading: Site filling.
5. Section 312316 - Excavation: Backfilling of building foundations and utilities within building perimeter.
6. Section 312316.13 - Trenching: Backfilling of utility trenches.
7. Section 331413 - Water Utility Distribution Piping: Pipe materials, fittings, valves, meters, and backflow preventers.
8. Section 333111 - Sanitary Sewerage Gravity Piping: Pipe materials and accessories normally encountered with gravity sanitary building piping.

#### 1.2 REFERENCE STANDARDS

##### A. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 10-lb Rammer and a 18-in. Drop.

##### B. ASTM International:

1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>).
2. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

5. ASTM D6031/D6031M - Standard Test Method for Logging In Situ Moisture Content and Density of Soil and Rock by the Nuclear Method in Horizontal, Slanted, and Vertical Access Tubes.
6. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

### 1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer information for geotextile fabric, indicating fabric and construction.
- C. Materials Source: Submit name of imported materials suppliers.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

### 1.4 QUALITY ASSURANCE

- A. Perform Work according to Geotechnical Engineering Report.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Subsoil Fill: Type as specified in Section 310513.
- B. Structural Fill: Type as specified in Section 310513.
- C. Granular Fill: Type as specified in Section 310516.
- D. Concrete:
  1. Description:
    - a. Structural, as specified in Section 033000.
    - b. Compressive Strength: 4,000 psi unless otherwise notified.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that subdrainage, dampproofing, and waterproofing installations have been inspected.

- B. Verify that underground tanks are anchored to their own foundations to avoid flotation after backfilling.
- C. Verify structural integrity of unsupported walls to support loads imposed by fill.

### 3.2 PREPARATION

- A. Compact subgrade to specified density requirements for subsequent backfill materials.
- B. Soft Subgrade:
  - 1. Cut out soft areas of subgrade not capable of compaction in place.
  - 2. Backfill with soil or granular fill and compact to density equal to or greater than specified requirements for subsequent fill material.
- C. Scarify subgrade surface to depth of 6 inches.

### 3.3 BACKFILLING

- A. Backfill areas to contours and elevations.
- B. Systematically backfill to allow maximum time for natural settlement.
- C. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces, and do not backfill with frozen materials.
- D. Place fill material in continuous layers and compact.
- E. Use placement method that does not disturb or damage utilities in trench or structures.
- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Structures:
  - 1. Backfill against supported foundation walls.
  - 2. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- H. Make gradual grade changes and blend slope into level areas.
- I. Remove surplus backfill materials from Site.
- J. Leave fill material stockpile areas free of excess fill materials.

### 3.4 TOLERANCES

- A. Top Surface of Backfilling within Building Areas: Plus or minus 1 inch from required elevations.

- B. Top Surface of Backfilling under Paved Areas: Plus or minus 1 inch from required elevations.
- C. Top Surface of General Backfilling: Plus or minus 2 inch from required elevations.

### 3.5 FIELD QUALITY CONTROL

- A. Inspecting: Request visual inspection of bearing surfaces by Architect/Engineer or other inspection agency before installing subsequent Work.
- B. Testing:
  - 1. Laboratory Material Testing: Comply with AASHTO T 180, ASTM D698, ASTM D1557, or ASTM D6938.
  - 2. In-Place Compaction Testing:
    - a. Density Tests: Comply with ASTM D1556/D1556M, D2167, or D6938.
    - b. Moisture Tests: Comply with ASTM D6031/D6031M.
  - 3. If tests indicate that Work does not meet specified requirements, remove Work, replace, compact, and retest.
  - 4. Testing Frequency: 1 test per 2,500 sq. ft per lift or layer.
  - 5. Proof-roll compacted fill surfaces under slabs on grade and pavement.

### 3.6 PROTECTION

- A. Reshape and recompact fills subjected to vehicular traffic during construction.

END OF SECTION 312323

## SECTION 321123 - AGGREGATE BASE COURSES

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Aggregate subbase.
2. Aggregate base course.

##### B. Related Sections:

1. Section 312213 - Rough Grading: Preparation of site for base course.
2. Section 312316.13 - Trenching: Compacted fill under base course.
3. Section 312323 - Fill: Compacted fill under base course.
4. Section 321623 - Sidewalks.

#### 1.2 REFERENCES

##### A. American Association of State Highway and Transportation Officials:

1. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.

##### B. ASTM International:

1. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
2. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
4. ASTM D2940 - Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

#### 1.3 SUBMITTALS

##### A. Section 013300 - Submittal Procedures: Requirements for submittals.

##### B. Product Data:

1. Submit data for aggregates.

##### C. Materials Source: Submit name of aggregate materials suppliers.

#### 1.4 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work according to Missouri Department of Transportation – Standard Specifications for Highway Construction.

### PART 2 - PRODUCTS

#### 2.1 AGGREGATE MATERIALS

- A. Coarse Aggregate: Fill Type A1 or A2 as specified in Section 310516.

#### 2.2 ACCESSORIES

- A. Geotextile Fabric: AASHTO M288; non-woven, polypropylene.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify compacted substrate is dry and ready to support paving and imposed loads.
  - 1. Proof roll substrate with in minimum two perpendicular passes to identify soft spots.
  - 2. Remove soft substrate and replace with compacted fill as specified in Section 312323.
- B. Verify substrate has been inspected, gradients and elevations are correct.

#### 3.2 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

#### 3.3 AGGREGATE PLACEMENT

- A. Install geotextile fabric over subgrade according to manufacturer's instructions.
  - 1. Lap ends and edges minimum 12 inches.
  - 2. Anchor fabric to subgrade when required to prevent displacement until aggregate is installed.
- B. Spread aggregate over prepared substrate to total compacted thickness indicated on Drawings.

- C. Roller compact aggregate to 95 percent maximum density or density indicated on Drawings or Geotechnical Engineering Report.
- D. Level and contour surfaces to elevations, profiles, and gradients indicated.
- E. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.
- F. Maintain optimum moisture content of fill materials to attain specified compaction density.
- G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

#### 3.4 TOLERANCES

- A. Maximum Variation From Flat Surface: 1/4 inch measured with 10 foot straight edge.
- B. Maximum Variation From Thickness: 1/4 inch.
- C. Maximum Variation From Elevation: 1/2 inch.

#### 3.5 FIELD QUALITY CONTROL

- A. Compaction testing will be performed according to ASTM D1556, ASTM D1557, ASTM D698, AASHTO T180, ASTM D2167, ASTM D2922, or ASTM D3017.
- B. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- C. Frequency of Tests: One test for every 2,500 square feet of each layer compacted aggregate.

#### 3.6 COMPACTION

- A. Compact materials to 95 percent of maximum density as determined from test strip, according to ASTM D2940.

END OF SECTION 321123

## SECTION 321623 - SIDEWALKS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Concrete paving for sidewalks.
- B. Related Requirements:
  - 1. Section 032000 - Concrete Reinforcing: Reinforcing steel and supports for cast-in-place concrete.
  - 2. Section 033000 - Cast-in-Place Concrete: Cast-in-place or in-situ concrete for structural building frames, slabs on fill or grade, and other concrete components.
  - 3. Section 312213 - Rough Grading: Preparation of Site for paving and base grade.
  - 4. Section 312323 - Fill: Compacted subgrade for paving.
  - 5. Section 321123 - Aggregate Base Courses.

#### 1.2 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO M182 - Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats.
- B. American Concrete Institute:
  - 1. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- C. ASTM International:
  - 1. ASTM A184/A184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
  - 2. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
  - 3. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
  - 4. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
  - 5. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
  - 6. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
  - 7. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
  - 8. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
  - 9. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

10. ASTM C33/C33M - Standard Specification for Concrete Aggregates.
11. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
12. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
13. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.
14. ASTM C150/C150M - Standard Specification for Portland Cement.
15. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
16. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete.
17. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
18. ASTM C231/C231M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
19. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.
20. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
21. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
22. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements.
23. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
24. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
25. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete.
26. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars.
27. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
28. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
29. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete.
30. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
31. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emisimeters.
32. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
33. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
34. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
35. ASTM D5893/D5893M - Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.
36. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
37. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
38. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
39. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.

40. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

### 1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
  1. Submit required information regarding concrete materials, joint filler, admixtures, and curing compounds.
  2. Mix Design:
    - a. Submit concrete mix design for each concrete strength prior to commencement of Work.
    - b. Submit separate mix designs if admixtures are required for hot- and cold-weather concrete Work.
    - c. Identify mix ingredients and proportions, including admixtures.
  3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Source Quality-Control Submittals: Indicate results of tests and inspections.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- F. Qualifications Statement:
  1. Submit qualifications for manufacturer and installer.

### 1.4 QUALITY ASSURANCE

- A. Perform Work according to Sections 032000 - Concrete Reinforcing, and 033000 - Cast-in-Place Concrete.
- B. Obtain cementitious materials from same source throughout.
- C. Perform Work according to Missouri Department of Transportation – Standard Specifications for Highway Construction.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.6 AMBIENT CONDITIONS

- A. Section 015000 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.
- B. Minimum Conditions: Do not place concrete if base surface temperature is less than 40 deg. F, or if surface is wet or frozen.
- C. Subsequent Conditions: Maintain minimum 50 deg. F, for not less than 72 hours after placing, and at a temperature above freezing for remainder of curing period.

1.7 EXISTING CONDITIONS

- A. Field Measurements:
  1. Verify field measurements prior to fabrication.
  2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 AGGREGATE SUBGRADE

- A. Type A1 as specified in Section 310516 – Aggregates for Earthworks and 321123 - Aggregate Base Courses.

2.2 MATERIALS

- A. Forms:
  1. Material:
    - a. Wood: Straight and free from warping, twisting, loose knots, splits, or other defects.
    - b. Steel: Channel-formed sections.
  2. Profile: To suit conditions.
  3. Joint Filler – Type 1:
    - a. Material: Asphalt-impregnated fiberboard or felt.
    - b. Comply with ASTM D1751.

- c. Thickness: 1/4 inch.
  - 4. Joint Filler – Type 2:
    - a. Type: Premolded compressible.
    - b. Thickness: 1/4 inch.
    - c. Self-Expanding Cork: Comply with ASTM D1752.
- B. Reinforcement:
  - 1. Deformed Reinforcing:
    - a. Steel: Comply with ASTM A615/A615M.
    - b. Yield Grade: 40 ksi.
    - c. Size: No. 4, minimum.
    - d. Billet Bars: Deformed.
    - e. Finish: Uncoated.
  - 2. Welded Plain-Wire Fabric:
    - a. Comply with ASTM A1064/A1064M.
    - b. Configuration: Flat sheets, 6x6/10x10 (6x6 – w 1.4 x w 1.4).
    - c. Finish: Uncoated.
  - 3. Dowels:
    - a. Description: Plain steel bars.
    - b. Comply with ASTM A615/A615M.
    - c. Yield Strength: 40 ksi.
    - d. Length: As indicated on Drawings.
    - e. Ends: Square, with burrs removed.
    - f. Finish: Uncoated.
  - 4. Tie Wire:
    - a. Type: Annealed.
    - b. Minimum Size: 16 gage.
    - c. Finish: Uncoated.
- C. Concrete:
  - 1. Concrete Materials:
    - a. As specified in Section 033000 - Cast-in-Place Concrete

## 2.3 FABRICATION

- A. Reinforcing:
  - 1. Comply with CRSI Manual of Practice.

- B. Hooks:
  - 1. As indicated on Drawings.
  - 2. Type:
    - a. Standard 90-degree bends.
    - b. Seismic.

## 2.4 MIXES

- A. Concrete:
  - 1. Mix concrete according to ACI 304 and deliver concrete according to ASTM C94/C94M.
  - 2. Mix Design:
    - a. Compressive Strength: 3,500 psi at 28 days.
    - b. Slump: 3 to 5 inches.
    - c. Maximum Water/Cement Ratio: 0.45.
    - d. Air Entrainment: 6.0 percent.
  - 3. Limit following cementitious materials to maximum percentage by weight of combined cementitious materials:
    - a. Fly Ash: 15.0 percent.
    - b. Blast-Furnace Slag: 20.0 percent.
  - 4. Admixtures:
    - a. Use accelerating admixtures in cold weather only if approved by Architect/Engineer in writing.
    - b. Use of admixtures will not relax cold-weather placement requirements.
    - c. Use calcium chloride only if approved by Architect/Engineer in writing.
    - d. Use set-retarding admixtures during hot weather only if approved by Architect/Engineer in writing.

## 2.5 ACCESSORIES

- A. Curing Compound:
  - 1. Comply with ASTM C309.
  - 2. Type: 1.
  - 3. Class: A.
- B. Joint Sealers:
  - 1. Hot Applied:
    - a. Comply with ASTM D6690.
    - b. Type: I, II or III.
  - 2. Cold Applied: Comply with ASTM C920 or D5893/D5893M.

- C. Cover Sheets:
  - 1. Comply with ASTM C171.
  - 2. Burlap: Comply with AASHTO M182.

## 2.6 SOURCE QUALITY CONTROL

- A. Testing: Comply with ASTM C94/C94M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
- B. Verify that gradients and elevations of subgrade are as indicated on Drawings.
- C. Verify reinforcing placement for proper size, spacing, location, and support.

### 3.2 PREPARATION

- A. Moisten substrate to minimize absorption of water from fresh concrete.
- B. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

### 3.3 INSTALLATION

- A. Subgrade:
  - 1. As specified in Section 321123 - Aggregate Base Courses.
- B. Forms:
  - 1. Place and secure forms and screeds to correct location, dimension, profile, and gradient.
  - 2. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
  - 3. Clean forms and coat with form oil each time before concrete is placed.
  - 4. Wood Forms: Thoroughly wet with water before concrete is placed.
- C. Reinforcement:
  - 1. Place reinforcing as indicated on Drawings.
  - 2. Interrupt reinforcing at expansion joints.
  - 3. Place dowels or reinforcing to achieve indicated paving alignment.
- D. Placing Concrete:
  - 1. As specified in Section 033000 - Cast-in-Place Concrete.

E. Joints:

1. Place continuous transverse expansion or contraction as indicated on the Drawings.
2. Filler:
  - a. Place joint filler between paving components and building or other appurtenances.
  - b. Recess top of filler 1/4 inch for sealant installation.
3. Provide sawn joints at 3 foot intervals between sidewalks and curbs or as indicated on the Drawings.
4. Provide keyed joints as indicated on Drawings.

F. Finishing:

1. Medium broom and trowel edges of joints.
2. Texture Direction: Transverse to paving direction.
3. Ramps: Broom perpendicular to slope.
4. Place curing compound or sealer on exposed concrete surfaces immediately after finishing.
5. Edges and Joints:
  - a. Edger Radius: 1/8 inch.
  - b. Spalled Corners and Edges: Clean and fill with mortar mixture and finish.

G. Curing:

1. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
2. Mats:
  - a. Cover exposed surface with two or more layers of wetted burlap, overlapping each other minimum 6 inches.
  - b. Maintain burlap continuously saturated and in contact with concrete for minimum seven days.
3. Impervious Sheeting:
  - a. Wet exposed surface and cover with impervious sheeting material, overlapped minimum 12 inches.
  - b. Maintain sheet in contact with concrete for minimum seven days.
4. Membrane Curing:
  - a. Apply membrane-curing compound uniformly to exposed surface after free water has disappeared from finished surface and before concrete has dried.
  - b. Apply compound in two coats, with second coat applied perpendicular to first coat.
  - c. If concrete has dried, moisten dried surface and apply curing compound as soon as free water disappears.

H. Backfilling: After curing, backfill, grade, and compact adjacent disturbed area as indicated.

### 3.4 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.
- B. Maximum Variation from True Position: 1/4 inch.
- C. Line and Grade for Forms: 1/8 inch in any 10-foot long section.

### 3.5 FIELD QUALITY CONTROL

#### A. Inspection and Testing:

- 1. Comply with ASTM C94/C94M.
- 2. Samples:
  - a. Sampling Procedures: Comply with ASTM C172/C172M.
  - b. Cylinder Molding and Curing Procedures: Comply with ASTM C31/C31M, standard cured.
  - c. Sample concrete and make one set of five (4 inch diameter) cylinders the first 5 cu. yd. placed each day, and one set for every additional 50 cu. yd. placed for the day.
  - d. Make one additional cylinder during cold-weather concreting, and field cure.
- 3. Cylinder Compressive Strength:
  - a. Comply with ASTM C39/C39M.
  - b. Acceptance: According to ASTM standards.
  - c. Test one cylinder cylinders at seven days, and three cylinders at 28 days.
  - d. Retain one cylinder cylinders for testing when requested by Architect/Engineer.
  - e. Dispose of remaining cylinders if testing is not required.
- 4. Slump, Temperature, and Air Content:
  - a. Measure for each compressive-strength concrete sample.
  - b. Slump: Comply with ASTM C143/C143M.
  - c. Air Content: Comply with ASTM C173/C173M and C231/C231M.
  - d. Temperature: Comply with ASTM C1064/C1064M.
- 5. Records:
  - a. Maintain records of placed concrete items.
  - b. Record date, location of pour, quantity, air temperature, and number of test samples taken.

### 3.6 PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, rain and flowing water, and mechanical injury.

- B. Do not permit traffic over paving for minimum 7 days after finishing or until 75 percent design strength of concrete has been achieved.
  
- C. Damaged Concrete:
  - 1. Remove and reconstruct concrete that has been damaged for entire length between scheduled joints.
  - 2. Refinishing damaged portion is not acceptable.
  - 3. Dispose of damaged portions.

END OF SECTION 321623

## SECTION 329219 - SEEDING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Fertilizing.
2. Seeding.
3. Hydroseeding.
4. Mulching.
5. Maintenance.

##### B. Related Sections:

1. Section 312213 - Rough Grading: Rough grading of site.
2. Section 312316.13 - Trenching: Rough grading over cut.

#### 1.2 REFERENCES

##### A. ASTM International:

1. ASTM C602 - Standard Specification for Agricultural Liming Materials.

#### 1.3 DEFINITIONS

- ##### A. Weeds: Vegetative species other than specified species to be established in given area.

#### 1.4 SUBMITTALS

- ##### A. Section 013300 - Submittal Procedures: Requirements for submittals.
- ##### B. Product Data: Submit data for seed mix, fertilizer, mulch, and other accessories.
- ##### C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

#### 1.5 CLOSEOUT SUBMITTALS

- ##### A. Operation and Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; and types, application frequency, and recommended coverage of fertilizer.

## 1.6 QUALITY ASSURANCE

- A. Provide seed mixture in containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging.
- B. Perform Work according to State of Missouri – Office of Administration requirements.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

## 1.8 MAINTENANCE SERVICE

- A. Maintain seeded areas immediately after placement until grass is well established and exhibits vigorous growing condition.

## PART 2 - PRODUCTS

### 2.1 SEED MIXTURE

- A. Furnish materials according to State of Missouri – Office of Administration standards.
- B. Description:
  - 1. Turf Type Hybrid Fescue (MFA All Pro).
  - 2. Perennial Rye Grass.
  - 3. Or as requested by Owner.

### 2.2 ACCESSORIES

- A. Mulching Material: Hay, oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry.
- B. Fertilizer: Commercial grade 13-13-13 type; recommended for grass; of proportion necessary to eliminate deficiencies of topsoil. Class T lime has finer particle size than Class O. Other classes are available.
- C. Lime: ASTM C602, Class T or Class O agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.
- D. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.

- E. Erosion Fabric: Jute matting, open weave.
- F. Stakes: Softwood lumber, chisel pointed.
- G. String: Inorganic fiber.

### 2.3 SOURCE QUALITY CONTROL

- A. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- B. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of testing.
- C. Testing is not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify prepared soil base is ready to receive the Work of this section.

### 3.2 FERTILIZING

- A. Apply lime at application rate as required. Work lime into top 6 inches of soil.
- B. Apply fertilizer at application rate 10 lbs. per 1,000 sq. ft.
- C. Apply after smooth raking of topsoil.
- D. Do not apply fertilizer at same time or with same machine used to apply seed.
- E. Mix fertilizer thoroughly into upper 2 inches of topsoil.
- F. Lightly water soil to aid dissipation of fertilizer. Irrigate top level of soil uniformly.

### 3.3 SEEDING

- A. Apply seed at rate of 300 lbs per acre evenly in two intersecting directions. Rake in lightly.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Planting Season: March 15 to June 1 or September 1 to November 1.

- D. Do not sow immediately following rain, when ground is too dry, or when winds are over 12 mph.
- E. Roll seeded area with roller not exceeding 112 lbs/linear foot.
- F. Immediately following seeding, apply mulch to thickness of 1/8 inches. Maintain clear of shrubs and trees.
- G. Apply water with fine spray immediately after each area has been mulched. Saturate to 1 inch of soil.

### 3.4 HYDROSEEDING

- A. Apply fertilizer, mulch and seeded slurry with hydraulic seeder at rate of 2,000 lbs per acre evenly in one pass.
- B. After application, apply water with fine spray immediately after each area has been hydroseeded. Saturate to 1 inch of soil.

### 3.5 SEED PROTECTION

- A. Cover seeded slopes where grade is 4 inches per foot or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.
- B. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Overlap edges and ends of adjacent rolls minimum 12 inches. Backfill trench and rake smooth, level with adjacent soil.
- C. Secure outside edges and overlaps at 36 inch intervals with stakes.
- D. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- E. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

### 3.6 MAINTENANCE

- A. Mow grass at regular intervals to maintain at maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at each mowing. Perform first mowing when seedlings are 40 percent higher than desired height.
- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming. Do not let clippings lay in clumps.
- D. Water to prevent grass and soil from drying out.
- E. Control growth of weeds. Apply herbicides. Remedy damage resulting from improper use of herbicides.

- F. Immediately reseed areas showing bare spots.
- G. Repair washouts or gullies.
- H. Protect seeded areas with warning signs during maintenance period.

END OF SECTION 329219

## SECTION 330110.58 - DISINFECTION OF WATER UTILITY PIPING SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Disinfection of potable water distribution system.
2. Testing and reporting of results.

##### B. Related Requirements:

1. Section 331413 - Water Utility Distribution Piping: Product and execution requirements for installation and testing of site domestic water distribution piping.

#### 1.2 REFERENCE STANDARDS

##### A. American Water Works Association:

1. AWWA B300 - Hypochlorites.
2. AWWA B301 - Liquid Chlorine.
3. AWWA B302 - Ammonium Sulfate.
4. AWWA B303 - Sodium Chlorite.
5. AWWA C651 - Disinfecting Water Mains.

#### 1.3 SUBMITTALS

##### A. Section 013300 - Submittal Procedures: Requirements for submittals.

##### B. Disinfection Procedure:

1. Submit description of procedure, including type of disinfectant and calculations indicating quantities of disinfectants required to produce specified chlorine concentration.

##### C. Product Data: Submit manufacturer information for proposed chemicals and treatment doses.

##### D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

##### E. Certify that final water complies with disinfectant quality standards of Missouri Department of Natural Resources.

##### F. Test and Evaluation Reports: Indicate testing results comparative to specified requirements.

##### G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

##### H. Qualifications Statements:

1. Submit qualifications for manufacturer and applicator.

#### 1.4 CLOSEOUT SUBMITTALS

##### A. Disinfection Report:

1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and completion.
3. Test locations.
4. Name of person collecting samples.
5. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
6. Date and time of flushing start and completion.
7. Disinfectant residual after flushing in ppm for each outlet tested.

#### 1.5 QUALITY ASSURANCE

- ##### A. Perform Work according to AWWA C651.

### PART 2 - PRODUCTS

#### 2.1 DISINFECTION CHEMICALS

##### A. Chemicals:

1. Hypochlorite: Comply with AWWA B300
2. Liquid Chlorine: Comply with AWWA B301.
3. Ammonium Sulfate: Comply with AWWA B302.
4. Sodium Chlorite: Comply with AWWA B303.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- ##### A. Verify that piping system has been cleaned, inspected, and pressure tested.
- ##### B. Verify that access fittings have been installed under Section 331413 - Water Utility Distribution Piping.
- ##### C. Perform scheduling and disinfecting activity with startup, water pressure testing, adjusting and balancing, and demonstration procedures, including coordination with related systems.

### 3.2 INSTALLATION

- A. Provide required equipment to perform Work of this Section.
- B. Inject treatment disinfectant into piping system at a rate of 25 mg/L free chlorine.
- C. Maintain disinfectant in system for 24 hours with a free chlorine residual of not less than 10 mg/L.
- D. All valves and appurtenances shall be operated while the treated water is in the line.
- E. Flush, circulate, and clean until required disinfectant quality standard has been achieved using domestic water.
- F. The chlorine residual at the pipe extremities should have a residual chlorine of 2 to 5 ppm or as directed by the Water Operator or authority.
- G. Replace permanent system devices that were removed for disinfection.

### 3.3 FIELD QUALITY CONTROL

- A. Disinfection, Flushing, and Sampling:
  - 1. Disinfect pipeline installation according to AWWA C651.
  - 2. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
  - 3. Disposal:
    - a. Legally dispose of chlorinated water.
    - b. Apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
  - 4. After final flushing and before pipeline is connected to existing system or placed in service, certify that disinfectant level meets quality standards of authority having jurisdiction.
  - 5. Water samples for bacteriological analysis shall be collected and submitted to the authority on all sections of the distribution system. Two (2) samples shall be collected 24 hours apart. Two consecutive sets of acceptable samples are required prior to use of new mains and facilities. All tests shall be approved by the appropriate State Agency before any water is dispensed to the public, or the system put into operation.

END OF SECTION 330110.58

## SECTION 330505.31 - HYDROSTATIC TESTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Hydrostatic testing of pressure piping.
- B. Related Requirements:
  - 1. Section 331413 - Public Water Utility Distribution Piping: Pipe materials and accessories normally encountered with pressurized water distribution systems.

#### 1.2 REFERENCE STANDARDS

- A. American Water Works Association:
  - 1. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

#### 1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Submit following items prior to start of testing:
  - 1. Testing procedures.
  - 2. List of test equipment.
  - 3. Testing sequence schedule.
  - 4. Provisions for disposal of flushing and test water.
  - 5. Certification of test gage calibration.
- C. Test and Evaluation Reports: Indicate results of piping tests.
- D. Qualifications Statement:
  - 1. Submit qualifications for applicator.

#### 1.4 QUALITY ASSURANCE

- A. Perform Work according to AWWA standards.

## PART 2 - PRODUCTS

### 2.1 HYDROSTATIC TESTING

#### A. Equipment:

1. Pressure pump.
2. Pressure hose.
3. Water meter.
4. Test connections.
5. Pressure relief valve.
6. Pressure Gage: Calibrated to 0.1 psi (0.69 kPa).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that piping is ready for testing.
- B. Verify that trenches are backfilled.
- C. Verify that pressure piping thrust restraints have been installed.

### 3.2 FIELD QUALITY CONTROL

#### A. Testing of Pressure Piping:

1. Test system according to AWWA C600 and following:
  - a. Hydrostatically test each portion of pressure piping, including valved section, at 1.5 times working pressure of piping, based on elevation of lowest point in piping corrected to elevation of test gage.
  - b. Conduct hydrostatic testing for at least two hours.
  - c. Slowly fill with water portion of piping to be tested, expelling air from piping at high points.
  - d. Install corporation cocks at high points.
  - e. Close air vents and corporation cocks after air is expelled.
  - f. Raise pressure to specified test pressure.
  - g. Observe joints, fittings, and valves undergoing testing.
  - h. Remove and renew cracked pipes, joints, fittings, and valves that show visible leakage.
  - i. Retest.
  - j. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
  - k. Maintain pressure within plus or minus 5.0 psi (34.4 kPa) of test pressure.
  - l. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of testing.
  - m. Compute maximum allowable leakage using following formula:

- 1)  $L = [SD \times \sqrt{P}]/C$ .
  - 2) L = testing allowance, gph.
  - 3) S = length of pipe tested, feet.
  - 4) D = nominal diameter of pipe, inches.
  - 5) P = average test pressure during hydrostatic testing, psig (kPa).
  - 6) C = 148,000.
  - 7) If pipe undergoing testing contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each pipe size.
2. If testing of piping indicates leakage greater than that allowed, locate source of leakage, make corrections, and retest until leakage is within acceptable limits.
  3. Correct visible leaks regardless of quantity of leakage.

END OF SECTION 330505.31

## SECTION 330505.36 - VACUUM TESTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Vacuum testing of manholes.
- B. Related Requirements:
  - 1. Section 330561 - Concrete Manholes: Requirements for sewage and stormwater manholes.

#### 1.2 REFERENCE STANDARDS

- A. ASTM International:
  - 1. ASTM C1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.

#### 1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Submit following items prior to start of testing:
  - 1. Testing procedures.
  - 2. List of test equipment.
  - 3. Testing sequence schedule.
  - 4. Provisions for disposal of flushing and test water.
  - 5. Certification of test gage calibration.
- C. Test and Evaluation Reports: Indicate results of manhole tests.
- D. Qualifications Statement:
  - 1. Submit qualifications for applicator.

#### 1.4 QUALITY ASSURANCE

- A. Perform Work according to ASTM standards.

## PART 2 - PRODUCTS

### 2.1 VACUUM TESTING

#### A. Equipment:

1. Vacuum pump.
2. Vacuum line.
3. Vacuum Tester Base:
  - a. Compression band seal.
  - b. Outlet port.
4. Shutoff valve.
5. Stopwatch.
6. Plugs.
7. Vacuum Gage: Calibrated to 0.1 in. Hg (0.34 kPa) or 0.1 in psi.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that manholes are ready for testing.
- B. Verify that manholes are backfilled.

### 3.2 FIELD QUALITY CONTROL

#### A. Manhole Testing:

1. Repair both outside and inside of joint to ensure permanent seal.
2. Test manholes with manhole frame set in place.
3. Vacuum Testing:
  - a. Comply with ASTM C1244.
  - b. Plug pipe openings; securely brace plugs and pipe.
  - c. Inflate compression band to create seal between vacuum base and structure.
  - d. Connect vacuum pump to outlet port with valve open, then draw vacuum to 10 in. Hg (33.8 kPa) or 5.0 psig.
  - e. Close valve.
  - f. Manhole Test Duration in Seconds:
    - 1) Manhole Diameter of 4 Feet, Depth of 10 ft or less: 120.
    - 2) Manhole Diameter of 4 Feet, Depth of 10 to 15 ft: 150.
    - 3) Manhole Diameter of 4 Feet, Depth of 15 to 20 ft: 180.
  - g. Record vacuum drop during test period.

- h. If vacuum drop is greater than 1 in. Hg (3.4 kPa), or 0.5 psig, during testing period, repair and retest manhole.
  - i. If vacuum drop of 1 in. Hg (3.4 kPa), or 0.5 psig, does not occur during test period, manhole is acceptable; discontinue testing.
  - j. If vacuum test fails to meet 1-in. Hg (3.4-kPa), or 0.5 psig, drop in specified time after repair, repair and retest manhole.
- 4. If unsatisfactory testing results are achieved, repair manhole and retest until result meets criteria.
  - 5. Repair visible leaks regardless of quantity of leakage.

END OF SECTION 330505.36

## SECTION 330505.41 - AIR TESTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Low-pressure air testing of gravity sewer piping.
- B. Related Requirements:
  - 1. Section 333111 - Sanitary Sewerage Gravity Piping: Pipe materials, manholes, and accessories normally encountered with gravity sewerage piping.

#### 1.2 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Submit following items prior to start of testing:
  - 1. Testing procedures.
  - 2. List of test equipment.
  - 3. Testing sequence schedule.
  - 4. Provisions for disposal of flushing and test water.
  - 5. Certification of test gage calibration.
- C. Test and Evaluation Reports: Indicate results of piping tests.
- D. Qualifications Statement:
  - 1. Submit qualifications for applicator.

#### 1.3 QUALITY ASSURANCE

- A. Perform Work according to AWWA or ASTM standards.

### PART 2 - PRODUCTS

#### 2.1 AIR TESTING

- A. Equipment:
  - 1. Air compressor.
  - 2. Air supply line.
  - 3. Shutoff valves.
  - 4. Pressure regulator.

5. Pressure relief valve.
6. Stopwatch.
7. Plugs.
8. Pressure Gage: Calibrated to 0.1 psi (0.69 kPa).

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify that piping is ready for testing.
- B. Verify that trenches are backfilled.

#### 3.2 PREPARATION

##### A. Lamping:

1. Lamp gravity piping after flushing and cleaning.
2. Perform lamping operation by shining light at one end of each pipe section between manholes.
3. Observe light at other end.
4. Pipe not installed with uniform line and grade will be rejected.
5. Remove and reinstall rejected pipe sections.
6. Clean and lamp until pipe section is installed to uniform line and grade.

##### B. Plugs:

1. Plug outlets, wye branches, and laterals.
2. Brace plugs to resist test pressures.

#### 3.3 FIELD QUALITY CONTROL

##### A. Low-Pressure Air Testing:

1. Test each reach of gravity sewer piping between manholes.
2. Introduce air pressure slowly to approximately 4 psig (28 kPa).
3. Determine ground water elevation above spring line of piping.
4. For every foot (0.3 m) of ground water above spring line of piping, increase starting air test pressure by 0.43 psi (3.0 kPa).
5. Do not increase pressure above 10 psig (69 kPa).
6. Allow pressure to stabilize for at least five minutes.
7. Adjust pressure to 3.5 psig (24 kPa) or to increased test pressure as determined above when ground water is present.
8. Do not make allowance for laterals.
9. Minimum Testing Duration in Minutes Per 100 Feet (30 m):
  - a. Pipe Size 3 Inches: 0.2.
  - b. Pipe Size 4 Inches: 0.3.

- c. Pipe Size 6 Inches: 0.7.
  - d. Pipe Size 8 Inches: 1.2.
  - e. Pipe Size 10 Inches: 1.5.
  - f. Pipe Size 12 Inches: 1.8.
  - g. Pipe Size 15 Inches: 2.1.
  - h. Pipe Size 18 Inches: 2.4.
  - i. Pipe Size 21 Inches: 3.0.
  - j. Pipe Size 24 Inches: 3.6.
  - k. Pipe Size 27 Inches: 4.2.
  - l. Pipe Size 30 Inches: 4.8.
  - m. Pipe Size 33 Inches: 5.4.
  - n. Pipe Size 36 Inches: 6.0.
- 
- 10. Record drop in pressure during testing period.
  - 11. If air pressure drops more than 1.0 psi (6.89 kPa) during testing period, piping has failed.
  - 12. If 1.0-psi (6.89-kPa) air pressure drop has not occurred during testing period, piping is acceptable; discontinue testing.
  - 13. If piping fails, test reach of piping in incremental stages until leaks are isolated, repair leaks, and retest entire reach between manholes.
  - 14. If unsatisfactory testing results are achieved, make necessary repairs and retest until result meets criteria.
  - 15. Repair visible leaks regardless of quantity of leakage.

END OF SECTION 330505.41

## SECTION 330505.43 - MANDREL TESTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Deflection testing of plastic sewer piping.
- B. Related Requirements:
  - 1. Section 333111 - Sanitary Sewerage Gravity Piping: Pipe materials, manholes, and accessories normally encountered with gravity sewerage piping.

#### 1.2 REFERENCE STANDARDS

- A. ASTM International:
  - 1. ASTM D2122 - Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

#### 1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Submit following items prior to start of testing:
  - 1. Testing procedures.
  - 2. List of test equipment.
  - 3. Testing sequence schedule.
  - 4. Provisions for disposal of flushing and test water.
  - 5. Certification of test gage calibration.
  - 6. Deflection mandrel drawings and calculations.
- C. Test and Evaluation Reports: Indicate results of piping tests.

### PART 2 - PRODUCTS

#### 2.1 DEFLECTION TESTING

- A. Equipment:
  - 1. "Go, no go" mandrel.
  - 2. Pull/retrieval ropes.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that piping is ready for testing.
- B. Verify that trenches are backfilled.

### 3.2 PREPARATION

- A. Section 017000 - Execution and Closeout Requirements: Requirements for preparation.
- B. Lamping:
  - 1. Lamp gravity piping after flushing and cleaning.
  - 2. Perform lamping operation by shining light at one end of each pipe section between manholes.
  - 3. Observe light at other end.
  - 4. Pipe not installed with uniform line and grade will be rejected.
  - 5. Remove and reinstall rejected pipe sections.
  - 6. Clean and lamp until pipe section is installed to uniform line and grade.
- C. Plugs:
  - 1. Plug outlets, wye branches, and laterals.
  - 2. Brace plugs to resist test pressures.

### 3.3 FIELD QUALITY CONTROL

- A. Deflection Testing of Plastic Sewer Piping:
  - 1. Perform vertical ring deflection testing on PVC and ABS sewer piping after backfilling has been in place for at least 30 days, but not longer than 12 months.
  - 2. Allowable maximum deflection for installed plastic sewer pipe is no greater than five percent of original vertical internal diameter.
  - 3. Perform deflection testing using "go, no go" mandrel.
  - 4. Mandrel Diameter:
    - a. Not less than 95 percent of base or average ID of pipe.
    - b. Pipe Diameter: Comply with ASTM D2122.
  - 5. Perform testing without mechanical pulling devices.
  - 6. Locate, excavate, replace, and retest piping that exceeds allowable deflection.

END OF SECTION 330505.43

## SECTION 330561 – CONCRETE MANHOLES

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Modular precast concrete manholes and structures with tongue-and-groove joints and transition to cover frame, covers, anchorage, and accessories.
2. Cast-in-place concrete manholes and structures with transition to cover frame, covers, anchorage, and accessories.
3. Doghouse manhole connections to existing sanitary or storm sewer lines.
4. Bedding and cover materials.
5. Vertical adjustment of existing manholes and structures.

##### B. Related Requirements:

1. Section 032000 - Concrete Reinforcing: Reinforcing steel as required by this Section.
2. Section 033000 - Cast-in-Place Concrete: Concrete type for manhole and structure foundation slab construction.
3. Section 310513 - Soils for Earthwork: Soils for backfill in trenches.
4. Section 310516 - Aggregates for Earthwork: Aggregate for backfill in trenches.
5. Section 310519.13 - Geotextiles for Earthwork: Filter fabric for subsurface drainage.
6. Section 312316 - Excavation: Excavating for manholes, structures, and foundation slabs.
7. Section 312323 - Fill: Backfilling after manhole and structure installation.
8. Section 333111 - Sanitary Sewerage Gravity Piping: Piping connections to manholes.

#### 1.2 DEFINITIONS

- ##### A. Bedding: Specialized material placed under manhole prior to installation and subsequent backfill operations.

#### 1.3 REFERENCE STANDARDS

##### A. American Association of State Highway Transportation Officials:

1. AASHTO M91 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
2. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
3. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

##### B. American Concrete Institute:

1. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures.

C. ASTM International:

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
4. ASTM C55 - Standard Specification for Concrete Building Brick.
5. ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
6. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
7. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
8. ASTM C877 - Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.
9. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
10. ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
11. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
12. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
13. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

1.4 COORDINATION

- A. Coordinate Work of this Section with connection to municipal sewer utility service and trenching.

1.5 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer information for manhole covers, component construction, features, configuration, and dimensions.
- C. Shop Drawings:
1. Indicate structure locations and elevations.
  2. Indicate sizes and elevations of piping, conduit, penetrations, and covers.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- F. Source Quality-Control Submittals: Indicate results of shop and factory tests and inspections.
- G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

H. Qualifications Statement:

1. Submit qualifications for manufacturer.
  - a.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of manholes and connections, and record invert elevations.

1.7 QUALITY ASSURANCE

- A. Perform Work according to AASHTO, ACI, and ASTM standards.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with a minimum of three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Handling: Comply with precast concrete manufacturer instructions and ASTM C913 for unloading and moving precast manholes and drainage structures.
- C. Storage:
  1. Store materials according to manufacturer instructions.
  2. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property.
  3. Repair property damaged from materials storage.
- D. Protection:
  1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
  2. Provide additional protection according to manufacturer instructions.

1.10 AMBIENT CONDITIONS

- A. Cold Weather Requirements: Comply with ACI 530/530.1.

1.11 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

1.12 WARRANTY

- A. Furnish one-year manufacturer's warranty for concrete manholes.

PART 2 - PRODUCTS

2.1 CONCRETE MANHOLES

A. Manhole Sections:

1. Materials:

- a. Reinforced Precast Concrete: Comply with ASTM C478.
- b. Gaskets: Comply with ASTM C923.

2. Joints:

- a. Comply with ASTM C913.
- b. Maximum Leakage: 0.025 gal. per hour per foot of joint at 3 feet of head.

B. Reinforcement:

1. Formed steel wire or reinforcing rods.
2. Finish: Unfinished.

C. Shaft and Eccentric Cone Top Sections:

1. Pipe Sections: Reinforced precast concrete.
2. Joints:
  - a. Lipped male/female.
  - b. Dry.
3. Sleeved to receive pipe.

D. Shape: Cylindrical.

E. Clear Inside Dimensions:

1. Diameter: 48 inches.
2. As indicated on Drawings.

- F. Design Depth:
  - 1. As indicated on Drawings.
- G. Clear Cover Opening:
  - 1. Diameter: 24 inches.
  - 2. As indicated on Drawings.
- H. Pipe Entry: Furnish openings as indicated on Drawings.
- I. Structure Joint Gaskets:
  - 1. Comply with ASTM C361 (C361M).
  - 2. Material: Rubber.

## 2.2 FRAMES AND COVERS

- A. Manufacturers:
  - 1. Neenah #R1726-A, EJ Iron Works 1120, GCI Castings 2276, or as indicated on the Drawings.
- B. Description:
  - 1. Material:
    - a. Cast iron.
    - b. Comply with ASTM A48, Class 30B or AASHTO M306.
  - 2. Lid:
    - a. Bearing Surface: Machined flat.
    - b. Configuration: Removable.

## 2.3 RISER RINGS

- A. Riser Rings:
  - 1. Thickness of 4 to 6 Inches:
    - a. Precast concrete.
    - b. Comply with ASTM C478.
  - 2. Thickness Less Than 4 Inches:
    - a. Cast iron.
    - b. Comply with AASHTO M306.
  - 3. Rubber Seal Wraps:

- a. Wraps and Band Widths: Comply with ASTM C877 (C877M), Type III.
- b. Cone/Riser Ring Joint: Minimum 3-inch overlap.
- c. Frame/Riser Ring Joint: 2-inch overlap.
- d. Additional Bands: Overlap upper band by 2 inches.

## 2.4 MATERIALS

### A. Cover and Bedding:

1. Bedding: Fill Type A3, as specified in Section 310516 - Aggregates for Earthwork.
2. Cover: Fill Type A3, as specified in Section 310516 - Aggregates for Earthwork.

## 2.5 ACCESSORIES

### A. Steps:

1. Rungs: Formed PP.
2. Diameter: 3/4 inch.
3. Width:
  - a. 12 inches.
  - b. As indicated on Drawings.
4. Spacing:
  - a. 16 inches o.c. vertically, set into structure wall.
  - b. As indicated on Drawings.

### B. Foundation Slab:

1. Cast-in-place concrete as specified in Section 033000 - Cast-in-Place Concrete.
2. Top Surface: Level.

### C. Joint Sealant: Comply with ASTM C990.

### D. Fasteners: Stainless steel; ASTM F593.

### E. Grout: As specified in Section 033000 - Cast-in-Place Concrete.

### F. Soil Backfill from Above Pipe to Finish Grade:

1. Soil Type S1 or S2, as specified in Section 310513 - Soils for Earthwork.
2. Subsoil: No frozen earth, or foreign matter, or rocks more than 6 inches in diameter.

## 2.6 FINISHES

### A. Bituminous Manhole Coating:

1. All precast concrete sections shall be coated on the outside with two (2) coats of bituminous material.

- B. Steel Galvanizing:
  - 1. Hot-dip galvanize after fabrication.
  - 2. Comply with ASTM A123.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that items provided by other Sections of Work are properly sized and located.
- B. Verify that built-in items are in proper location and are ready for roughing into Work.
- C. Verify that excavation base is ready to receive Work and excavations and that dimensions and elevations are as indicated on Drawings or layout drawings.

### 3.2 PREPARATION

- A. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
- B. Coordinate placement of inlet and outlet pipe or duct sleeves as required by other Sections.
- C. Do not install manholes and structures where Site conditions induce loads exceeding structural capacity of manholes or structures.
- D. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

### 3.3 INSTALLATION

- A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.
- B. Correct over-excavation with coarse aggregate.
- C. Remove large stones or other hard matter impeding consistent backfilling or compaction.
- D. Protect manhole from damage or displacement while backfilling operation is in progress.
- E. Excavating:
  - 1. As specified in Section 312316 – Excavation and in indicated locations and depths.
  - 2. Provide clearance around sidewalls of manhole or structure for construction operations, granular backfill.

3. If ground water is encountered, prevent accumulation of water in excavations; place manhole or structure in dry trench.
  4. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation as approved by Architect/Engineer.
- F. Base and Alignment:
1. Install manholes supported at proper grade and alignment on crushed-stone bedding as indicated on Drawings.
  2. Form and place manhole or structure cylinders plumb and level, to correct dimensions and elevations.
- G. Attachments:
1. Cut and fit for pipe.
  2. Set cover frames and covers level to correct elevations without tipping.
- H. Backfilling: As specified in Section 310513 - Soils for Earthwork, 310516 - Aggregates for Earthwork, and 312323 - Fill.
- I. Precast Concrete Manholes:
1. Lift precast components at lifting points designated by manufacturer.
  2. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
  3. Assembly:
    - a. Assemble multisection manholes and structures by lowering each section into excavation.
    - b. Install rubber gasket joints between precast sections according to manufacturer recommendations.
    - c. Lower, set level, and firmly position base section before placing additional sections.
  4. Remove foreign materials from joint surfaces and verify that sealing materials are placed properly.
  5. Maintain alignment between sections by using guide devices affixed to lower section.
  6. Joint sealing materials may be installed on Site or at manufacturer's plant.
  7. Verify that installed manholes and structures meet required alignment and grade.
  8. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
  9. Cut pipe flush with interior of structure.
  10. Shape inverts through manhole and structures as indicated on Drawings.
- J. Doghouse Manholes and Structures:
1. Stake out location and burial depth of existing sewer line in area of proposed manhole or structure.
  2. Carefully excavate around existing sewer line to adequate depth for foundation slab installation.

3. Protect existing pipe from damage.
4. Cut out soft spots and replace with granular fill compacted to 95 percent maximum density.
5. Bear firmly and fully on crushed stone bedding or support system as indicated on Drawings.
6. Install precast concrete manhole or structure around existing pipe according to applicable Paragraphs in this Section.
7. Grout pipe entrances as specified in Section 033000 - Cast-in-Place Concrete.
8. Block upstream flow at existing manhole or structure with expandable plug.
9. Use hydraulic saw to cut existing pipe at manhole or structure entrance and exit and along pipe length at a point halfway up OD on each side of pipe.
10. Bottom half of pipe is to remain as manhole flow channel.
11. Saw cut to smooth finish with top half of pipe flush with interior of manhole or structure.
12. Grout base of manhole or structure to achieve slope to manhole or structure channel as specified in Section 033000 - Cast-in-Place Concrete and trowel smooth.

K. Sanitary Manhole Drop Connections: As indicated on Drawings.

### 3.4 FIELD QUALITY CONTROL

#### A. Testing:

1. Cast-in-Place Concrete: As specified in Section 033000 - Cast-in-Place Concrete.
2. Concrete Manhole Sections: Comply with ASTM C497 (C497M as specified in Section 330505.33 - Infiltration and Exfiltration Testing or as specified in Section 330505.36 - Vacuum Testing.

B. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

### 3.5 ADJUSTING

#### A. Vertical Adjustment of Existing Manholes and Structures:

1. If required, adjust top elevation of existing manholes and structures to finished grades as indicated on Drawings.
2. Frames, Grates, and Covers:
  - a. Remove frames, grates, and covers cleaned of mortar fragments.
  - b. Reset to required elevation according to requirements specified for installation of castings.
3. Reinforcing Bars:
  - a. Remove concrete without damaging existing vertical reinforcing bars if removal of existing concrete wall is required.
  - b. Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement as indicated on Drawings.

4. Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete as specified in Section 033000 - Cast-in-Place Concrete.

END OF SECTION 330561

## SECTION 330563 - CONCRETE VAULTS AND CHAMBERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Precast concrete vaults and chambers.
2. Drainage system junction boxes.
3. Drainage system sedimentation chambers.
4. Knock-out boxes.
5. End walls.
6. Pipe ends.
7. Frames and covers.
8. Access hatches.

##### B. Related Requirements:

1. Section 031000 - Concrete Forming and Accessories: Erection and bracing of forms.
2. Section 032000 - Concrete Reinforcing: Reinforcing steel as required by this Section.
3. Section 033000 - Cast-in-Place Concrete: Concrete type for concrete vault or chamber construction.
4. Section 312316 - Excavation: Excavating for vaults or chambers, and foundation slabs.
5. Section 312323 - Fill: Backfilling after vault or chamber installation.
6. Section 331413 - Water Utility Distribution
7. Section 333111 - Public Sanitary Sewerage Gravity Piping: Piping connections to vaults or chambers.

#### 1.2 REFERENCE STANDARDS

##### A. American Association of State Highway and Transportation Officials:

1. AASHTO HB-17 - Standard Specifications for Highway Bridges.
2. AASHTO M 306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

##### B. American Concrete Institute:

1. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
2. ACI 318 - Building Code Requirements for Structural Concrete.

##### C. American Welding Society:

1. AWS D1.1/D1.1M - Structural Welding Code - Steel.
2. AWS D1.4/D1.4M - Structural Welding Code - Reinforced Steel.

##### D. ASTM International:

1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A48 - Standard Specification for Gray Iron Castings.
3. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
5. ASTM A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
6. ASTM A767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
7. ASTM A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
8. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
9. ASTM A884 - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
10. ASTM C877 - Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.
11. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
12. ASTM A996 - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
13. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
14. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
15. ASTM C33 - Standard Specification for Concrete Aggregates.
16. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
17. ASTM C138 - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
18. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
19. ASTM C150 - Standard Specification for Portland Cement.
20. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
21. ASTM C192 - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
22. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
23. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
24. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
25. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
26. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
27. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
28. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
29. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
30. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.

31. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.
32. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
33. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
34. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars.
35. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
36. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
37. ASTM C1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.
38. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
39. ASTM C1433 - Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers.
40. ASTM C1504 - Standard Specification for Manufacture of Precast Reinforced Concrete Three-Sided Structures for Culverts and Storm Drains.

E. National Precast Concrete Association:

1. NPCA Plant Certification Program.
2. NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.

F. The Society for Protective Coatings:

1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

### 1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer information regarding frames and covers, steps, component construction, features, configuration, and dimensions.

C. Shop Drawings:

1. Indicate vault or chamber locations, elevations, sections, equipment supports, piping, conduit, sizes and elevations of penetrations.
2. Indicate design, construction and installation details, typical reinforcement and additional reinforcement at openings.

D. Submit concrete mix design for each different mix.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.

- G. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for custom fabrications.
- H. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- I. Source Quality-Control Submittals: Indicate results of shop tests and inspections.
- J. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- K. Qualifications Statements:
  - 1. Submit qualifications for manufacturer, installer, and licensed professional.
  - 2. Submit manufacturer's approval of installer.
  - 3. Welders: Qualify procedures and personnel according to AWS D1.1/D1.1M.

#### 1.4 QUALITY ASSURANCE

- A. Obtain precast concrete vaults and chambers from single source.
- B. Perform structural design according to ACI 318.
- C. Perform Work according to NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.
- D. Material and Fabrication:
  - 1. Single-Cell Box Culverts: Comply with ASTM C1433.
  - 2. Three-Sided Structures: Comply with ASTM C1504.
  - 3. Other Structures: Comply with ASTM C913.
- E. Welding:
  - 1. Structural Steel: Comply with AWS D1.1/D1.1M.
  - 2. Reinforcing Steel: Comply with AWS D1.4/D1.4M.
- F. Perform Work according to AASHTO, ACI, and ASTM standards.

#### 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with a minimum of three years' documented experience.
- B. Welders: AWS qualified within previous 12 months for employed weld types.
- C. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of Missouri.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Concrete Products: Do not deliver products until concrete has cured five days or has attained minimum 75 percent of specified 28-day compressive strength.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Handling:
  - 1. Comply with manufacturer instructions for unloading, storing, and moving vaults or chambers.
  - 2. Lift vaults or chambers from designated lifting points.
- D. Storage:
  - 1. Store materials according to manufacturer instructions.
  - 2. Store vaults and chambers to prevent damage to Owner's property or other public or private property.
  - 3. Repair property damaged from materials storage.
- E. Protection:
  - 1. Protect materials in clean location remote from construction operations areas.
  - 2. Provide additional protection according to manufacturer instructions.

## 1.7 EXISTING CONDITIONS

- A. Field Measurements:
  - 1. Verify field measurements prior to fabrication.
  - 2. Indicate field measurements on Shop Drawings.

## 1.8 WARRANTY

- A. Furnish one-year manufacturer's warranty for concrete vaults, chambers, and appurtenances.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Minimum Loading: Comply with ASTM C857 and ASTM C890.
- B. Roof Live Load, with Impact Loading:
  - 1. Heavy Traffic:
    - a. Comply with ASTM C857; A-16 or AASHTO HB-17; HS20-44.

- b. Maximum Each Wheel: 16,000 lbf. (71.2 kN).
- 2. Medium Traffic:
  - a. Comply with ASTM C857; A-12 or AASHTO HB-17; HS15-44.
  - b. Maximum Each Wheel: 12,000 lbf. (53.4 kN).
- 3. Light Traffic:
  - a. Comply with ASTM C857; A-8 or AASHTO HB-17; HS10.
  - b. Maximum Each Wheel: 8,000 lbf. (35.6 kN).
- 4. Walkway Traffic:
  - a. Comply with ASTM C857; A-0.3.
  - b. Maximum Loading: 300 psf (14.4 kPa).

## 2.2 PRECAST CONCRETE VAULTS AND CHAMBERS

### A. Fabricator List:

- 1. Furnish materials according to ASTM, ACI, and AASHTO standards.

### B. Material of Construction: Reinforced precast concrete.

### C. Foundation Slab:

- 1. Cast-in-place or Precast concrete of type as specified in Section 033000 - Cast-in-Place Concrete.
- 2. Top Surface: Leveled.

## 2.3 ACCESS HATCHES

### A. Manufacturers:

- 1. Halliday or equivalent.

### B. Description:

- 1. Materials of Construction: Aluminum; welded.
- 2. Size: As indicated on Drawings.
- 3. Door Configuration: As indicated on Drawings.
- 4. Cover:
  - a. Fabrication: Diamond plate.
  - b. Reinforce with structural stiffeners as required to support indicated loads.
- 5. Frame:
  - a. Type: Channel.

6. Hinge Material: Stainless steel.
7. Lift Handle:
  - a. Type: Flush drop; non-removable.
  - b. Mounting: In cover.
8. Lifting Mechanism:
  - a. Compression Springs: Stainless steel.
  - b. Furnish automatic hold-open and dead stop to retain cover in open position.
  - c. Cover springs to prevent contact by personnel entering vault or chamber.
9. Latch Mechanism:
  - a. Lock: Stainless steel.
  - b. Furnish removable external handle and permanent internal release mechanism.
10. Hardware: Stainless steel.

C. Admixtures:

1. Air Entrainment: Comply with ASTM C260/C260M.
2. Chemical Admixtures:
  - a. Comply with ASTM C494.
3. Fly Ash: Comply with ASTM C618, Class F or C.
4. Blast Furnace Slag: Comply with ASTM C989, Grade 80.

D. Concrete Reinforcement:

1. Reinforcing Steel:
  - a. Comply with ASTM A615.
  - b. Yield Grade: 60 ksi.
  - c. Billet Bars: Deformed.
  - d. Finish: Uncoated.
2. Reinforcing Wire:
  - a. Plain Wire:
    - 1) Comply with ASTM A1064.
    - 2) Finish: Unfinished.
  - b. Deformed Wire:
    - 1) Comply with ASTM A1064/A1064M.
    - 2) Finish: Unfinished.
3. Welded Steel Wire Fabric:

- a. Plain Wire:
  - 1) Comply with ASTM A1064.
  - 2) Finish: Unfinished.
- b. Deformed Wire:
  - 1) Comply with ASTM A1064.
  - 2) Finish: Unfinished.

## 2.4 FABRICATION

- A. Comply with ACI 318 and NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.
- B. Fabricate vaults, chambers and openings to size and configuration as indicated on Drawings.
- C. Forms:
  - 1. Fabricate to provide uniform precast concrete units with consistent dimensions.
  - 2. Clean after each use.
- D. Reinforcing:
  - 1. Install reinforcement by tying or welding to make rigid assemblies.
  - 2. Position reinforcement to maintain minimum 1/2-inch cover.
  - 3. Secure reinforcement to prevent displacement while placing concrete.
- E. Position and secure embedded items to prevent displacement while placing concrete.
- F. Deposit concrete in forms and consolidate concrete without segregating aggregate.
- G. Provide initial curing by retaining moisture using one of following methods:
  - 1. Cover with PE sheets.
  - 2. Cover with burlap or other absorptive material and keep continually moist.
  - 3. Apply curing compound according to manufacturer instructions.
- H. Provide final curing according to manufacturer's standard.
- I. Remove forms without damaging concrete.

## 2.5 MIXES

- A. Concrete:
  - 1. Normal Weight: Select proportions according to ACI 2111.1 and 318.
  - 2. Admixtures:

- a. Include admixture types and quantities indicated in concrete mix designs approved through submittal process.
- b. Do not use calcium chloride.

## 2.6 FINISHES

### A. Reinforcing Steel:

1. Galvanized Finish: Comply with ASTM A767.
2. Epoxy-Coated Finish: Comply with ASTM A775.

### B. Wire and Wire Fabric:

1. Epoxy-Coated Finish: Comply with ASTM A884.

### C. Concrete:

1. Formed Surfaces Not Exposed to View: As formed.
2. Unformed Surfaces:
  - a. Finish with vibrating screed or hand float.
  - b. Items Permitted: Color variations, minor indentations, chips, and spalls.
  - c. Items Not Permitted: Major imperfections, honeycomb, or other such defects.
3. Exposed-to-View Finishes:
  - a. Surfaces: Trowel or Light broom.

### D. Steel:

1. Galvanizing:
  - a. Comply with ASTM A123.
  - b. Hot-dip galvanize after fabrication.

## 2.7 ACCESSORIES

### A. Membrane Curing Compound: Comply with ASTM C309.

### B. Step Rungs:

1. Material: Formed steel-reinforced PP.
2. Diameter: 3/4 inch.
3. Width: 12 inches.
4. Spacing: 16 inches o.c. vertically or as indicated on Drawings.

### C. Inserted and Embedded Items:

1. Structural-Steel Sections:

- a. Comply with ASTM A36.
- b. Finish: Galvanized.

D. Joint Sealants and Joint Gaskets:

1. Gasket Joints for Circular Concrete Pipe:

- a. Comply with ASTM C443.
- b. Gaskets: Standard rubber.

2. External Sealing Bands:

- a. Comply with ASTM C877.
- b. Material: Type I, rubber and mastic.

3. Preformed Joint Sealants for Concrete Pipe and Box Sections: Comply with ASTM C990.

4. Elastomeric Joint Sealants:

- a. Comply with ASTM C920.
- b. Material: Silicone or Polyurethane.
- c. Grade NS, Class 25.

E. Pipe Entry Connectors: Comply with ASTM C923.

F. Grout:

- 1. Cement Type: Portland cement, sand, and water mixture with stiff consistency to suit intended purpose.
- 2. Nonshrink Type:
  - a. Description: Premixed compound consisting of nonmetallic aggregate, cement, and water-reducing and plasticizing agents.
  - b. Comply with ASTM C1107/C1107M.
  - c. Minimum Compressive Strength: 2,400 psi in 48 hours, and 7,000 psi in 28 days.

G. Bituminous Coating:

1. Manufacturers:

- a. Furnish materials according to ASTM, ACI, or AASHTO standards.

H. Touch-Up Primer for Galvanized Surfaces:

- 1. Comply with ASTM A780.

## 2.8 SOURCE QUALITY CONTROL

A. Quality Requirements: Requirements for testing, inspection, and analysis.

B. Testing:

1. Perform following tests for each 150 cu. yd. of concrete placed with minimum one set of tests each week:
  - a. Slump: Comply with ASTM C143.
  - b. Compressive Strength: ASTM C31, ASTM C192 and ASTM C39.
  - c. Air Content: Comply with ASTM C231 or [ASTM C173.
  - d. Unit Weight: Comply with ASTM C138.
2. Make test results available to Architect/Engineer and Owner upon request.

C. Inspection:

1. Visually inspect completed vaults and chambers for defects.
2. Repair defects on surfaces exposed to view to achieve uniform appearance.
3. Repair honeycomb by removing loose material and applying grout to produce smooth surface flush with adjacent surface.
4. Repair major defects only if permitted by Architect/Engineer and Owner.

D. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that items provided by other Sections of Work are properly sized and located.
- C. Verify correct size and elevation of excavation.
- D. Verify that subgrade and bedding are properly prepared and ready to receive Work of this Section.

### 3.2 PREPARATION

- A. Execution and Closeout Requirements: Requirements for installation preparation.
- B. Mark each vault or chamber by indentation or using waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.
- C. Coordinate placement of inlet and outlet pipe or duct sleeves required by other Sections.

- D. Do not install vault or chamber if Site conditions induce loads exceeding weight capacity of vault or chamber.
- E. Inspect vaults and chambers immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

### 3.3 INSTALLATION

- A. According to ASTM C891.
- B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.
- C. While lowering vaults or chambers into excavations and joining pipe to units, take precautions to ensure that interiors of pipeline and structure remain clean.
- D. Install vaults and chambers to elevation and alignment as indicated on Drawings.

### 3.4 FIELD QUALITY CONTROL

- A. Testing:
  - 1. Vacuum Test: Comply with ASTM C1244.
  - 2. Hydrostatic Exfiltration Test: According to manufacturer instructions.

END OF SECTION 330563

## SECTION 331413 - WATER UTILITY DISTRIBUTION PIPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Pipe and fittings for public line.
2. Tapping sleeves and valves.
3. Pipe support systems.
4. Bedding and cover materials.
5. Service line pipe and fittings.
6. Corporation stop assemblies.
7. Curb stop assemblies.
8. Meter setting equipment.
9. Meter boxes.
10. Trenching, bedding, and cover

##### B. Related Requirements:

1. Section 032000 - Concrete Reinforcing: Reinforcing steel and required supports for cradles and encasements.
2. Section 033000 - Cast-in-Place Concrete: Concrete for cradles and encasements.
3. Section 310513 - Soils for Earthwork: Soils for backfill in trenches.
4. Section 310516 - Aggregates for Earthwork: Aggregate for backfill in trenches.
5. Section 312316 - Excavation: Excavation and backfill as required by this Section.
6. Section 312316.13 - Trenching: Excavation and backfill as required by this Section.
7. Section 312323 - Fill: Requirements for backfill to be placed by this Section.
8. Section 330110.58 - Disinfection of Water Utility Piping Systems: Disinfection of water mains and appurtenances.
9. Section 330563 - Concrete Vaults and Chambers: Cast-in-place, precast-concrete, or masonry structures for access to subsurface drainage piping or utilities.
10. Section 331419 - Valves and Hydrants for Water Utility Service: Fire hydrants, valves, and valve boxes for fire hydrant and water main installations.

##### C. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

##### D. American Society of Mechanical Engineers:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

##### E. ASTM International:

1. ASTM A36 - Standard Specification for Carbon Structural Steel.

2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products).
3. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
4. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
5. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
6. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>).
7. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>).
8. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
9. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
10. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
11. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
12. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
13. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
14. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
15. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

F. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
6. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
7. AWWA C153 - Ductile-Iron Compact Fittings.
8. AWWA C200 - Steel Water Pipe, 6 In. (150 mm) and Larger.
9. AWWA C203 - Coal-Tar Protective Coatings and Linings for Steel Water Pipe.
10. AWWA C205 - Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. (100 mm) and Larger - Shop Applied.
11. AWWA C206 - Field Welding of Steel Water Pipe.
12. AWWA C207 - Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm).
13. AWWA C208 - Dimensions for Fabricated Steel Water Pipe Fittings.
14. AWWA C213 - Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings.
15. AWWA C300 - Reinforced Concrete Pressure Pipe, Steel-Cylinder Type.
16. AWWA C301 - Prestressed Concrete Pressure Pipe, Steel-Cylinder Type.
17. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.

18. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
19. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
20. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
21. AWWA C606 - Grooved and Shouldered Joints.
22. AWWA C700 - Cold-Water Meters - Displacement Type, Metal Alloy Main Case.
23. AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.
24. AWWA C702 - Cold-Water Meters - Compound Type.
25. AWWA C707 - Encoder-Type Remote-Registration Systems for Cold-Water Meters.
26. AWWA C800 - Underground Service Line Valves and Fittings.
27. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
28. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service.
29. AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. (350 mm Through 1,200 mm), for Water Transmission and Distribution.
30. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

G. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP-60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.

H. National Fire Protection Association:

1. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

I. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

## 1.2 COORDINATION

- A. Section 013000 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work of this Section with termination of water main connection at Site boundary, connection to City of Sedalia.

## 1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer information regarding pipe materials, pipe fittings, valves, and hydrants.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

E. Qualifications Statements:

1. Submit qualifications for manufacturer and installer.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

- A. Valves: Mark valve body with manufacturer's name and pressure rating.
- B. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.
- C. Perform Work according to City of Sedalia standards.
- D. Maintain copy of each standard affecting Work of this Section on Site.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Storage:
  1. Store materials according to manufacturer instructions.
  2. Block individual and stockpiled pipe lengths to prevent moving.
  3. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
  4. Store PE and PVC materials out of sunlight.
- D. Protection:
  1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
  2. Provide additional protection according to manufacturer instructions.

## 1.8 EXISTING CONDITIONS

### A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

## 1.9 WARRANTY

- A. Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish one-year manufacturer's warranty for valves and fire hydrants.

## PART 2 - PRODUCTS

### 2.1 WATER PIPING

#### A. Ductile-Iron Pipe:

1. Comply with AWWA C151.
2. Bituminous Outside Coating: Comply with AWWA C151.
3. Pipe Mortar Lining:
  - a. Comply with AWWA C104.
  - b. Thickness: Double.
4. PE Encasement: Comply with AWWA C105.
5. Pipe Class:
  - a. Comply with AWWA C151.
  - b. Class 54.
6. Fittings:
  - a. Material: Ductile iron; comply with AWWA C110.
  - b. Compact Fittings: Comply with AWWA C153.
  - c. Coating and Lining:
    - 1) Bituminous Coating: Comply with AWWA C110.
    - 2) Cement-Mortar Lining: Comply with AWWA C104; double thickness.
7. Joints:
  - a. Mechanical and Push-on Joints: Comply with AWWA C111.
  - b. Flanged Joints: Comply with AWWA C115, ASME B16.1.

#### B. PVC:

1. Comply with AWWA C900 and C905, Class 165, 235, 305, or as indicated.

2. Fittings: Comply with AWWA C900, C905, and C111.
3. Joints:
  - a. Comply with ASTM D3139 and F477].
  - b. Seals: PVC flexible elastomeric.
  - c. Solvent-cement couplings are not permitted.

C. PVC:

1. Comply with ASTM D1785.
2. Schedule: 40, 80, or as indicated.
3. Fittings: Comply with AWWA C900, C905, and C111.
4. Joints:
  - a. Comply with ASTM D3139 and F477.
  - b. Seals: PVC flexible elastomeric.
  - c. Solvent-cement couplings are not permitted.

D. PVC:

1. Comply with ASTM D2241.
2. Pressure Class: SDR-21 for 200-psig (1 380-kPa) rating.
3. Fittings: Comply with AWWA C900, C905, and C111.
4. Joints:
  - a. Comply with ASTM D3139 and F477.
  - b. Seals: PVC flexible elastomeric.
  - c. Solvent-cement couplings are not permitted.

E. Steel Pipe:

1. Comply with AWWA C200.
2. Type: Fabricated pipe.
3. Minimum Wall Thickness:
  - a. Pipe Diameters 8 Inches and Smaller: 0.375 inches.
  - b. Pipe Diameters Greater than 8 Inches : 0.50 inches.
4. Fittings and Special Sections: Comply with AWWA C208.
5. Flanges:
  - a. Comply with AWWA C207.
  - b. Type: Slip-on.
6. Field Welding Materials: Comply with AWWA C206.
7. Interior Cement Mortar Lining: Comply with AWWA C205.
8. Buried Steel Pipe Exterior Lining:
  - a. Description: Shop-applied prime coat and coal tar enamel protective coating.
  - b. Comply with AWWA C203.

## 2.2 TAPPING SLEEVES AND VALVES

### A. Tapping Sleeves:

#### 1. Manufacturers:

a. Ford or equivalent.

#### 2. Description:

a. Material: Stainless steel.

b. Outlet Flange Dimensions and Drilling: Comply with ASME B16.1, Class 125, and MSS SP-60.

### B. Tapping Valves:

#### 1. Manufacturers:

a. Mueller or equivalent.

#### 2. Description:

a. Comply with AWWA C500.

b. Type: Double disc with non-rising stem.

c. Inlet Flanges: Comply with ASME B16.1, Class 125, and MSS SP-60.

d. Mechanical Joint Outlets: Comply with AWWA C111.

## 2.3 VALVES AND FIRE HYDRANTS

A. As specified in Section 331419 - Valves and Hydrants for Water Utility Service.

## 2.4 PIPE SUPPORTS AND ANCHORING

### A. Metal for Pipe Support Brackets:

1. Material: Structural steel.

2. Finish: Galvanized.

3. Coating: Bituminous paint.

### B. Metal Tie Rods and Clamps or Lugs:

1. Material: Galvanized steel.

2. Size: Comply with NFPA 24.

3. Coating: Bituminous paint.

## 2.5 CONCRETE ENCASEMENT AND CRADLES

### A. Concrete:

1. As specified in Section 033000 - Cast-in-Place Concrete.
2. Type: Reinforced, air entrained or as indicated.
3. Compressive Strength: 4,000 psi at 28 days.
4. Finish: Rough troweled.

B. Concrete Reinforcement: As specified in Section 032000 - Concrete Reinforcing.

## 2.6 SERVICE LINE PIPING AND FITTINGS

A. Copper Tubing:

1. Comply with ASTM B88.
2. Type: K and L, annealed.
3. Fittings: Cast copper; ASME B16.18 or wrought copper; ASME B16.22.
4. Joints: Compression connection or BCuP silver braze; AWS A5.8.

B. PVC Pipe:

1. Comply with ASTM D1785, Schedule 40 or Schedule 80, and D2241, SDR-21 for 200-psig (1.38-MPa) rating].
2. Fittings: PVC; ASTM D2466.
3. Joints: Solvent welded; ASTM D2855.

C. PE Pipe:

1. Comply with AWWA C901 and ASTM D3035, DR 11, for 200 psig (1.38 MPa) pressure rating.
2. Fittings:
  - a. Type: Molded or fabricated.
  - b. Comply with AWWA C901,
3. Joints: Compression.

## 2.7 CORPORATION STOP ASSEMBLIES

A. Corporation Stops:

1. Comply with ASTM B62.
2. Body: Brass or red brass alloy.
3. Inlet End: Threaded for tapping according to AWWA C800.
4. Outlet End: Suitable for service pipe specified.

B. Service Saddles:

1. Type: Double strap.
2. Designed to hold pressures in excess of pipe working pressure.

## 2.8 CURB STOP ASSEMBLIES

### A. Curb Stops:

1. Body: Brass or red brass alloy.
2. Comply with ASTM B62.
3. Valve Type: Plug.
4. Sealing: Positive pressure.

### B. Curb Boxes and Covers:

1. Body: Cast iron.
2. Lid:
  - a. Inscription: WATER.
  - b. Plug: Pentagonal.

## 2.9 BACKFLOW PREVENTERS

### A. Reduced-Pressure Backflow Preventers:

1. Comply with ASSE 1013.
2. Materials:
  - a. Body: Bronze.
  - b. Internal Parts: Bronze.
  - c. Springs: Stainless steel.
3. Check Valves:
  - a. Quantity: Two, operating independently operating.
  - b. Spring-loaded.
  - c. Third Check Valve: Open under back pressure in case of diaphragm failure.
4. Differential Pressure Relief Valve:
  - a. Type: Diaphragm.
  - b. Location: Between check valves.
5. Gate Valves:
  - a. Type: Resilient seated.
  - b. Comply with AWWA C509.
  - c. Quantity: Two.
6. Accessories:
  - a. Non-threaded vent outlet.
  - b. Strainer.
  - c. Four resilient-seated ball valve test cocks.

- B. Double-Check Valve Assemblies:
  - 1. Comply with ASSE 1012.
  - 2. Materials:
    - a. Body: Bronze.
    - b. Internal Parts: Corrosion resistant.
    - c. Springs: Stainless steel.
  - 3. Check Valves:
    - a. Quantity: Two, operating independently.

C. Intermediate atmospheric vent.

## 2.10 WATER METERS

- A. Water meter and remote read system (if required) shall conform to the City of Sedalia requirements and specifications.

## 2.11 METER SETTING EQUIPMENT

- A. Pit, frame and cover, copper setter (or meter yoke) shall conform to the City of Sedalia requirements and specifications.

## 2.12 MATERIALS

- A. Bedding and Cover:
  - 1. Bedding: Fill Type A3 as specified in Section 310516 - Aggregates for Earthwork.
  - 2. Cover: Fill Type A3 as specified in Section 310516 - Aggregates for Earthwork.
  - 3. Soil Backfill from above Pipe to Finish Grade:
    - a. Soil Type S2 as specified in Section 310513 - Soils for Earthwork.
    - b. Subsoil with no rocks greater than 2 inches in diameter, frozen earth, or foreign matter.]

## 2.13 FINISHES

- A. Steel: Hot-dip galvanized after fabrication, according to ASTM A123/A123M.
- B. Protective Coating: Coal-tar epoxy or Bituminous paint.

## 2.14 ACCESSORIES

- A. Air-Release Valves:

1. As located on Drawings.
- B. Pipe Markers: As required by the City of Sedalia or as shown in the drawings.
- C. Vaults: As specified in Section 330563 - Concrete Vaults and Chambers.
- D. Steel Rods, Bolt, Lugs, and Brackets:
  1. Comply with ASTM A36 or A307.
  2. Grade A carbon steel.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify that existing utility water main size, location, and invert are as indicated on Drawings.

#### 3.2 PREPARATION

- A. Pipe Cutting:
  1. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
  2. Use only equipment specifically designed for pipe cutting; use of chisels or hand saws is not permitted.
  3. Grind edges smooth with beveled end for push-on connections.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

#### 3.3 INSTALLATION

- A. Bedding:
  1. Excavation:
    - a. As specified in Section 312316 – Excavation and 312316.13 - Trenching.
    - b. Hand trim for accurate placement of pipe to elevations as indicated on Drawings.
  2. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
  3. Install utilities on pile support systems where indicated on Drawings.
  4. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6-inches of compacted depth, and compact to 95 percent of maximum density.
- B. Piping:
  1. Comply with AWWA C600 and C605.

2. Handle and assemble pipe according to manufacturer instructions.
  3. Steel Rods, Bolts, Lugs, and Brackets: Coat buried steel before backfilling.
  4. Maintain 10 feet of horizontal separation between water main and sewer piping.
  5. Ductile-Iron Piping and Fittings: Comply with AWWA C600.
  6. Grooved and Shouldered Pipe Joints: Comply with AWWA C606.
  7. Field Welding Materials: Comply with AWWA C206.
  8. Flanged Joints: Do not use in underground installations except within structures.
  9. Route pipe in straight line, and re-lay pipe that is out of alignment or grade.
  10. Bearing:
    - a. Maintain bearing along entire length of pipe.  
Excavate bell holes to permit proper joint installation.
    - b. Do not lay pipe in wet or frozen trench.
  11. Prevent foreign material from entering pipe during placement.
  12. Allow for expansion and contraction without stressing pipe or joints.
  13. Close pipe openings with watertight plugs during Work stoppages.
  14. Install access fittings to permit disinfection of water system performed under Section 330110.58 - Disinfection of Water Utility Piping Systems.
  15. Cover:
    - a. Establish elevations of buried piping with not less than 3 feet of cover.
    - b. Measure depth of cover from final surface grade to top of pipe barrel.
  16. Pipe Markers: As required by the Owner.
- C. Valves and Hydrants: As specified in Section 331419 - Valves and Hydrants for Water Utility Service.
- D. Tapping Sleeves and Valves: As indicated on Drawings and according to manufacturer instructions.
- E. Thrust Restraints: As required and indicated in the Plans.
- F. Service Connections: As shown in the Plans.
- G. Corporation Stop Assemblies:
1. Make connection for each different kind of water main, using suitable materials, equipment, and methods as approved by Architect/Engineer.
  2. Provide service clamps for mains constructed of materials other than cast iron or ductile iron.
  3. Location:
    - a. Screw corporation stops directly into tapped and threaded iron main at 10- and 2-o'clock positions along main's circumference.
    - b. Locate and stagger corporation stops at least 12 inches apart longitudinally.
  4. Plastic Pipe Mains:

- a. Provide full support for service clamp for full circumference of pipe, with minimum 2-inch width of bearing area.
  - b. Exercise care against crushing or causing other damage to mains at time of tapping or installation of service clamp or corporation stop.
- 5. Use seals or other devices such that no leaks are present in mains at points of tapping.
  - 6. Do not backfill and cover service connections until installation has been approved by Architect/Engineer.

H. Curb Stop Assemblies:

- 1. Set curb stops as shown on the plans.
- 2. Boxes:
  - a. Center and plumb curb boxes over curb stops.
  - b. Set box cover flush with finished grade.

I. Water Meters: Install meters according to AWWA M6, with isolating valves on inlet and outlet as indicated on Drawings.

J. Backflow Preventers:

- 1. Install backflow preventers where indicated on Drawings and according to manufacturer instructions.
- 2. Testing and Installation Requirements: Comply with local water company requirements and plumbing codes.

K. Backfilling:

- 1. Backfilling: Backfill around sides and to top of pipe as specified in Section 312316 – Excavation, 312316.13 – Trenching, and 312323 - Fill.

L. Disinfection of Potable Water Piping Systems: As specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.

M. Installation Standards: Install Work according to City of Sedalia standards.

### 3.4 FIELD QUALITY CONTROL

A. Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.

B. Testing:

- 1. Pressure test piping system according to AWWA C600 and following:
  - a. Test Pressure: Not less than 150 psig (1 380 kPa) or 50 psi (345 kPa) in excess of maximum static pressure, whichever is greater.
  - b. Conduct hydrostatic test for a minimum of two hours.
  - c. Slowly fill section to be tested with water; expel air from piping at high points.
  - d. Install corporation cocks at high points.
  - e. Close air vents and corporation cocks after air is expelled.

- f. Raise pressure to specified test pressure.
- g. Observe joints, fittings, and valves under test.
- h. Remove and renew cracked pipes, joints, fittings, and valves showing visible leakage, and retest.
- i. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
- j. Maintain pressure within plus or minus 5 psi (34.4 kPa) of test pressure.
- k. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
- l. Compute maximum allowable leakage using following formula:
  - 1)  $L = SD \times \sqrt{P}/C$ .
  - 2) L = testing allowance, gph (L/h).
  - 3) S = length of pipe tested, feet (m).
  - 4) D = nominal diameter of pipe, inches (mm).
  - 5) P = average test pressure during hydrostatic test, psig (kPa).
  - 6) C = 148,000 (794 797).
- m. If pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.
- n. Leakage:
  - 1) If test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.
  - 2) Correct visible leaks regardless of quantity of leakage.

END OF SECTION 331413

## SECTION 331419 - VALVES AND HYDRANTS FOR WATER UTILITY SERVICE

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Valves.
2. Valve boxes.
3. Fire hydrants.

##### B. Related Requirements:

1. Section 033000 - Cast-in-Place Concrete: Concrete for thrust restraints.
2. Section 310516 - Aggregates for Earthwork: Fire hydrant drainage gravel.
3. Section 330110.58 - Disinfection of Water Utility Piping Systems: Requirements for flushing and disinfecting.
4. Section 331413 - Water Utility Distribution Piping: Pressure testing of valves and hydrants.

#### 1.2 REFERENCE STANDARDS

##### A. American Water Works Association:

1. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
2. AWWA C502 - Dry-Barrel Fire Hydrants.
3. AWWA C503 - Wet-Barrel Fire Hydrants.
4. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
5. AWWA C550 - Protective Interior Coatings for Valves and Hydrants.

##### B. National Fire Protection Association:

1. NFPA 291 - Recommended Practice for Fire Flow Testing and Marking of Hydrants.

##### C. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

#### 1.3 COORDINATION

##### A. Section 013000 - Administrative Requirements: Requirements for coordination.

##### B. Coordinate Work of this Section with installation of water mains.

#### 1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer information regarding component materials, fittings, assembly and parts diagram, and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- E. Source Quality-Control Submittals: Indicate results of shop or factory tests and inspections.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statements:
  - 1. Submit qualifications for manufacturer and installer.
  - 2. Submit manufacturer's approval of installer.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of valves and hydrants.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Execution and Closeout Requirements: Requirements for maintenance materials.
- B. Tools: Furnish one tee wrench of required length to Owner.

#### 1.7 QUALITY ASSURANCE

- A. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.
- B. Cast manufacturer's name, pressure rating, and year of fabrication into valve body.
- C. Perform Work according to ASTM and AWWA standards.

#### 1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with a minimum of three years' documented experience.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Delivery:
  - 1. Seal valve and hydrant ends to prevent entry of foreign matter.
  - 2. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
  - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
  - 2. Provide additional protection according to manufacturer instructions.

## PART 2 - PRODUCTS

### 2.1 VALVES

- A. Performance and Design Criteria:
  - 1. Pressure Rating:
    - a. 12-inch Diameter and Smaller: 250 psig.
    - b. 14-inch Diameter and Larger: 250 psig.
  - 2. End Connections: Flanged or Mechanical joint.
  - 3. Furnish valves of diameters 16 inches and larger with bypass valves and gear operators.
  - 4. Coatings:
    - a. Comply with AWWA C550.
    - b. Application: Interior and exterior.
- B. Resilient-Wedge Gate Valves:
  - 1. Manufacturers:
    - a. Mueller, Clow, or American Flow Control.
  - 2. Description:
    - a. Comply with AWWA C509.
    - b. Body: Ductile iron.
    - c. Seats: Resilient.
    - d. Stem:

- 1) Type: Non-rising.
- 2) Material: Bronze.

e. Operation:

- 1) Square operating nut.
- 2) Opening Direction: Counterclockwise.

## 2.2 FIRE HYDRANTS

### A. Manufacturers:

1. Mueller, Clow, or American Flow Control.

### B. Dry-Barrel, Breakaway Type:

1. Comply with AWWA C502.
2. Body: Cast iron.
3. Valve: Compression type.
4. Burial Depth: As indicated on Drawings.
5. Inlet Connection Size: 6 inches.
6. Valve Opening: 5-1/4 inches in diameter.
7. End Connections: Mechanical joint.
8. Bolts and Nuts: Stainless steel].
9. Interior Coating: Comply with AWWA C550.
10. Opening Direction: Counterclockwise.

### C. Hose Connections:

1. One pumper, two hose nozzles.
2. Obtain thread type and size from local fire department.
3. Attach nozzle caps by separate chains.

### D. Finishes:

1. Primer and two coats of enamel paint.
2. Color: Comply with requirements of City of Sedalia.

## 2.3 VALVE BOXES

### A. Description:

1. 12-inch Diameter Valves and Smaller:
  - a. Material: Cast iron.
  - b. Type: Two piece; screw.
2. Valves Larger than 12-inch Diameter:
  - a. Material: Cast iron.

- b. Type: Three piece; screw.
- c. Base: Round.

3. Lid Inscription: WATER.

## 2.4 ACCESSORIES

- A. Thrust Restraints: As required.
- B. Valve Box Aligner: High-strength plastic device designed to automatically center valve box base and to prevent it from shifting off center during backfilling.
- C. Fire Hydrant Drainage Gravel: As specified in Section 310516 - Aggregates for Earthwork.

## 2.5 SOURCE QUALITY CONTROL

- A. Provide shop inspection and testing of completed assembly.
- B. Certificate of Compliance:
  - 1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
  - 2. Specified shop tests are not required for Work performed by approved manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Execution and Closeout Requirements: Requirements for installation examination.
- B. Determine exact location and size of valves from Drawings.
- C. Identify required lines, levels, contours, and datum locations.
- D. Verify that elevations of existing facilities prior to excavation and installation of valves and hydrants are as indicated on Drawings.

### 3.2 PREPARATION

- A. Execution and Closeout Requirements: Requirements for installation preparation.
- B. Locate, identify, and protect from damage utilities to remain.
- C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.

1. Notify Architect/Engineer and Owner not less than 2 days in advance of proposed utility interruption.
2. Do not proceed without written permission from Architect/Engineer.

### 3.3 INSTALLATION

- A. Perform trench excavation, backfilling, and compaction.
- B. Install valves and hydrants in conjunction with pipe laying.
- C. Provide buried valves with valve boxes installed flush with finished grade.
- D. Provide support blocking and drainage gravel while installing fire hydrants; do not block drain hole.
- E. Orientation:
  1. Set valves and hydrants plumb.
  2. Set fire hydrants with pumper nozzle facing roadway.
  3. Set fire hydrants with centerline of pumper nozzle 18 inches above finished grade and with safety flange not more than 6 inches nor less than 2 inches above grade.
- F. After main-line pressure testing, flush fire hydrants and check for proper drainage.
- G. Disinfection of Water Piping System: Flush and disinfect valves and hydrants with water mains as specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.

### 3.4 FIELD QUALITY CONTROL

- A. Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Testing: Pressure test valves and hydrants with water mains as specified in Section 331413 - Water Utility Distribution Piping.

END OF SECTION 331419

## SECTION 333111 - SANITARY SEWERAGE GRAVITY PIPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Sanitary sewerage piping.
2. Connection to existing manholes.
3. Wye branches and tees.
4. Sanitary laterals.
5. Pile support systems.
6. Bedding and cover materials.

##### B. Related Requirements:

1. Section 310513 - Soils for Earthwork: Soils for backfill in trenches.
2. Section 310516 - Aggregates for Earthwork: Aggregate for backfill in trenches.
3. Section 312316 - Excavation: Product and execution requirements for excavation and backfill required by this Section.
4. Section 312316.13 - Trenching: Execution requirements for trenching required by this Section.
5. Section 312323 - Fill: Requirements for backfilling as required by this Section.
6. Section 330505.36 - Vacuum Testing of manholes.
7. Section 330505.41 - Air Testing of gravity sewer piping
8. Section 330505.43 - Mandrel Testing: Deflection testing of plastic sewerage piping.
9. Section 330561 - Concrete Manholes: Manholes for sanitary sewerage piping.

#### 1.2 DEFINITIONS

- A. ABS: Acrylonitrile butadiene styrene.
- B. Bedding: Fill placed under, beside, and directly over pipe, prior to subsequent backfill operations.
- C. EPDM: Ethylene-propylene-diene terpolymer.

#### 1.3 REFERENCE STANDARDS

##### A. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

##### B. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C150 - Thickness Design of Ductile-Iron Pipe.
6. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
7. AWWA C153 - Ductile-Iron Compact Fittings.

C. ASTM International:

1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
2. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
4. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
5. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
6. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
7. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
8. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
9. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
10. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
11. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
12. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
13. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
14. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
15. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
16. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
17. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
18. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

#### 1.4 COORDINATION

- A. Coordinate Work of this Section with connection to municipal sewer utility service.

#### 1.5 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer's information indicating proposed materials, accessories, details, and construction information.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Test and Evaluation Reports: Submit reports indicating field tests made and results obtained.
- E. Manufacturer Instructions:
  - 1. Indicate special procedures required to install specified products.
- F. Source Quality-Control Submittals: Indicate results of shop or factory tests and inspections.
- G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- H. Qualifications Statement:
  - 1. Submit qualifications for manufacturer and installer.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record invert elevations and actual locations of pipe runs, connections, manholes, and cleanouts.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

#### 1.7 QUALITY ASSURANCE

- A. Perform Work according to ASTM, AWWA, and AASHTO standards.

#### 1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Storage:
  - 1. Store materials according to manufacturer instructions.
  - 2. Store valves in shipping containers with labeling in place.
- D. Protection:
  - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
  - 2. Block individual and stockpiled pipe lengths to prevent moving.
  - 3. Provide additional protection according to manufacturer instructions.

## 1.10 EXISTING CONDITIONS

- A. Field Measurements:
  - 1. Verify field measurements prior to fabrication.
  - 2. Indicate field measurements on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 SANITARY SEWERAGE PIPING

- A. Ductile-Iron Pipe:
  - 1. Comply with AWWA C150 or AWWA C151.
  - 2. Minimum Special Thickness Class: 52.
  - 3. End Connections: Bell and spigot.
  - 4. Outside Coating:
    - a. Type: Asphaltic.
    - b. Minimum Uniform Thickness: 1 mil.
    - c. Comply with AWWA C151.
  - 5. Lining:
    - a. Cement mortar lined.
    - b. Comply with AWWA C104.

B. Plastic Pipe:

1. Comply with ASTM D2241.
2. Pressure Class: SDR-21 for 200-psig (1 380-kPa) rating.
3. Fittings: Comply with AWWA C900, C905, and C111.
4. Joints:
  - a. Comply with ASTM D3139 and F477.
  - b. Seals: PVC flexible elastomeric.
  - c. Solvent-cement couplings are not permitted.

C. Plastic Pipe:

1. Material: PVC.
2. Comply with ASTM D3034, SDR-26 and SDR-35.
3. End Connections: Bell-and-spigot style, with rubber-ring-sealed gasket joint.
4. Fittings: PVC.
5. Joints:
  - a. Elastomeric gaskets.
  - b. Comply with ASTM F477.

D. Plastic Pipe:

1. Material: PVC, Schedule 40 and 80.
2. Comply with ASTM D1785.
3. End Connections: Bell-and-spigot style, with solvent-sealed ends.
4. Fittings:
  - a. Material: PVC.
  - b. Comply with ASTM D2466.
5. Joints:
  - a. Solvent welded with solvent cement complying with ASTM D2564.
  - b. Comply with ASTM D2855.

2.2 MANHOLES

- A. As specified in Section 330561 - Concrete Manholes.

2.3 COUPLINGS

A. Description:

1. Material: PVC or metal solid sleeve coupling. Resilient, chemical-resistant, elastomeric PVC, with stainless steel sheer ring.
2. Attachment: Two Series-300 stainless-steel clamps, screws, and housings.

## 2.4 FLEXIBLE PIPE BOOTS FOR MANHOLE PIPE ENTRANCES

### A. Description:

1. Material: EPDM.
2. Comply with ASTM C923.
3. Attachment: Series-300 stainless-steel clamp and hardware.

## 2.5 CONCRETE ENCASUREMENT AND CRADLES

### A. Concrete:

1. As specified in Section 033000 - Cast-in-Place Concrete.
2. Strength: 4,000 psi at 28 days.
3. Air entrained if concrete exposed to weather conditions.
4. Finish: Rough troweled.

### B. Concrete Reinforcement: As specified in Section 032000 - Concrete Reinforcing.

## 2.6 MATERIALS

### A. Bedding and Cover:

1. Bedding: Fill Type A3, as specified in Section 310516 - Aggregates for Earthwork.
2. Cover: Fill Type A3 as specified in Section 310516 - Aggregates for Earthwork.
3. Soil Backfill from Above Pipe to Finish Grade:
  - a. Soil Type S1 or S2, as specified in Section 310513 - Soils for Earthwork.
  - b. Subsoil with no rocks more than 2 inches in diameter, frozen earth, or foreign matter.

## 2.7 FINISHES

### A. Galvanizing:

1. Hot-dip galvanize after fabrication.
2. Comply with ASTM A123/A123M.

## 2.8 ACCESSORIES

### A. Pile Support Brackets: Galvanized structural steel, thoroughly coated with bituminous paint.

## 2.9 SOURCE QUALITY CONTROL

- A. Quality Requirements: Requirements for testing, inspection, and analysis.
- B. Provide shop inspection and testing of pipe.

C. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that trench cut and excavation base is ready to receive Work of this Section.
- C. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Execution and Closeout Requirements: Requirements for installation preparation.
- B. Correct over-excavation with A3 aggregate.
- C. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.
- D. Protect and support existing sewer lines, utilities, and appurtenances.
- E. Utilities:
  1. Maintain profiles of utilities.
  2. Coordinate with Engineer and other utilities to eliminate interference.
  3. Notify Architect/Engineer if crossing conflicts occur.

3.3 INSTALLATION

- A. Bedding:
  1. Excavate pipe trench as specified in Section 312316.13 - Trenching.
  2. Excavate to lines and grades as indicated on Drawings, or as required to accommodate installation of encasement.
  3. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
  4. Provide sheeting and shoring as specified in Section 312316.13 - Trenching.
  5. Placement:

- a. Place bedding material at trench bottom.
  - b. Level materials in continuous layer not exceeding 6-inch compacted depth.
  - c. Compact to 95 percent of maximum density.
- B. Piping:
1. Install pipe, fittings, and accessories according to ASTM D2321 and seal joints watertight.
  2. Lay pipe to slope gradients as indicated on Drawings.
  3. Begin at downstream end of system and progress upstream.
  4. Bedding: Install at sides and over top of pipe, to minimum compacted thickness of 8 inches.
- C. Manholes: As specified in Section 330561 - Concrete Manholes.
- D. Connections to Existing Manholes:
1. Drilling:
    - a. Core drill existing manhole to clean opening.
    - b. Use of pneumatic hammers, chipping guns, and sledge hammers are not permitted.
  2. Install watertight neoprene gasket and seal with nonshrink concrete grout.
  3. Encasement:
    - a. Concrete encase new sewer pipe minimum of 24 inches to nearest pipe joint.
    - b. Use epoxy binder between new and existing concrete.
  4. Prevent construction debris from entering existing sewer line when making connection.
- E. Wye Branches and Tees:
1. Concurrent with pipe-laying operations, install wye branches and pipe tees at locations indicated on Drawings.
  2. Use standard fittings of same material and joint type as sewer main.
  3. Maintain minimum 5 foot separation distance between wye connection and manhole.
  4. Use saddle wye or tee with stainless-steel clamps for taps into existing piping.
  5. Mount saddles with solvent cement or gasket and secure with metal bands.
  6. Lay out holes with template, and cut holes with mechanical cutter.
- F. Sanitary Laterals:
1. Construct laterals from wye branch to terminal point.
  2. Where depth of main pipeline warrants, construct riser-type laterals from wye branch.
  3. Minimum Depth of Cover over Piping: 3 feet.
  4. Minimum Separation Distance between Laterals: 2 feet.
  5. Install watertight plug, braced to withstand pipeline test pressure thrust, at termination of lateral.
  6. Marker Stake:

- a. Install temporary marker stake extending from end of lateral to 36 inches above finished grade.
- b. Paint top 12 inches of stake with fluorescent orange paint.

G. Backfilling:

1. As specified in Section 312323 - Fill.
2. Backfill around sides and to top of pipe with cover fill in minimum lifts of 8 inches.
3. Tamp fill in place, and compact to 95 percent of maximum density.
4. Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.
5. Maintain optimum moisture content of bedding material as required to attain specified compaction density.

### 3.4 TOLERANCES

- A. Quality Requirements: Requirements for tolerances.
- B. Maximum Variation from Indicated Slope: 1/8 inch in 10 feet.

### 3.5 FIELD QUALITY CONTROL

- A. Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Testing:
  1. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.
  2. Pipe Testing:
    - a. Pressure Testing: As specified in Section 330505.41 - Air Testing.
    - b. Deflection Testing: As specified in Section 330505.43 - Mandrel Testing.
  3. Compaction Testing:
    - a. Comply with AASHTO T 180, ASTM D698, ASTM D1557, or ASTM D6938.
    - b. Testing Frequency: As determined by the Engineer.

### 3.6 PROTECTION

- A. Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
- C. Cap open ends of piping during periods of Work stoppage.

END OF SECTION 333111