

# PROJECT MANUAL

*Water & Wastewater Improvements*

*Graham Cave State Park*

*Danville, Missouri*

Designed By: Crockett Engineering  
1000 W. Nifong, Bldg. 1  
Columbia, MO 65203

Date Issued: September 9, 2024

Project No.: X2321-01

STATE *of* MISSOURI

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OFFICE *of* ADMINISTRATION  
Facilities Management, Design & Construction

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**SECTION 000107 - PROFESSIONAL SEALS AND CERTIFICATIONS**

**PROJECT NUMBER:** (X2321-01 "Water & Wastewater Improvements – Multiple Assets – Graham Cave State Park")

**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:**



8-9-24

*Jesse Ray Stephens*

**TABLE OF CONTENTS**

<b>SECTION</b>	<b>TITLE</b>	<b>NUMBER OF PAGES</b>
<b>DIVISION 00 – PROCUREMENT AND CONTRACTING INFORMATION</b>		
<b>000000 INTRODUCTORY INFORMATION</b>		
000101	Project Manual Cover	1
000107	Professional Seals and Certifications	1
000110	Table of Contents	2
000115	List of Drawings	2
<b>001116</b>	<b>INVITATION FOR BID (IFB) plus Missouri Buys instructions and special notice</b>	<b>2</b>
<b>002113</b>	<b>INSTRUCTIONS TO BIDDERS (Includes MBE/WBE/SDVE Information)</b>	<b>8</b>
003144	MBE/WBE/SDVE Directory	1
<b>**The following documents may be found on MissouriBUYS at <a href="https://missouribuys.mo.gov/">https://missouribuys.mo.gov/</a>**</b>		
<b>004000 PROCUREMENT FORMS &amp; SUPPLEMENTS</b>		
004113	Bid Form	*
004336	Proposed Subcontractors Form	*
004337	MBE/WBE/SDVE Compliance Evaluation Form	*
004338	MBE/WBE/SDVE Eligibility Determination Form for Joint Ventures	*
004339	MBE/WBE/SDVE Good Faith Effort (GFE) Determination Forms	*
004340	SDVE Business Form	*
004541	Affidavit of Work Authorization	*
004545	Anti-Discrimination Against Israel Act Certification Form	*
<b>005000 CONTRACTING FORMS AND SUPPLEMENTS</b>		
005213	Construction Contract	3
005414	Affidavit for Affirmative Action	1
<b>006000 PROJECT FORMS</b>		
006113	Performance and Payment Bond	2
006325	Product Substitution Request	2
006519.16	Final Receipt of Payment and Release Form	1
006519.18	MBE/WBE/SDVE Progress Report	2
006519.21	Affidavit of Compliance with Prevailing Wage Law	1
<b>007000 CONDITIONS OF THE CONTRACT</b>		
007213	General Conditions	20
007300	Supplementary Conditions	1
007333	Supplementary General Conditions for Federally Funded/Assisted Construction Projects	21
007334	Terms and Conditions for Contractor Receipt if Federal ARPA SFRF Funds	9
007346	Wage Rate	4
<b>DIVISION 01 GENERAL REQUIREMENTS</b>		
011000	Summary of Work	3
012100	Allowances	3
012600	Contract Modification Procedures	2
013100	Coordination	4
013115	Project Management Communication	4
013200	Schedule – Bar Chart	4
013300	Submittals	7
013513.31	Site Security and Health Requirements (DNR)	4
015000	Construction Facilities and Temporary Controls	8
017400	Cleaning	3
017900	Demonstration and Training	6
<b>DIVISION 3 - CONCRETE</b>		
033000	Cast In Place Concrete	6
<b>DIVISION 5 - METALS</b>		
055000	Metal Fabrications	11
SECTION 000110 – TABLE OF CONTENTS		
9/9/20		

<b>DIVISION 6 – WOODS &amp; PLASTICS</b>		
061000	Rough Carpentry	6
<b>DIVISION 7 – THERMAL &amp; MOISTURE PROTECTION</b>		
073113	Asphalt Shingles	7
074646	Fiber Cement Siding	3
<b>DIVISION 8 – DOORS &amp; WINDOWS</b>		
081119	Stainless Steel Door Frames	5
081743	Fiberglass Doors	6
<b>DIVISION 9 – FINISHES</b>		
099113	Exterior Painting	6
099123	Interior Painting	7
<b>DIVISION 22 – PLUMBING</b>		
220519	Meters & Gauges for Plumbing Piping	4
220523	Valves for Plumbing Piping	5
220529	Hangers and Supports for Piping Systems	4
221116	Domestic Water Piping	10
221218	Pumping Equipment	3
221313	Facility Sanitary Sewers	6
221353	Septic Tanks and Piping	6
<b>DIVISION 23 – HVAC</b>		
230501	General Mechanical Requirements for HVAC	8
<b>DIVISION 26 – ELECTRICAL</b>		
260519	Low Voltage Electrical Power Conductors	9
260526	Grounding and Bonding for Electrical Systems	4
260529	Hangers and Supports For Electrical Systems	4
260533.13	Conduit for Electrical Systems	7
260533.16	Boxes for Electrical Systems	4
260543	Underground Raceways for Electrical Equipment	9
260533	Identification for Electrical Equipment	6
260583	Wiring Connections	4
260923	Lighting Control Devices	3
262100	Low-Voltage Electrical Service Entrance	2
262300	Low Voltage Switchgear	4
262813	Fuses	3
262816.16	Enclosed Switches	3
265100	Lighting	6
<b>DIVISION 31 – EARTHWORK</b>		
311000	Site Clearing	4
312000	Earth Moving	10
312500	Erosion Control	10
<b>DIVISION 32 – EXTERIOR IMPROVEMENTS</b>		
321216	Asphalt Paving	6
321313	Concrete Paving	10
321373	Concrete Pavement Joint Sealants	5
329200	Turf and Grasses	6
<b>APPENDIX</b>		
Appendix A	Land Disturbance Permit	31

## SECTION 000115 – LIST OF DRAWINGS

### 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 - PRODUCTS (NOT APPLICABLE)

### 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	Sheet G-001	09/09/2024	C-SIT-G001
2.	Site Location & Control Plan	Sheet G-002	09/09/2024	C-SIT-G002
3.	Sewer Demolition Plan – Campground	Sheet D-101	09/09/2024	C-SIT-D101
4.	Well House Demolition Plan – Campground	Sheet D-102	09/09/2024	C-SIT-D102
5.	Sewer Demolition Plan – Park Office	Sheet D-103	09/09/2024	C-SIT-D103
6.	Well House Demolition Plan – Park Office	Sheet D-104	09/09/2024	C-SIT-D104
7.	Pavilion/Playground Demolition Plan	Sheet D-105	09/09/2024	C-SIT-D105
8.	Sewer Grading Plan – Campground	Sheet C-101	09/09/2024	C-SIT-C101
9.	Sewer Grading Plan – Park Office	Sheet C-102	09/09/2024	C-SIT-C102
10.	Sewer Drip Irrigation Plan – Campground	Sheet C-201	09/09/2024	C-SIT-C201
11.	Well House Site Plan – Campground	Sheet C-202	09/09/2024	C-SIT-C202
12.	Sewer Drip Irrigation Plan – Park Office	Sheet C-203	09/09/2024	C-SIT-C203

13.	Well House Site Plan – Park Office	Sheet C-204	09/09/2024	C-SIT-C204
14.	Parvillion/Playground Water Plan	Sheet C-205	09/09/2024	C-SIT-C205
15.	Drip Irrigation Details	Sheet C-301	09/09/2024	C-SIT-C301
16.	Site Construction Details	Sheet C-302	09/09/2024	C-SIT-C302
17.	Well House Building Code Criteria	Sheet S-101	09/09/2024	C-SIT-S101
18.	Well House Building Plan and Elevations	Sheet S-102	09/09/2024	C-SIT-S102
19.	Well House Structural Details	Sheet S-103	09/09/2024	C-SIT-S103
20.	Well House Equipment Plan	Sheet E-101	09/09/2024	C-SIT-E101
21.	Well House Electrical Plan	Sheet E-102	09/09/2024	C-SIT-E102

**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. Water & Wastewater Improvements  
Graham Cave State Park  
Danville, Missouri  
**Project No.: X2321-01**

### 3.0 BIDS WILL BE RECEIVED:

- A. Until: 1:30 PM, October 15, 2024
- B. **Only electronic bids on MissouriBUYS shall be accepted: <https://missouribuys.mo.gov>. Bidder must be registered to bid.**

### 4.0 DESCRIPTION:

- A. Scope: The project consists of removing and replacing two lagoon systems with new drip irrigation wastewater treatment, replacement of two well houses and equipment, and installation of new water lines at various locations within the park..
- B. MBE/WBE/SDVE Goals: MBE 0%, WBE 0%, 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.**
- C. **\*\*NOTE:** Bidders are provided new Good Faith Effort (GFE) forms on MissouriBUYS.

### 5.0 PRE-BID MEETING:

- A. Place/Time: 10 AM, October 3, 2024, at Graham Cave State Park at 217 State Highway TT, Danville, MO 63361.
- 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: Crockett Engineering, Jesse Stephens, 573-447-0292, email: [jstephens@crockettengineering.com](mailto:jstephens@crockettengineering.com)
- B. Project Manager: Eric Hibdon, 573-508-3666, email: [Eric.Hibdon@oa.mo.gov](mailto:Eric.Hibdon@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.
- C. This is a federally funded/assisted construction project that requires compliance by the awarded Bidder with applicable federal laws and regulations. The Bidder should review Section 007333, Supplementary General Conditions for Federally Funded/Assisted Construction Projects and Section 007334, Terms and Conditions for Contractor Receipt of Federal ARPA SFRF Funds, which are made part of this Invitation to Bid and will be made part of the resulting contract by reference.

## Very Important MissouriBUYS Instructions to Help Submit a Bid Correctly

- A. The bidder shall submit his or her bid and all supporting documentation on MissouriBUYS eProcurement System. No hard copy bids shall be accepted. Go to <https://missouribuy.mo.gov> and register. The bidder must register and complete a profile fully with all required documents submitted prior to submitting a bid.
- B. Once registered, log in.
1. Under "Solicitation" select "View Current Solicitations."
  2. Under "Filter by Agency" select "OA-FMDC-Contracts Chapter 8", then click "Filter Solicitation" button.
  3. Select "Active Solicitations" tab.
  4. To see the Solicitation Summary, click on the Project Number and the summary will open. Click each heading to open detailed information.
- C. Here are simplified instructions for uploading the bid to MissouriBUYS:
1. Find the solicitation by completing Steps 1 through 4 above.
  2. Select the three dots under "Actions." Select "Add New Response."
  3. When the Quote box opens, give the response a title and select "OK."
  4. The detailed solicitation will open. Select "Check All" for the Original Solicitation Documents, open each document, and select "Accept." If this step is not completed, a bid cannot be uploaded. Scroll to the bottom of the page and select "Add Attachments." If you do not see this command, not all documents have been opened and accepted.
  5. The Supplier Attachments box will open. Select "Add Attachment" again.
  6. The Upload Documents box will open. Read the instructions for uploading. Disregard the "Confidential" check box.
  7. Browse and attach up to 5 files at a time. Scroll to bottom of box and select "Upload." The Supplier Attachments box will open. Repeat Steps 5 through 7 if more than 5 files are to be uploaded.
  8. When the Supplier Attachments box opens again and uploading is complete, select "Done." A message should appear that the upload is successful. If it does not, go to the Bidder Response tab and select "Submit."
  9. The detailed solicitation will open. At the bottom select "Close."
- D. Any time a bidder wants to modify the bid, he or she will have to submit a new one. FMDC will open the last response the bidder submits. The bidder may revise and submit the bid up to the close of the solicitation (bid date and time). Be sure to allow for uploading time so that the bid is successfully uploaded prior to the 1:30 PM deadline; we can only accept the bid if it is uploaded before the deadline.
- E. If you want to verify that you are uploading documents correctly, please contact Paul Girouard: 573-751-4797, [paul.girouard@oa.mo.gov](mailto:paul.girouard@oa.mo.gov) ; April Howser: 573-751-0053, [April.Howser@oa.mo.gov](mailto:April.Howser@oa.mo.gov) ; or Mandy Roberson: 573-522-0074, [Mandy.Roberson@oa.mo.gov](mailto:Mandy.Roberson@oa.mo.gov).
- F. If you are experiencing login issues, please contact Web Procure Support (Proactis) at 866-889-8533 anytime from 7:00 AM to 7:00 PM Central Time, Monday through Friday. If you try using a userid or password several times that is incorrect, the system will lock you out. Web Procure Support is the only option to unlock you! If you forget your userid or password, Web Procure Support will provide a temporary userid or password. Also, if it has been a while since your last successful login and you receive an "inactive" message, contact Web Procure (Proactis). If you are having a registration issue, you may contact Cathy Holliday at 573-751-3491 or by email: [cathy.holliday@oa.mo.gov](mailto:cathy.holliday@oa.mo.gov).



## **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 any one (1) party may be limited in accordance with available supply.
- B. For the convenience of contractors, sub-contractors and suppliers, copies of construction documents are on file at the office of the Director, Division of Facilities Management, Design and Construction and on the Division's web site - <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 also 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 contractor to fulfill in every detail all of the requirements of the contract, nor accepted as a basis for any claims for extra compensation.
- B. Under no circumstances will contractors give their plans and specifications to another contractor. Any bid received from a contractor whose name does not appear on the list of plan holders may be subject to rejection.

### **4.0 - INTERPRETATIONS**

- A. No bidder shall be entitled to rely on oral interpretations as to the meaning of the plans and specifications or the acceptability of alternate products, materials, form or type of construction. Every request for interpretation shall be made in writing and submitted with all supporting documents not less than five (5) working days before opening of bids. Every interpretation made to a bidder will be in the form of an addendum and will be sent as promptly as is practicable to all persons to whom plans and specifications have been issued. All such addenda shall become part of the contract documents.
- B. Approval for an "acceptable substitution" issued in the form of an addendum as per Paragraph 4A above, and as per Article 3.1 of the General Conditions; ACCEPTABLE SUBSTITUTIONS shall constitute approval for use in the project of the product.
- C. An "acceptable substitution" requested after the award of bid shall be approved if proven to the satisfaction of the Owner and the Designer as per Article 3.1, 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.
- D. A request for "Acceptable Substitutions" shall be made on the Section 006325 Substitution Request Form. The request shall be sent directly to the project Designer. A copy of said request should also be mailed to the Owner, Division of Facilities Management, Design and Construction, Post Office Box 809, Jefferson City, Missouri 65102.

## **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 or their bid will be rejected for being non-responsive.

Depending on the specific project requirements, **the following is a GENERIC list** of all possible bid forms that may be due with bid submittals and times when they may be due. Please check for specific project requirements on the proposal form (Section 004113). ***Not all of the following bid forms may be required to be submitted.***

### **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

- B. All bids shall be submitted without additional terms and conditions, modification or reservation on the bid forms with each space properly filled. Bids not on these forms will be rejected.
- C. 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 on the bid form, Section 004113. Failure of the contractor to submit 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 closing, or if on notification of award refuses or is unable to execute tendered contract, provide an acceptable performance and payment bond, provide evidence of required insurance coverage and/or provide required copies of affirmative action plans within ten (10) working days after such tender.
- D. The 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. Bid bonds will only be returned upon request.

## **6.0 - SIGNING OF BIDS**

- A. A bid from an individual shall be signed as noted on the Bid Form.
- B. 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.
- C. A bid from a limited liability company (LLC) shall be signed by a manager or a managing member of the LLC.
- D. A bid from a corporation shall have the correct corporate name thereon and the signature of an authorized officer of the corporation manually written. Title of office held by the person signing for the corporation shall appear, along with typed name of said individual. Corporate license number shall be provided and, if a corporation organized in a state other than Missouri, a Certificate of Authority to do business in the State of Missouri shall be attached. In addition, for corporate proposals, the President or Vice-President 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.

- E. 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.
- F. The Bidder should include its corporate license number on the Bid Form and, if the corporation is organized in a state other than Missouri, a Certificate of Authority to do business in the State of Missouri shall be attached to the bid form.

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

- A. It is the bidder's sole responsibility to assure receipt by Owner of bid submittals by the date and time specified in the Invitation for Bid. Bids received after the date and time specified shall not be considered by the Owner.
- B. Bids must be submitted through the MissouriBUYS statewide eProcurement system (<https://www.missouribuys.mo.gov/>) in accordance with the instructions for that system. The Owner shall only accept bids submitted through MissouriBUYS. Bids received by the Owner through any other means, including hard copies, shall not be considered and will be discarded by the Owner unopened.
- C. To respond to an Invitation for Bid, the Bidder must first register with MissouriBUYS by going through the MissouriBUYS Home Page (<https://www.missouribuys.mo.gov/>), clicking the "Register" button at the top of the page, and completing the Vendor Registration. Once registered, the Bidder accesses its account by clicking the "Login" button at the top of the MissouriBUYS Home Page. Enter your USERID and PASSWORD, which the Bidder will select. Under Solicitations, select "View Current Solicitations." A new screen will open. Under "Filter by Agency" select "OA-FMDC-Contracts Chapter 8." Under "Filter by Opp. No." type in the State Project Number. Select "Submit." Above the dark blue bar, select "Other Active Opportunities." To see the Solicitation Summary, single click the Opp. No. (Project Number) and the summary will open. Single quick click each blue bar to open detailed information. The Bidder must read and accept the Original Solicitation Documents and complete all identified requirements. The Bidder should download and save all of the Original Solicitation Documents on its computer so that the Bidder can prepare its response to these documents. The Bidder should upload its completed response to the downloaded documents as an attachment to the electronic solicitation response.
- D. Step-by-step instructions for how a registered vendor responds to a solicitation electronically are provided in Section 001116 – Invitation For Bid.
- E. The Bidder shall submit its bid on the forms provided by the Owner on MissouriBUYS with each space fully and properly completed, including all amounts required for alternate bids, unit prices, cost accounting data, etc. The Owner may reject bids that are not on the Owner's forms or that do not contain all requested information.
- F. No Contractor shall stipulate in his bid any conditions not contained in the specifications or standard bid form contained in the contract documents. To do so may subject the Contractor's bid to rejection.
- G. The completed forms shall be without interlineations, alterations or erasures.

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

- A. Bidder may withdraw his bid at any time prior to 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. The Bidder shall modify his or her original bid by submitting a revised bid on MissouriBUYS.

#### **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 by way of limitation, contracts for the furnishing and installation of furniture, equipment, machines, appliances and other apparatus.

- C. The Owner shall award a contract to the lowest, responsive, 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 bid shall be considered binding upon the Owner until the written contract has been properly executed, a satisfactory bond has been furnished, evidence of required insurance coverage, submittal of executed Section 004541, Affidavit of Work Authorization form, documentation evidencing enrollment and participation in a federal work authorization program has been received and an affirmative action plan submitted. Failure to execute and return the contract and associated documents within the prescribed period of time 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.
- F. If the successful bidder is doing business in the State of Missouri under a fictitious name, he 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.
- G. Any successful bidder which is a corporation organized in a state other than Missouri shall furnish to the Owner, attached to the Bid Form, a properly certified copy of its current Certificate of Authority to do business in the State of Missouri, such certificate to remain on file with the Owner. No contract will be awarded by the Owner unless such certificate is furnished by the bidder.
- H. Any successful bidder which is a corporation organized in the State of Missouri shall furnish at its own cost to the Owner, if requested, a Certificate of Good Standing issued by the Secretary of State, such certificate to remain on file with the Owner.
- I. 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.
- J. 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. Section-004541, Affidavit of Work Authorization is located on the MissouriBUYS solicitation for this project. 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.uscis.gov/e-verify/>. The contractor shall be responsible for ensuring that all subcontractors and suppliers associated with this contract enroll in E-Verify.

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

- A. The successful bidder shall furnish a performance/payment bond as set forth in General Conditions Article 6.1 on a condition 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, 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. Failure to list the Bidder’s firm, or a subcontractor for each category of work identified on the Bid Form or the listing of more than one subcontractor for any category without designating the portion of work to be performed by each shall be cause for rejection of the bid. 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, 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 person'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. Pursuant to section 34.600, RSMo, 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 as defined in section 34.600, RSMo, 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 requested to complete and submit the applicable portion of Section 004545 - Anti-Discrimination Against Israel Act Certification with their 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. If the exhibit is not submitted, the Owner shall rescind its Intent to Award and move to the next lowest, responsive, responsible bidder.

## **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 non-responsive, and its bid shall be rejected.
2. The Bidder should submit with its bid all of 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 appropriate 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 Bidder that is a SDVE doing business as Missouri firm, corporation, or individual, or that maintains a Missouri office or place of business, shall receive a three-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 becomes 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. The form is available on the MissouriBUYS solicitation for this project.

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.) In order 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 actually 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 Administration, Division of Purchasing and Material Management or by the Department of Veterans Affairs.
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 Division of Purchasing and Materials Management's online SDVE directory (<https://oao.mo.gov/sdve-certification-program/>) or the Department of Veterans Affairs' directory (<https://veterans.certify.sba.gov/#search>).
3. Additional information, clarifications, etc., regarding the listings in the directories may be obtained by calling the Division at (573)751-3339 and asking to speak to 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 GFE forms are located on the MissouriBUYS solicitation for this project. 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 determined 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;
3. If no bidder has obtained any participation in a particular category (MBE/WBE/SDVE) or made a good faith effort to do so, the Director may waive that goal rather than rebid.

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 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 non-responsive 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 this 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.
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  
DIVISION OF FACILITIES MANAGEMENT,  
DESIGN AND CONSTRUCTION  
*MBE/WBE/SDVE DIRECTORIES***

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The MBE/WBE Directory for goods and services is maintained by the Office of Equal Opportunity (OEO) and is located at the following web address:

<https://apps1.mo.gov/MWBCertifiedFirms/>

The SERVICE DISABLED VETERAN ENTERPRISE (SDVE) Directories may be accessed at the following web addresses:

<https://oeo.mo.gov/sdve-certification-program/>

<https://veterans.certify.sba.gov/#search>



# 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:**                    **Water & Wastewater Improvements  
Graham Cave State Park  
Danville, Missouri**

**Project Number:**            **X2321-01**

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 performance time is **200 working days** from the transmittal date of this agreement. The contract completion date is **MONTH, DAY, YEAR**. 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: \$

**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:** The requirements of the Davis-Bacon Act are not applicable to this project funded, which is funded solely by Coronavirus State and Local Fiscal Recover Funds (SLFRF) under the American Rescue Plan Act (ARPA).

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

The Contractor has been granted a waiver of the 0% MBE and 0% 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)
- ix. Affidavit for Affirmative Action (Section 005414)
- 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)
- 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.

Further, if the Contractor provides any “personal information” as defined in §105.1500, RSMo concerning an entity exempt from federal income tax under Section 501(c) of the Internal Revenue Code of 1986, as amended, the Contractor understands and agrees that it is voluntarily choosing to enter into a state contract and providing such information for that purpose. The state will treat such personal information in accord with §105.1500, RSMo.

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*



STATE OF MISSOURI  
 OFFICE OF ADMINISTRATION  
 DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION  
**AFFIDAVIT FOR AFFIRMATIVE ACTION**

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

NAME
------

First being duly sworn on oath states: that

he/she is the  sole proprietor  partner  officer or  manager or managing member of

NAME
------

a  sole proprietorship  partnership  
 limited liability company (LLC)

or  corporation, and as such, said proprietor, partner, or officer is duly authorized to make this

affidavit on behalf of said sole proprietorship, partnership, or corporation; that under the contract known as

PROJECT TITLE
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Less than 50 persons in the aggregate will be employed and therefore, the applicable Affirmative Action requirements as set forth in Article 1.4 of the General Conditions of the State of Missouri have been met.

PRINT NAME & SIGNATURE
------------------------

DATE
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**NOTARY INFORMATION**

NOTARY PUBLIC EMBOSSER SEAL
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STATE OF
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COUNTY (OR CITY OF ST. LOUIS)
-------------------------------

USE RUBBER STAMP IN CLEAR AREA BELOW
--------------------------------------

SUBSCRIBED AND SWORN BEFORE ME, THIS
--------------------------------------

DAY OF
NOTARY PUBLIC SIGNATURE

YEAR
MY COMMISSION EXPIRES

NOTARY PUBLIC NAME (TYPED OR PRINTED)
---------------------------------------

**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
LOCATION	DATE INSTALLED

**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:

---

Substitution is accepted.

Substitution is accepted with the following comments:

---

Substitution is not accepted.

ARCHITECT/ENGINEER

DATE



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

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
-----------

TITLE
-------

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	\$	\$	

## **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

ARTICLE:

**1. General Provisions**

- 1.1. Definitions
- 1.2. Drawings and Specifications
- 1.3. Compliance with Laws, Permits, Regulations and Inspections
- 1.4. Nondiscrimination in Employment
- 1.5. Anti-Kickback
- 1.6. Patents and Royalties
- 1.7. Preference for American and Missouri Products and Services
- 1.8. Communications
- 1.9. Separate Contracts and Cooperation
- 1.10. Assignment of Contract
- 1.11. Indemnification
- 1.12. Disputes and Disagreements

**2. Owner/Designer Responsibilities**

**3. Contractor Responsibilities**

- 3.1. Acceptable Substitutions
- 3.2. Submittals
- 3.3. As-Built Drawings
- 3.4. Guaranty and Warranties
- 3.5. Operation and Maintenance Manuals
- 3.6. Other Contractor Responsibilities
- 3.7. Subcontracts

**4. Changes in the Work**

- 4.1. Changes in the Work
- 4.2. Changes in Completion Time

**5. Construction and Completion**

- 5.1. Construction Commencement
- 5.2. Project Construction
- 5.3. Project Completion
- 5.4. Payments

**6. Bond and Insurance**

- 6.1. Bond
- 6.2. Insurance

**7. Termination or Suspension of Contract**

- 7.1. For Site Conditions
- 7.2. For Cause
- 7.3. For Convenience

## 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, tool, 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, and 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 take affirmative action to insure 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.

B. The Contractor and his subcontractors shall develop, implement, maintain and submit in writing to the Owner an affirmative action program if at least fifty (50) persons in the aggregate are employed under this contract. If less than fifty (50) persons in the aggregate are to be employed under this contract, the Contractor shall submit, in lieu of the written affirmative action program, a properly executed Affidavit for Affirmative Action

in the form included in the contract specifications. For the purpose of this section, an "affirmative action program" means positive action to influence all employment practices (including, but not limited to, recruiting, hiring, promoting and training) in providing equal employment opportunity regardless of race, color, sex, national origin, religion, age (where the person affected is between age 40 and 70), disabled and Vietnam-era veteran status, and disability. Such "affirmative action program" shall include:

1. A written policy statement committing the total organization to affirmative action and assigning management responsibilities and procedures for evaluation and dissemination;
2. The identification of a person designated to handle affirmative action;
3. The establishment of non-discriminatory selection standards, objective measures to analyze recruitment, an upward mobility system, a wage and salary structure, and standards applicable to lay-off, recall, discharge, demotion and discipline;
4. The exclusion of discrimination from all collective bargaining agreements; and
5. Performance of an internal audit of the reporting system to monitor execution and to provide for future planning.

In the enforcement of this non-discrimination clause, the Owner may use any reasonable procedures available, including, but not limited to: requests, reports, site visits and inspection of relevant documents of contractors and subcontractors.

C. 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 place 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 insure 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 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.
    - 4. Written Affirmative Action Plans as required in Article 1.4.
- 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: Jesse Stephens  
Crockett Engineering  
1000 W. Nifong, Bldg. 1  
Columbia, MO 65203  
Phone: 573-447-0292  
Email: [jstephens@crockettengineering.com](mailto:jstephens@crockettengineering.com)

Construction Representative: Ken Sheputis  
Division of Facilities Management, Design and Construction  
805 Clinic Road  
Hannibal, Missouri 63401  
Telephone: 417-573-7161  
Email: [Kenneth.Sheputis@oa.mo.gov](mailto:Kenneth.Sheputis@oa.mo.gov)

Project Manager: Eric Hibdon  
Division of Facilities Management, Design and Construction  
301 West High Street, Room 730  
Jefferson City, Missouri 65101  
Telephone: 573-508-3666  
Email: [Eric.Hibdon@oa.mo.gov](mailto:Eric.Hibdon@oa.mo.gov)

Contract Specialist: Mandy Roberson  
Division of Facilities Management, Design and Construction  
301 West High Street, Room 730  
Jefferson City, Missouri 65101  
Telephone: 573-522-0074  
Email: [Mandy.Roberson@oa.mo.gov](mailto:Mandy.Roberson@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 3 complete sets of drawings and specifications at no charge.
- B. The Owner will furnish the Contractor with approximately 3 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.

**SUPPLEMENTARY GENERAL CONDITIONS**  
**FOR FEDERALLY FUNDED/ASSISTED CONSTRUCTION PROJECTS**

**(American Rescue Plan Act (ARPA) Projects)**

**1.0 Notice of Federal Funding**

This project is being performed in whole or in part using federal funds. Therefore, all work or services performed by the Contractor and its subcontractors shall be subject to the terms and conditions set forth below in addition to all terms and conditions in the Construction Contract, General Conditions, and other contract documents. The concepts, rules, and guidelines set forth in 2 C.F.R. 200 describing allowable costs and administrative requirements apply.

**2.0 Definitions**

As used herein, “Federal Government” means the government of the United States of America. “Federal Agency” means an agency, entity, department or division of the Federal Government that is providing funding for this project. All other terms shall have the meanings established in the Construction Contract, General Conditions, and/or Project Manual, unless such definitions conflict with a definition provided in an applicable statute or regulation.

**3.0 Conflicting Terms or Conditions**

To the extent that any terms or conditions set forth herein conflict with the Construction Contract or its General Conditions, the more stringent of the two terms and conditions shall govern.

**4.0 No Obligation by Federal Government**

The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the non-Federal entity, Contractor, or any other party pertaining to any matter resulting from the contract.

**5.0 Compliance with Federal Laws, Regulations and Executive Orders**

The Contractor and its subcontractors and suppliers are required to comply with all applicable Federal laws, regulations, and executive orders, regardless of whether set forth herein. The Contractor shall assist and enable the State of Missouri in complying with any requirements imposed by the Federal Agency as a condition of funding.

**6.0 Compliance with Civil Rights Provisions**

The Contractor shall comply with all Federal statutes, executive orders, and regulations relating to nondiscrimination. These include, but are not limited to the following:

Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin;

Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex;

Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps;

The Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age;

Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing;

Title VII of the Civil Rights Act of 1964 (42 U.S.C. part 2000(e), which prohibits discrimination against employees on the basis of religion;

Any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and

The requirements of any other nondiscrimination statute(s) that may apply to the application.

## **7.0 Equal Employment Opportunity (41 C.F.R. 60-1.4(b)).**

During the performance of this contract, the Contractor agrees as follows:

- (1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

- (2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
- (3) The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicants or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.
- (4) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

- (5) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (6) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- (8) The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

*Provided*, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided*, That if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and sub contractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and sub contractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any

further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

**8.0 Notice of Requirement for Affirmative Action To Ensure Equal Employment Opportunity**  
(Executive Order 11246, 41 C.F.R. 60-4.2)

(1) The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.

(2) The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Time-tables	Goals for minority participation for each trade	Goals for female participation in each trade
107	11.4	6.9

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The Contractor's compliance with the Executive Order and the regulations in 41 C.F.R. pt. 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 C.F.R. 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 C.F.R. pt. 60-4. Compliance with the goals will be measured against the total work hours performed.

(3) The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

(4) As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is (insert description of the geographical areas where the contract is to be performed giving the state, county and city, if any).

**9.0 Standard Federal Equal Employment Opportunity Construction Contract Specifications**  
(Executive Order 11246 - 41 C.F.R. 60-4.3)

(1) As used in these specifications:

a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

d. "Minority" includes:

(i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

(2) Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

(3) If the Contractor is participating (pursuant to 41 C.F.R. 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

(4) The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the FEDERAL REGISTER in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement

contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

(5) Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

(6) In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

(7) The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.



f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other contractors and subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 C.F.R. pt. 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

(8) Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

(9) A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

(10) The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.

(11) The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

(12) The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

(13) The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 C.F.R. 60-4.8.

(14) The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily

understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

(15) Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

#### **10.0 Prohibition of Segregated Facilities**

- (1) The Contractor agrees that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this clause is a violation of the Equal Employment Opportunity clause in this contract.
- (2) “Segregated facilities,” as used in this clause, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national origin because of written or oral policies or employee custom. The term does not include separate or single-user rest rooms or necessary dressing or sleeping areas provided to assure privacy between the sexes.
- (3) The Contractor shall include this clause in every subcontract and purchase order that is subject to the Equal Employment Opportunity clause of this contract.

#### **11.0 Davis-Bacon Act (40 U.S.C. §§ 3141-3144, and §§ 3146-3148, and 29 C.F.R. pt. 5)**

*\*The requirements of the Davis-Bacon Act and this section are not applicable to this project, which is funded solely by Coronavirus State and Local Fiscal Recover Funds (SLFRF) under the American Rescue Plan Act (ARPA).*

- (1) Minimum wages.
  - (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 C.F.R. pt. 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis–Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill,

except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis–Bacon poster (WH–1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- (ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
  - (2) The classification is utilized in the area by the construction industry; and
  - (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.
- (C) In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.
- (D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- (iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has

found, upon the written request of the Contractor, that the applicable standards of the Davis–Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The (write in name of Federal Agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime Contractor, or any other federally-assisted contract subject to Davis–Bacon prevailing wage requirements, which is held by the same prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the (Agency) may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis–Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 C.F.R. 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis–Bacon Act, the Contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 C.F.R. 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime Contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered

worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime Contractor to require a subcontractor to provide addresses and social security numbers to the prime Contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a “Statement of Compliance,” signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 C.F.R. pt. 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 C.F.R. pt. 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 C.F.R. pt. 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the “Statement of Compliance” required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the (write the name of the agency) or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal Agency may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 C.F.R. 5.12.

(4) Apprentices and trainees—

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary

employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (ii) Trainees. Except as provided in 29 C.F.R. 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 C.F.R. pt. 30.

- (5) Compliance with Copeland Act requirements. The Contractor shall comply with the requirements of 29 C.F.R. pt. 3, which are incorporated by reference in this contract.
- (6) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 C.F.R. 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal Agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 C.F.R. 5.5.
- (7) Contract termination: debarment. A breach of the contract clauses in 29 C.F.R. 5.5 may be grounds for termination of the contract, and for debarment as a Contractor and a subcontractor as provided in 29 C.F.R. 5.12.
- (8) Compliance with Davis–Bacon and Related Act requirements. All rulings and interpretations of the Davis–Bacon and Related Acts contained in 29 C.F.R. pts. 1, 3, and 5 are herein incorporated by reference in this contract.
- (9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 C.F.R. pt.s 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.
- (10) Certification of eligibility.
  - (i) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis–Bacon Act or 29 C.F.R. 5.12(a)(1).
  - (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis–Bacon Act or 29 C.F.R. 5.12(a)(1).
  - (iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. § 1001.

### **12.0 Copeland “Anti-Kickback” Act**

- (1) The Contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract. The Contractor and subcontractors are prohibited from inducing, by any means, any person employed on the project to give up any part of the compensation to which the employee is entitled.
- (2) The Contractor or subcontractor shall insert in any subcontracts the clause above, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.
- (3) A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a Contractor and subcontractor as provided in 29 C.F.R. 5.12.

### **13.0 Contract Work Hours and Safety Standards Act (40 U.S.C. 3701 to 3708, 29 C.F.R. 5.5)**



- (1) Overtime requirements. No Contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1) of this section the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of \$27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.
- (3) Withholding for unpaid wages and liquidated damages. The Owner shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same prime Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.
- (4) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

#### **14.0 Suspension and Debarment (Executive Orders 12549 and 12689, 2 C.F.R. pt. 180)**

- (1) A contract award (see 2 C.F.R. 180.220) must not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 C.F.R. 180 that implement Executive Orders 12549 (3 C.F.R. pt. 1986 Comp., p. 189) and 12689 (3 C.F.R. pt. 1989 Comp., p. 235), “Debarment and Suspension.” SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.
- (2) The contractor is required to verify that none of the contractor’s principals (defined at 2 C.F.R. 180.995) or its affiliates (defined at 2 C.F.R. 180.905) are excluded (defined at 2 C.F.R. 180.940) or disqualified (defined at 2 C.F.R. 180.935).
- (3) The contractor must comply with 2 C.F.R. pt. 180, subpart C and the regulations of the granting Federal Agency regarding suspension and debarment, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

- (4) This certification is a material representation of fact relied upon by the Owner. If it is later determined that the Contractor did not comply with 2 C.F.R. pt. 180, subpart C in addition to remedies available to the Owner, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.
- (5) By submitting a bid, the bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

#### **15.0 Byrd Anti-Lobbying Amendment (31 U.S.C. § 1352)**

- (1) Contractors that apply or bid for an award exceeding \$100,000 agree to file the required certification (set forth below), in compliance with 31 U.S.C. § 1352 (as amended).
- (2) Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352.
- (3) Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

#### **CERTIFICATION REGARDING LOBBYING**

The Bidder or Offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form–LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required

certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

#### **16.0 Procurement of Recovered Materials**

The Contractor shall comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (42 U.S.C. § 6962). The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

Information about this requirement, along with the list of EPA designated items, is available at EPA's Comprehensive Procurement Guidelines web site, <https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program>.

#### **17.0 Fair Labor Standards Act**

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 C.F.R. pt. 201, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part-time workers. The Contractor has full responsibility to monitor compliance to the referenced statute or regulation. The Contractor must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division.

#### **18.0 Access to Records and Reports**

The Contractor must maintain an acceptable cost accounting system. The Contractor agrees to provide the Owner, the Federal Agency and the Comptroller General of the United States or any of their duly authorized representatives access to any books, documents, papers and records of the Contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.

#### **19.0 Occupational Health and Safety Act**

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 C.F.R. pt. 1910 with the same force and effect as if given in full text. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The employer retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (29 C.F.R. pt. 1910). The employer must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

#### **20.0 Rights to Inventions**

Contracts or agreements that include the performance of experimental, developmental, or research work must provide for the rights of the Federal Government and the Owner in any resulting invention as established by 37 C.F.R. pt. 401, Rights to Inventions Made by Non-profit Organizations and Small

Business Firms under Government Grants, Contracts, and Cooperative Agreements. This contract incorporates by reference the patent and inventions rights as specified within 37 C.F.R. 401.14. Contractor must include this requirement in all sub-tier contracts involving experimental, developmental, or research work.

### **21.0 Energy Conservation**

The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. § 6201 et seq.).

### **22.0 Clean Air Act and Federal Water Pollution Control Act**

- (1) If the amount of the Contract exceeds \$150,000, the Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq. and the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 1251 et seq.
- (2) The Contractor agrees to report each violation to the Owner, and understands and agrees that the Owner will, in turn, report each violation as required to assure notification to the Federal Agency and the appropriate Environmental Protection Agency Regional Office.
- (3) The Contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance.

### **23.0 Contractor Employee Whistleblower Rights and Requirement to Inform Employees of Whistleblower Rights**

- (1) This contract and employees working on this contract will be subject to the whistleblower rights and remedies in the pilot program on contractor employee whistleblower protections established at 41 U.S.C. § 4712 by section 828 of the National Defense Authorization Act for Fiscal Year 2013 (Pub. L. 112-239) and FAR 3.908.
- (2) The Contractor shall inform its employees in writing, in the predominant language of the workforce, of employee whistleblower rights and protections under 41 U.S.C. § 4712, as described in section 3.908 of the Federal Acquisition Regulation.
- (3) The Contractor shall insert the substance of this clause, including this paragraph (c), in all subcontracts over the simplified acquisition threshold.

### **24.0 Veteran's Preference**

In the employment of labor (excluding executive, administrative, and supervisory positions), the Contractor and all sub-tier contractors must give preference to covered veterans as defined within Title 49 United States Code Section 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 U.S.C. § 632) owned and controlled by disabled veterans. This preference only applies when there are covered veterans readily available and qualified to perform the work to which the employment relates.

### **25.0 Drug Free Workplace Act**

The Contractor shall provide a drug free workplace in accordance with the Drug Free Workplace Act of 1988, 41 U.S.C. Chapter 81, and all applicable regulations. The Contractor shall report any conviction of the Contractor's personnel under a criminal drug statute for violations occurring on the Contractor's premises or off the Contractor's premises while conducting official business. A report of a conviction shall be made to the state agency within five (5) working days after the conviction.

## **26.0 Access Requirements for Persons with Disabilities**

Contractor shall comply with 49 U.S.C. § 5301(d), stating Federal policy that the elderly and persons with disabilities have the same rights as other persons to use mass transportation services and facilities and that special efforts shall be made in planning and designing those services and facilities to implement that policy. Contractor shall also comply with all applicable requirements of Sec. 504 of the Rehabilitation Act (1973), as amended, 29 U.S.C. § 794, which prohibits discrimination on the basis of handicaps, and the Americans with Disabilities Act of 1990 (ADA), as amended, 42 U.S.C. § 12101 et seq., which requires that accessible facilities and services be made available to persons with disabilities, including any subsequent amendments thereto.

## **27.0 Seismic Safety**

The Contractor agrees to ensure that all work performed under this contract, including work performed by subcontractors, conforms to a building code standard that provides a level of seismic safety substantially equivalent to standards established by the National Earthquake Hazards Reduction Guidelines for Contract Provisions for Obligated Sponsors and Airport Improvement Program Projects Issued on June 19, 2018 Page 61 Program (NEHRP). Local building codes that model their code after the current version of the International Building Code (IBC) meet the NEHRP equivalency level for seismic safety.

## **28.0 Required Use of American Iron, Steel, Manufactured Products, and Construction Materials – Build America, Buy America (Pub. L. No. 117-58, §§ 70901-52)**

*\*The requirements of the Build America, Buy America Act and this section are not applicable to projects funded solely by Coronavirus State and Local Fiscal Recover Funds (SLFRF) under the American Rescue Plan Act (ARPA). The Contractor will be subject to the requirements of the Build America, Buy America Act only if SLFRF funds are used in conjunction with funds from another federal program that requires enforcement of the Build America, Buy America Act. Information about federal funding sources is provided in the Invitation for Bid.*

The Owner is the recipient of an award of Federal financial assistance from a program for infrastructure for this project. Pursuant to the Build America, Buy America Act of the Infrastructure Investment and Jobs Act ("IIJA"), Pub. L. No. 117-58, none of the funds provided under the Federal award may be used unless the requirements of the domestic content procurement preference outlined below are met. Therefore, the Contractor shall ensure the following:

- (1) all iron and steel used in the project are produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
- (2) all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another

standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation; and

(3) all construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States.

The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project, but are not an integral part of the structure or permanently affixed to the infrastructure project.

### *Waivers*

When necessary, recipients of Federal financial assistance may apply for, and the awarding agency may grant, a waiver from the domestic content procurement preference.

When the Federal agency has made a determination that one of the following exceptions applies, the awarding official may waive the application of the domestic content procurement preference in any case in which the agency determines that:

(1) applying the domestic content procurement preference would be inconsistent with the public interest;

(2) the types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality; or

(3) the inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent. A request to waive the application of the domestic content procurement preference must be in writing. The agency will provide instructions on the format, contents, and supporting materials required for any waiver request. Waiver requests are subject to public comment periods of no less than 15 days and must be reviewed by the Made in America Office.

There may be instances where an award qualifies, in whole or in part, for an existing waiver described on the awarding agency web site.

If the Contractor determines that an application for a waiver is necessary or an existing waiver is applicable to this project, the Contractor shall timely notify the Owner. The Owner will make a determination if a waiver is applicable or if a waiver application is necessary. The Contractor shall not submit any waiver application or information directly to the Federal agency without prior approval by the Owner.

### *Definitions*

“Construction materials” includes an article, material, or supply—other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives—that is or consists primarily of: • non-ferrous metals; • plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); • glass (including optic glass); • lumber; or • drywall.

“Domestic content procurement preference” means all iron and steel used in the project are produced in the United States; the manufactured products used in the project are produced in the United States; or the construction materials used in the project are produced in the United States.

“Infrastructure” includes, at a minimum, the structures, facilities, and equipment for, in the United States, roads, highways, and bridges; public transportation; dams, ports, harbors, and other maritime facilities; intercity passenger and freight railroads; freight and intermodal facilities; airports; water systems, including drinking water and wastewater systems; electrical transmission facilities and systems; utilities; broadband infrastructure; and buildings and real property. Infrastructure includes facilities that generate, transport, and distribute energy.

“Project” means the construction, alteration, maintenance, or repair of infrastructure in the United States.

### **29.0 Prohibition on Certain Telecommunication and Video Surveillances Services or Equipment (Pub. L. 115-232, Section 889)**

Section 889(b) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, and 2 C.F.R. § 200.216 prohibit the head of a Federal executive agency and recipients or subrecipients of funds from such agencies from obligating or expending grant, cooperative agreement, loan, or loan guarantee funds on certain telecommunications products or from certain entities for national security reasons. Pursuant to such provisions, the Contractor understands and agrees that the Contractor and its subcontractors shall not obligate or expend loan or grant funds from the Federal Agency under this Contract to:

(1) Procure or obtain;

(2) Extend or renew a contract to procure or obtain; or

(3) Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in [Public Law 115–232](#), section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

(i) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

(ii) Telecommunications or video surveillance services provided by such entities or using such equipment.

(iii) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

**TERMS AND CONDITIONS FOR CONTRACTOR**  
**RECEIPT OF FEDERAL ARPA SFRF FUNDS**

**I. Use of Funds:** \_\_\_\_\_ (“Contractor”) understands and agrees that the State of Missouri has received funds for this project under section 602(c) of the Social Security Act (“Act”), as added by Section 9901 of the American Rescue Plan Act (“ARPA”), Pub. L. No. 117-2 (March 11, 2021), 135 Stat. 4, 223–26, and the funds disbursed under such grant may only be used in compliance with the ARPA and the U.S. Department of the Treasury (“Treasury”)’s regulations implementing that section and guidance, and in compliance with all other restrictions and specifications on use set forth in or applicable through this agreement.

**Period of Performance:** The period of performance for the award begins on the date hereof and ends no later than December 31, 2026. Contractor may use funds granted under this agreement to cover eligible costs incurred during the period of performance, but no later than December 31, 2024.

**Reporting:** Contractor agrees to comply with any reporting obligations established by Treasury or the State of Missouri (“State”), as it relates to this agreement.

**Maintenance of and Access to Records:** Contractor shall maintain records and financial documents sufficient to evidence compliance with section 602(c) of the Act and Treasury’s regulations implementing that section and guidance regarding the eligible uses of funds. Contractor shall also maintain records and financial documents: 1. sufficient for the State, with respect to Contractor’s participation in this grant agreement, to evidence compliance with section 602(c) of the Act and Treasury’s regulations implementing that section and guidance regarding the eligible uses of funds; and 2. necessary for the State, with respect to Contractor’s participation in this agreement, to comply with obligations under 2 C.F.R. Part 200 and any other applicable law. The Treasury Office of Inspector General, the Government Accountability Office, their authorized representatives, the State, or its authorized representatives, shall have the right of access to records and documents (electronic and otherwise) of Contractor in order to conduct audits or other investigations or reviews. Records shall be maintained by Contractor for a period of five (5) years after the end of the period of performance. Wherever practicable, records should be collected, transmitted, and stored in open and machine-readable formats. Contractor’s obligations under this section shall include, without limitation, maintenance of the following specified types of records and financial documents: contracts, invoices, receipts, payrolls, and financial statements.

**Pre-award Costs:** Pre-award costs, as defined at 2 C.F.R. § 200.458, may not be paid with funding from this agreement.

**Compliance with Applicable Law and Regulations:** Contractor agrees to comply with the requirements of section 602 of the Act, regulations adopted by Treasury pursuant to section 602(f) of the Act, guidance issued by Treasury regarding the foregoing, and all other restrictions and specifications set forth in or applicable through this agreement. Contractor also agrees to comply with all other applicable state and federal statutes, regulations, and executive orders, and



Contractor shall provide for such compliance by other parties in any agreements it enters into with other parties relating to this grant.

Federal regulations applicable to this agreement include, without limitation, the following:

i. If the amount of this agreement is expected to equal or exceed \$25,000, or if this agreement is for federally-required audit services, OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement), 2 C.F.R. Part 180, and Treasury's implementing regulation at 31 C.F.R. Part 19, including both the requirement to comply with that part's Subpart C as a condition of participation in this transaction, and the requirement to pass the requirement to comply with that subpart to each person with whom the participant enters into a covered transaction at the next lower tier;

ii. Recipient Integrity and Performance Matters, pursuant to which the award term set forth at 2 C.F.R. Part 200, Appendix XII, is hereby incorporated by reference;

iii. Uniform Relocation Assistance and Real Property Acquisitions Act of 1970 (42 U.S.C. §§ 4601–4655) and implementing regulations; and

iv. Generally applicable federal environmental laws and regulations.

Federal statutes and regulations prohibiting discrimination applicable to this agreement include, without limitation, the following:

i. Title VI of the Civil Rights Act of 1964 (42 U.S.C. §§ 2000d *et seq.*) and Treasury's implementing regulations at 31 C.F.R. Part 22, which prohibit discrimination on the basis of race, color, or national origin under programs or activities receiving federal financial assistance;

ii. the Fair Housing Act, Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§ 3601 *et seq.*) which prohibits discrimination in housing on the basis of race, color, religion, national origin, sex, familial status, or disability;

iii. Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794), which prohibits discrimination on the basis of disability under any program or activity receiving federal financial assistance;

iv. the Age Discrimination Act of 1975, as amended (42 U.S.C. §§ 6101 *et seq.*) and Treasury's implementing regulations at 31 C.F.R. Part 23, which prohibit discrimination on the basis of age in programs or activities receiving federal financial assistance; and

v. For local governments only, Title II of the Americans with Disabilities Act of 1990, as amended (42 U.S.C. §§ 12101 *et seq.*), which prohibits discrimination on the basis of disability under programs, activities, and services provided or made available by state and local governments or instrumentalities or agencies thereto.

Remedial Actions: The State reserves the right to impose additional conditions or requirements on Contractor's receipt of this funds under this agreement, as the State deems necessary or advisable, in order to facilitate compliance with any existing or additional conditions or requirements imposed upon the State by Treasury for the State's receipt of ARPA funds. The State also reserves the right to seek recoupment or repayment of funds under this agreement in whole or in part, in the event that Treasury seeks recoupment or repayment of payments made to the State, for reasons relating to Contractor's acts or omissions respecting this agreement. These reservations are expressed without limitation to any other rights the State may hold, either to impose additional conditions or requirements on Contractor's receipt of funds under this agreement or to recoup such funds in whole or in part, under this agreement or other applicable law.

Hatch Act: Contractor agrees to comply, as applicable, with requirements of the Hatch Act (5 U.S.C. §§ 1501–1508 and 7324–7328), which limit certain political activities of State or local government employees whose principal employment is in connection with an activity financed in whole or in part by this federal assistance.

False Statements: Contractor understands that making false statements or claims in connection with this award is a violation of federal law and may result in criminal, civil, or administrative sanctions, including fines, imprisonment, civil damages and penalties, debarment from participating in federal awards or contracts, and/or any other remedy available by law.

Publications: Any publications produced with funds from this agreement must display the following language: "This product [is being] [was] supported, in whole or in part, by federal award number [enter project FAIN] awarded to State of Missouri by the U.S. Department of the Treasury."

Debts Owed State and Federal Government: Any funds paid to Contractor (1) in excess of the amount to which Contractor is finally determined to be authorized to retain under the terms of this agreement; (2) that are determined by the Treasury Office of Inspector General to have been misused; or (3) that are determined by Treasury to be subject to a repayment obligation pursuant to sections 602(e) and 603(b)(2)(D) of the Act and have not been repaid by Contractor shall constitute a debt owed by the State to the federal government. In such instance, the funds constituting the State's debt to the federal government shall also constitute Contractor's debt to the State. Debts owed by Contractor to the State must be paid promptly by Contractor. A debt owed the State by Contractor under this agreement is delinquent if it has not been paid by the date specified in the State's initial demand for payment, unless other satisfactory arrangements have been made or if Contractor knowingly or improperly retains funds that are a debt as defined in this paragraph. The State will take any actions available to it to collect such a debt, including but not limited to actions available to it under the "Remedial Actions" paragraph found in this same section (I) above. The rights of the State as expressed in this paragraph are in addition to, and do not imply the exclusion of, any other rights the State may have under applicable law to collect a debt or seek damages from Contractor.

Disclaimer: In its award of federal financial assistance to the State, Treasury provides that the United States expressly disclaims any and all responsibility or liability to the State or third

persons for the actions of the State or third persons resulting in death, bodily injury, property damages, or any other losses resulting in any way from the performance of this award or any other losses resulting in any way from the performance of this award or any contract or subcontract under this award. Furthermore, in its award of federal financial assistance to the State, Treasury also states that the acceptance of this award by the State does not in any way establish an agency relationship between the United States and the State. This disclaimer applies with equal force to this agreement.

Increasing Seat Belt Use in the United States: Pursuant to Executive Order 13043, 62 FR 19217 (Apr. 18, 1997), Contractor is hereby encouraged to adopt and enforce on-the-job seat belt policies and programs for its employees when operating company-owned, rented or personally owned vehicles, and to encourage any subcontractors to do the same.

Reducing Text Messaging While Driving: Pursuant to federal Executive Order 13513, 74 FR 51225 (Oct. 6, 2009), the State hereby encourages Contractor to adopt and enforce policies that ban text messaging while driving, and to encourage any subcontractors to do the same.<sup>1</sup>

**II.** By entering into this agreement, Contractor ensures its current and future compliance with Title VI of the Civil Rights Act of 1964, as amended, which prohibits exclusion from participation, denial of the benefits of, or subjection to discrimination under programs and activities receiving federal funds, of any person in the United States on the ground of race, color, or national origin (42 U.S.C. § 2000d et seq.), as implemented by Treasury Title VI regulations at 31 C.F.R. Part 22 and other pertinent executive orders such as federal Executive Order 13166; directives; circulars; policies; memoranda and/or guidance documents.

Contractor acknowledges that federal Executive Order 13166, “Improving Access to Services for Persons with Limited English Proficiency,” seeks to improve access to federally assisted programs and activities for individuals who, because of national origin, have Limited English Proficiency (“LEP”). Contractor understands that denying a person access to its programs, services, and activities because of LEP is a form of national origin discrimination prohibited under Title VI of the Civil Rights Act of 1964 and Treasury’s implementing regulations. Accordingly, Contractor shall initiate reasonable steps, or comply with Treasury’s directives, to ensure that LEP persons have meaningful access to its programs, services, and activities. Contractor understands and agrees that meaningful access may entail providing language assistance services, including oral interpretation and written translation where necessary, to ensure effective communication in Contractor’s programs, services, and activities.

Contractor agrees to consider the need for language services for LEP persons during development of applicable budgets and when conducting programs, services, and activities. As a resource, Treasury has published its LEP guidance at 70 FR 6067. For more information on LEP, please visit <http://www.lep.gov>.

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<sup>1</sup> Section I is based on requirements set forth in Treasury’s Coronavirus State Fiscal Recovery Fund Award Terms and Conditions document, executed by the State on July 26, 2021.

Contractor acknowledges and agrees that compliance with this assurance constitutes a condition of continued receipt of federal financial assistance and is binding upon Contractor and Contractor's successors, transferees, and assignees for the period in which such assistance is provided.

*Contractor shall comply with Title VI of the Civil Rights Act of 1964, which prohibits recipients of federal financial assistance from excluding from a program or activity, denying benefits of, or otherwise discriminating against a person on the basis of race, color, or national origin (42 U.S.C. § 2000d et seq.), as implemented by the Department of the Treasury's Title VI regulations, 31 C.F.R. Part 22, which are herein incorporated by reference and made a part of this agreement. Title VI also includes protection to persons with "Limited English Proficiency" in any program or activity receiving federal financial assistance, 42 U.S.C. § 2000d et seq., as implemented by the Department of the Treasury's Title VI regulations 31 C.F.R. Part 22, and herein incorporated by reference and made a part of this agreement.*

Contractor shall cooperate in any enforcement or compliance review activities by Treasury or the State of the aforementioned obligations. Enforcement may include investigation, arbitration, mediation, litigation, and monitoring of any settlement agreements that may result from these actions. That is, Contractor shall comply with information requests, on-site compliance review, and reporting requirements.

Contractor shall maintain and provide to applicants, beneficiaries, their representatives, or any other party requesting the same, information on how to file a Title VI complaint of discrimination with the State of Missouri.

Contractor shall provide to the State documentation of an administrative agency's or court's findings of non-compliance of Title VI and efforts to address the non-compliance, including any voluntary compliance or other agreements between Contractor and the administrative agency that makes any such finding. If Contractor settles a case or matter alleging such discrimination, Contractor must provide to the State documentation of the settlement. If Contractor has not been the subject of any court or administrative agency finding of discrimination, Contractor shall so state.

The United States of America has the right to seek judicial enforcement of the terms of this assurances section and nothing in this section alters or limits the federal enforcement measures that the United States may take in order to address violations of this section or applicable federal law.

Under penalty of perjury, the undersigned certifies that he/she has read and understood this section's obligations as herein described, that any information submitted in conjunction with this assurance document is accurate and complete, and that Contractor is in compliance with the aforementioned nondiscrimination requirements.

By signing this certification, the undersigned represents his or her intention, and legal authorization, to do so on behalf of Contractor.<sup>2</sup>

\_\_\_\_\_  
Signature of Contractor's Authorized Representative

Date: \_\_\_\_\_

\_\_\_\_\_  
Printed Name of Contractor's Authorized Representative

Contractor's Unique Entity Identifier: \_\_\_\_\_  
(\*Name associated with the Unique Entity Identifier must match the Contractor's name on contract documents)

**III.** This agreement shall be conducted in accordance with the standards set forth at 2 C.F.R. §§ 200.317 through 200.327, as applicable. Pursuant to 2 C.F.R. § 200.327 and Appendix II to Part 200 of Title 2 of the C.F.R.:

i. Contracts for more than \$250,000 must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as appropriate.

ii. All contracts in excess of \$10,000 must address termination for cause and for convenience by the State, including the manner by which it will be effected and the basis for settlement.

iii. Except as otherwise provided under 41 C.F.R. Part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 C.F.R. Part 60-1.3 must include the equal opportunity clause provided under 41 C.F.R. 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p.339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 C.F.R. Part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

iv. When required by federal program legislation, all prime construction contracts in excess of \$2,000 awarded by non-federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 C.F.R. Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute,

<sup>2</sup> Section II is based on requirements set forth in Treasury's Assurance of Compliance with Civil Rights Requirements document, executed by the State on July 26, 2021.

contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract must be conditioned upon the acceptance of the wage determination. The non-federal entity must report all suspected or reported violations to the federal awarding agency. The contracts must also include a provision for compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 C.F.R. Part 3, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”). The Act provides that each contractor must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-federal entity must report all suspected or reported violations to the federal awarding agency.

v. Where applicable, all contracts awarded by the non-federal entity in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Contract Work Hours and Safety Standards Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.<sup>3</sup>

vi. If the State or Contractor wishes to enter into a contract or subcontract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under the State’s award of ARPA funds or this agreement, the State and/or Contractor must comply with the requirements of 37 C.F.R. Part 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” and any implementing regulations issued by the awarding agency.

vii. Contracts and subgrants of amounts in excess of \$150,000 must contain a provision that requires the non-federal award to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the

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<sup>3</sup> Additionally, “in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in [29 C.F.R.] § 5.1,” 29 C.F.R. § 5.5(c) requires that another clause be included “in any such contract,” *id.* For language appropriate to construction of this additional clause, see 29 C.F.R. § 5.5(c).

Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA). [

viii. A contract award (see 2 CFR 180.220) must not be made to parties listed on the governmentwide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 C.F.R. 180 that implement Executive Orders 12549 (3 C.F.R. Part 1986 Comp., p. 189) and 12689 (3 C.F.R. Part 1989 Comp., p. 235), “Debarment and Suspension.” SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549. This requirement applies when the amount of the agreement is expected to equal or exceed \$25,000, or if the agreement is for federally-required audit services. 2 C.F.R. § 180.220.]

ix. Contractors that apply or bid for an award exceeding \$100,000 must file the certification required by 31 U.S.C. § 1352, the Byrd Anti-Lobbying Amendment. Under that law, each tier certifies to the tier above that it will not and has not used federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any federal contract, grant or any other award covered by 31 U.S.C. § 1352. Each tier must also disclose any lobbying with non-federal funds that takes place in connection with obtaining any federal award. Such disclosures are forwarded from tier to tier up to the non-federal award.

x. A non-federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines. In the performance of this agreement, Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired: 1. competitively within a timeframe providing for compliance with this agreement’s performance schedule; 2. meeting this agreement’s performance requirements; or 3. at a reasonable price. Information about this requirement, along with the list of EPA-designated items, is available at EPA’s Comprehensive Procurement Guidelines webpage: <http://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program>. Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

xi. Pursuant to Pub. L. No. 115-232, H.R. 5515 (115<sup>th</sup> Congress, 2018), and 2 C.F.R. § 200.216, funds provided by this agreement shall not be obligated or expended to: 1. Procure or obtain; 2. Extend or renew a contract to procure or obtain; or 3. Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered

telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. For purposes of this prohibition, “covered telecommunications equipment or services” has the meaning as set forth at Sec. 889(f)(3) of Pub. L. No. 115-232. *See also* 2 C.F.R. § 200.216.

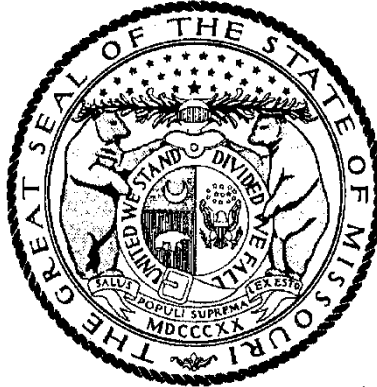
xii. Pursuant to 2 C.F.R. § 200.322, as appropriate and to the extent consistent with law, Contractor should, to the greatest extent practicable under this agreement, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). For purposes of this provision: 1. “produced in the United States” means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States. 2. “manufactured products” means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.



# Missouri

## Division of Labor Standards

### WAGE AND HOUR SECTION



MICHAEL L. PARSON, Governor

# Annual Wage Order No. 31

Section 070

## MONTGOMERY 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 \_\_\_\_\_

Todd Smith, Director  
Division of Labor Standards

Filed With Secretary of State: \_\_\_\_\_ **March 8, 2024**

Last Date Objections May Be Filed: **April 8, 2024**

Prepared by Missouri Department of Labor and Industrial Relations

Building Construction Rates for  
MONTGOMERY County

Section 070

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	\$27.16*
Boilermaker	\$27.16*
Bricklayer-Stone Mason	\$27.16*
Carpenter	\$27.16*
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	\$27.16*
Plasterer	
Communication Technician	\$27.16*
Electrician (Inside Wireman)	\$57.38
Electrician Outside Lineman	\$27.16*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	\$27.16*
Glazier	\$27.16*
Ironworker	\$27.16*
Laborer	\$27.16*
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	\$27.16*
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	\$69.84
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	\$27.16*
Plumber	\$73.14
Pipe Fitter	
Roofer	\$27.16*
Sheet Metal Worker	\$73.86
Sprinkler Fitter	\$27.16*
Truck Driver	\$27.16*
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  
MONTGOMERY County

Section 070

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	\$27.16*
Millwright	
Pile Driver	
Electrician (Outside Lineman)	\$27.16*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	\$52.56
General Laborer	
Skilled Laborer	
Operating Engineer	\$63.88
Group I	
Group II	
Group III	
Group IV	
Truck Driver	\$27.16*
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 **Removing and replacing two lagoon systems with new drip irrigation wastewater treatment, replacement of two well houses and equipment, and installation of new water lines at various locations within the park.**
  - 1. Project Location: **Graham Cave State Park, 217 Highway TT, Danville MO 63361**
  - 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 **9-9-2024** were prepared for the Project by **Crockett Engineering Consultants located at 1000 W. Nifong, Building 1, Columbia MO 65203**
- C. The Work consists of **water and sewer upgrades at five major locations within the park**
  - 1. The Work includes **the following:**
    - a. Removal and remediation of the lagoon adjacent to the park office. This lagoon will be removed and replaced with a new drip irrigation system. All conveyance piping to the lagoon will be removed and replaced. Portions of the new system must be installed and periodically pumped out to maintain sewer service for the park staff.
    - b. Removal and replacement of the existing well house and water pump equipment at the park office. A new well house will be constructed. Contractor will need to minimize downtime in switchover between old and new well houses. The existing well house must remain in place while the new one is being constructed.
    - c. Removal and remediation of the lagoon adjacent to the campground area. This lagoon will be removed and replaced with a new drip irrigation system. Portions of the conveyance piping will be removed and replaced.
    - d. Removal and replacement of the existing well house at the campground. The existing well house must be demolished before construction of the new well house. Conveyance piping to the shower house from the new well house will be constructed.
    - e. New waterlines will be installed from the park office well house down to the playground/pavilion area with various parking lot patching and rock chipping required.
- D. The Work will be constructed under a single prime contract.

#### 1.3 DESIGNER'S ESTIMATE OF CONSTRUCTION COST RANGE

- A. N/A

## **1.4 WORK SEQUENCE**

- A. The Work will be conducted in **One** phase.

## **1.5 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 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. Water will be shut down in the campground area between November 1<sup>st</sup> and April 1<sup>st</sup>. Contractor shall restore function water to the campground on or before April 1<sup>st</sup>.
  - 3. 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.
- C. Use of the Existing Building: Maintain the existing building in a weathertight condition throughout the construction period. Repair damage cause by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period..

## **1.6 OCCUPANCY REQUIREMENTS**

- A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate owner usage. Perform the Work so as not to interfere with the Owner's operations.
- B. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.
  - 1. The Designer will prepare a Certificate of Partial Occupancy for each specific portion of the Work to be occupied prior to substantial completion.
  - 2. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy, the Owner will operate and maintain mechanical and electrical systems serving occupied portions for the building.

3. Upon occupancy, the Owner will assume responsibility for maintenance and custodial service for occupied portions for the building.

## **1.7 MISCELLANEOUS PROVISIONS**

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

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

**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. Lump-sum allowances.
  - 2. 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**

- A. At the earliest practical date after award of the Contract, Designer of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Designer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Designer from the designated supplier.

#### **1.5 SUBMITTALS**

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

#### **1.6 COORDINATION**

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

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

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

#### **3.2 PREPARATION**

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

### **3.3 SCHEDULE OF ALLOWANCES**

- A. Weather Allowance: Included within the completion period for this Project 30 “bad weather” days.

**END OF SECTION 012100**

## **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 012200 "Unit Prices" for administrative requirements for using Unit Prices.
  - 3. Division 1, Section 013115 "Project Management Communications" for administrative requirements for communications.
  - 4. Division 0, Section 007213, Article 3.1 "Acceptable Substitutions" for administrative procedures for handling Requests for Substitutions made after Contract award.
  - 5. Division 0, Section 007213, Article 4.0 "Changes in the Work" for Change Order requirements.

#### **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.
- C. Responses from the Designer will not change any requirement of the Contract Documents. In the event the Contractor believes that a response to a RFI will cause a change to the requirements of the Contract Document, the Contractor shall give written

notice to the Designer requesting a Change Order for the work. Failure to give such written notice within ten (10) working days, shall waive the Contractor's right to seek additional time or cost under Article 4, "Changes in the Work" of the General Conditions.

#### **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. Coordination Drawings.
  - 2. Administrative and supervisory personnel.
  - 3. Project meetings.
- B. Each Contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific Contractor.
- C. 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.
- B. Coordination: Each Contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each Contractor shall coordinate its operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components with other Contractors to ensure maximum accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
  - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required

maintenance, service, and repair of all components including mechanical and electrical.

- C. Prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate Contractors if coordination of their Work is required.
  
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other Contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's Construction Schedule.
  - 2. Preparation of the Schedule of Values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Startup and adjustment of systems.
  - 8. Project Closeout activities.
  
- E. 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. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
  
- B. 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.
- C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of Manufacturers and Fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Designer and Construction Representative of scheduled meeting dates.
  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. Options
    - c. Related RFIs
    - d. Related Change Orders
    - e. Purchases
    - f. Deliveries
    - g. Submittals
    - h. Review of mockups
    - i. Possible conflicts
    - j. Compatibility problems
    - k. Time schedules
    - l. Weather limitations
    - m. Manufacturer's written recommendations
    - n. Warranty requirements
    - o. Compatibility of materials
    - p. Acceptability of substrates
    - q. Temporary facilities and controls
    - r. Space and access limitations
    - s. Regulations of authorities having jurisdiction
    - t. Testing and inspecting requirements

- u. Installation procedures
  - v. Coordination with other Work
  - w. Required performance results
  - x. Protection of adjacent Work
  - y. 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. Revise paragraph below if Project requires holding progress meetings at different intervals. Insert special intervals such as "every third Tuesday" to suit special circumstances.
  7. Project name
  8. Name and address of Contractor
  9. Name and address of Designer
  10. RFI number including RFIs that were dropped and not submitted
  11. RFI description
  12. Date the RFI was submitted
  13. Date Designer's response was received
  14. 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. Samples
  - 4. Quality Assurance Submittals
  - 5. Construction Photographs
  - 6. Operating and Maintenance Manuals
  - 7. 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 each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Coordinate transmittal of different types of submittals for related 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 36"x48".

## **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**

- A. The Contractor shall comply with the General Conditions, Article 3.2.
- B. The Contractor shall submit full-size, fully fabricated samples, cured and finished as specified, and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
  1. The Contractor shall mount or display samples in the manner to facilitate review of qualities indicated. Prepare samples to match the Designer's sample including the following:
    - a. Specification Section number and reference
    - b. Generic description of the Sample
    - c. Sample source
    - d. Product name or name of the Manufacturer
    - e. Compliance with recognized standards
    - f. Availability and delivery time
  2. The Contractor shall submit samples for review of size, kind, color, pattern, and texture. Submit samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

- a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show approximate limits of the variations.
  - b. Refer to other Specification Sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
  - c. Refer to other Sections for samples to be returned to the Contractor for incorporation in the Work. Such samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of sample submittals.
  - d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.
3. Field samples are full-size examples erected onsite to illustrate finishes, coatings, or finish materials and to establish the Project standard.
    - a. The Contractor shall comply with submittal requirements to the fullest extent possible. The Contractor shall process transmittal forms to provide a record of activity.

## **1.7 QUALITY ASSURANCE DOCUMENTS**

- A. The Contractor shall comply with the General Conditions, Article 3.2
- B. The Contractor shall submit quality control submittals including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.
- C. 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.
- D. 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.
- E. 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
033000	Cast-In- Place Concrete - Mix Design	Product Data
033000	Cast-In- Place Concrete	Certification
033000	Cast-In-Place Concrete	Test Report
055000	Metal Fabrications	Product Data
061000	Rough Carpentry	Product Data
061000	Truss Shop Drawings	Shop Drawings
073113	Asphalt Shingles	Product Data
073113	Asphalt Shingles	Warranty
071113	Asphalt Shingles	Operation / Maintenance Manual
074646	Fiber Cement Siding	Product Data
074646	Fiber Cement Siding	Warranty
074646	Fiber Cement Siding	Operation / Maintenance Manual
081743	Fiberglass Doors	Product Data
081743	Fiberglass Doors	Shop Drawings
081743	Fiberglass Doors	Warranty
181743	Fiberglass Doors	Operation / Maintenance Manual
081119	Stainless Steel Door Frames	Product Data
081119	Stainless Steel Door Frames	Shop Drawings
081119	Stainless Steel Door Frames	Warranty
091113	Exterior Painting	Product Data
091113	Exterior Painting	Certification
099123	Interior Painting	Product Data
099123	Interior Painting	Certification

220519	Meters & Gauges for Plumbing	Product Data
220519	Meters & Gauges for Plumbing	Warranty
220519	Meters & Gauges for Plumbing	Operation / Maintenance Manual
220523	Valves for Plumbing Piping	Product Data
220523	Valves for Plumbing Piping	Operation / Maintenance Manual
220523	Valves for Plumbing Piping	Warranty
220529	Hangers & Supports for Piping Systems	Product Data
221116	Domestic Water Piping	Product Data
221116	Domestic Water Piping	Certification
221116	Domestic Water Piping	Test Report
221116	Domestic Water Piping	Operation / Maintenance Manual
221116	Domestic Water Piping	Warranty
221116	Domestic Water Piping	As-Built
221218	Pumping Equipment	Shop Drawings
221218	Pumping Equipment	Product Data
221218	Pumping Equipment	Test Report
221218	Pumping Equipment	Operation / Maintenance Manual
221218	Pumping Equipment	Warranty
221313	Facility Sanitary Sewer	Product Data
221313	Facility Sanitary Sewer	Certification
221313	Facility Sanitary Sewer	Test Report
221313	Facility Sanitary Sewer	Operation / Maintenance Manual
221313	Facility Sanitary Sewer	Warranty
221313	Facility Sanitary Sewer	As-Built
221353	Septic Tanks and Piping	Shop Drawings
221353	Septic Tanks and Piping	Product Data
221353	Septic Tanks and Piping	Certification
221353	Septic Tanks and Piping	Test Report
221353	Septic Tanks and Piping	Operation / Maintenance Manual
221353	Septic Tanks and Piping	Warranty
230501	HVAC Equipment	Shop Drawings
230501	HVAC Equipment	Product Data
230501	HVAC Equipment	Operation / Maintenance Manual
230501	HVAC Equipment	Warranty
260526	Electrical Power Conductors & Cables	Product Data
260526	Grounding and Bonding	Product Data
260529	Hangers & Supports for Electrical	Product Data
260533.13	Conduit for Electrical Systems	Product Data
260533.16	Boxes for Electrical Systems	Product Data

260543	Underground Raceways for Electrical	Product Data
260543	Underground Raceways for Electrical	As-Builts
260553	Identification for Electrical Equipment	As-Builts
260583	Wiring Connections	Product Data
260923	Lighting Control Devices	Product Data
260923	Lighting Control Devices	Operation / Maintenance Manual
260923	Lighting Control Devices	Warranty
262100	Electrical Service Entrance	Product Data
262100	Electrical Service Entrance	Certification
262100	Electrical Service Entrance	Warranty
262300	Low Voltage Switchgear	Product Data
262300	Low Voltage Switchgear	Certification
262300	Low Voltage Switchgear	Operation / Maintenance Manual
262300	Low Voltage Switchgear	Warranty
262813	Fuses	Product Data
262813	Fuses	Certification
262813	Fuses	Warranty
262816.16	Enclosed Switches	Product Data
262816.16	Enclosed Switches	Certification
262816.16	Enclosed Switches	Warranty
265100	Lighting	Product Data
265100	Lighting	Operation / Maintenance Manual
265100	Lighting	Warranty
312000	Earthmoving- Imported Soil Testing	Test Report
312000	Earthmoving - Trench Backfill	Product Data
312500	Erosion Control	Product Data
321216	Asphalt Paving - Mix Design	Test Report
321313	Concrete Paving - Mix Design	Test Report
321313	Concrete Paving	Product Data
321373	Concrete Paving Joint Sealants	Product Data
321373	Concrete Paving Joint Sealants	Product Data
329000	Turf and Grasses	Product Data

**END OF SECTION 013300**

## **SECTION 013513.31 - SITE SECURITY AND HEALTH REQUIREMENTS (DNR)**

### **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 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.

### **3.4 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 013513.31**

## **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. Water service and distribution
  - 2. Temporary electric power and light
  - 3. Temporary heat
  - 4. Ventilation
  - 5. Telephone service
  - 6. Sanitary facilities, including drinking water
  - 7. Storm and sanitary sewer
- C. Support facilities include, but are not limited to, the following:
  - 1. Field offices and storage sheds
  - 2. Temporary roads and paving
  - 3. Dewatering facilities and drains
  - 4. Temporary enclosures
  - 5. Hoists and temporary elevator use
  - 6. Temporary project identification signs and bulletin boards
  - 7. Waste disposal services
  - 8. Rodent and pest control
  - 9. Construction aids and miscellaneous services and facilities
- D. Security and protection facilities include, but are not limited to, the following:
  - 1. Temporary fire protection
  - 2. Barricades, warning signs, and lights
  - 3. Sidewalk bridge or enclosure fence for the site
  - 4. Environmental protection

#### **1.3 SUBMITTALS**

- A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

- B. Implementation and Termination Schedule: Within (15) days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

#### **1.4 QUALITY ASSURANCE**

- A. Regulations: Comply with industry standards and applicable laws and regulations including, but not limited to, the following:
  - 1. Building code requirements
  - 2. Health and safety regulations
  - 3. Utility company regulations
  - 4. Police, fire department, and rescue squad rules
  - 5. 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. Gypsum Wallboard: Provide gypsum wallboard on interior walls of temporary offices.
- D. Roofing Materials: Provide UL Class A standard-weight asphalt shingles or UL Class C mineral-surfaced roll roofing on roofs of job-built temporary office, shops, and shed.
- E. Paint: Comply with requirements of Division 9 Section "Painting".
1. For job-built temporary offices, shops, sheds, fences, and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.
  2. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.
  3. For interior walls of temporary offices, provide two (2) quarts interior latex-flat wall paint.
- F. 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.
- G. Water: Provide potable water approved by local health authorities.
- H. 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. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
  - 4. 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: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.
  - 1. Install electric power service underground, except where overhead service must be used.
  - 2. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125V, AC 20ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
- D. 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.
- E. Temporary Heating and Cooling: The normal heating and/or cooling system of the building shall be maintained in operation during the construction. Should the Contractor find it necessary to interrupt the normal HVAC service to spaces, which have not been vacated for construction, such interruptions shall be pre-scheduled with the Construction Representative.
- F. 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.
- G. 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.
- 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. Temporary Paving: Construct and maintain temporary roads and paving to support the indicated loading adequately and to withstand exposure to traffic during the construction period. Locate temporary paving for roads, storage areas, and parking where the same permanent facilities will be located. Review proposed modifications to permanent paving with the Designer.
  - 1. Paving: Comply with Division 2 Section “Hot-Mixed Asphalt Paving” for construction and maintenance of temporary paving.
  - 2. Coordinate temporary paving development with subgrade grading, compaction, installation and stabilization of subbase, and installation of base and finish courses of permanent paving.
  - 3. Install temporary paving to minimize the need to rework the installations and to result in permanent roads and paved areas without damage or deterioration when occupied by the Owner.
  - 4. Delay installation of the final course of permanent asphalt concrete paving until immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.
  - 5. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.
- E. Construction Parking: Parking at the site will be provided in the areas designated at the Pre-Construction Meeting.
- F. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.

- G. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.
  - 1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.
  - 2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.
- H. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.
- I. 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.
- J. Rodent Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures are regular intervals so the Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

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

- A. 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.
- B. Enclosure Fence: Before excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.
  - 1. Provide open-mesh, chainlink fencing with posts set in a compacted mixture of gravel and earth.
- C. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
  - 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

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.
  - 1. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- 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.
  - 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances as required by the governing authority.
  - 3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
    - a. Replace air filters and clean inside of ductwork and housing.
    - b. Replace significantly worn parts and parts subject to unusual operating conditions.
    - c. Replace lamps burned out or noticeably dimmed by hours of use.

**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 ~~once~~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 017900 - DEMONSTRATION AND TRAINING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

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

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.
- C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
  - 1. Identification: On each copy, provide an applied label with the following information:
    - a. Name of Project.
    - b. Name and address of videographer.
    - c. Name of Architect.
    - d. Name of Construction Manager.
    - e. Name of Contractor.
    - f. Date of video recording.
  - 2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.

3. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

## **1.5 QUALITY ASSURANCE**

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

## **1.6 COORDINATION**

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

## **PART 2 - PRODUCTS**

### **2.1 INSTRUCTION PROGRAM**

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  1. Basis of System Design, Operational Requirements, and Criteria: Include the following:



- a. System, subsystem, and equipment descriptions.
  - b. Performance and design criteria if Contractor is delegated design responsibility.
  - c. Operating standards.
  - d. Regulatory requirements.
  - e. Equipment function.
  - f. Operating characteristics.
  - g. Limiting conditions.
  - h. Performance curves.
2. Documentation: Review the following items in detail:
- a. Emergency manuals.
  - b. Operations manuals.
  - c. Maintenance manuals.
  - d. Project record documents.
  - e. Identification systems.
  - f. Warranties and bonds.
  - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
- a. Instructions on meaning of warnings, trouble indications, and error messages.
  - b. Instructions on stopping.
  - c. Shutdown instructions for each type of emergency.
  - d. Operating instructions for conditions outside of normal operating limits.
  - e. Sequences for electric or electronic systems.
  - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
8. Repairs: Include the following:
  - a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 007213 "General Conditions".
- B. Set up instructional equipment at instruction location.

### **3.2 INSTRUCTION**

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
  2. Owner will furnish an instructor to describe Owner's operational philosophy.
  3. Owner will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  1. Schedule training with Owner with at least seven days' advance notice.

- C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

### **3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS**

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
  - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.
  - 1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
  - 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
  - 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
  - 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
    - a. Name of Contractor/Installer.
    - b. Business address.
    - c. Business phone number.
    - d. Point of contact.
    - e. E-mail address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
  - 1. Film training session(s) in segments not to exceed 15 minutes.
    - a. Produce segments to present a single significant piece of equipment per segment.
    - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
    - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

**END OF SECTION 017900**

**SECTION 03 3000**  
**CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Sections:
  - 1. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.
- C. Floor surface flatness and levelness measurements.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Concrete Testing Service: Owner engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

**PART 2 - PRODUCTS**

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

## 2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150 Type I/II, gray. Supplement with the following:
    - a. Fly Ash: ASTM C 618, Class F or C.
    - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
  - B. Normal-Weight Aggregates: ASTM C 33, graded.
    - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.
    - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
  - C. Water: ASTM C 94/C 94M and potable.

## 2.4 ADMIXTURES

- A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.5 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).
- B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch (10 by 19 mm).

## 2.6 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

## 2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. 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.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 2.8 RELATED MATERIALS
- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- 2.9 CONCRETE MIXTURES
- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 20 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing admixture in concrete, as required, for placement and workability.
- D. Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: As specified in drawings at 28 days.
  2. Maximum Water-Cementitious Materials Ratio: 0.50 – footings; 0.45 – all other mixes
  3. Slump Limit: 4 inches (125 mm) or 8 inches (200 mm for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
  4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
  5. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
    - a. Add water vapor reducing admixture per manufacturers specified dosage rate to ready mix truck at the batch plant, or jobsite before discharge, mix rapidly for 7 minutes. (Follow Manufacturer's Instructions).
- 2.10 FABRICATING REINFORCEMENT
- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."
- 2.11 CONCRETE MIXING
- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

### **PART 3 - EXECUTION**

#### **3.1 FORMWORK**

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete.

### 3.2 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. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

### 3.3 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

- 1. Lap joints 6 inches (150 mm) and seal with manufacturers recommended tape.

### 3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

- 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

### 3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

- 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

- D. Isolation Joints in Slabs-on-Grade: 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.

- E. Waterstops: Install in construction joints and at other joints indicated according to manufacturer's written instructions.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

- 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

- C. Cold-Weather Placement: Comply with ACI 306.1.

- D. Hot-Weather Placement: Comply with ACI 301.

### 3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

- 1. Apply to concrete surfaces not exposed to public view.

- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

- 1. Apply to concrete surfaces exposed to public view.



- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  - 2. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch (3.2 mm) at the gymnasium floor and 1/4" (6.4mm) at all other locations.

### 3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for 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. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
    - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
  - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.10 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

### 3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

**END OF SECTION 03 3000**

## SECTION 05 5000

### METAL FABRICATIONS

#### PART 1 – GENERAL

##### 1.1 SECTION INCLUDES

- A. Section Includes:
  - 1. Custom fabricated metal items and certain manufactured units not otherwise indicated to be supplied under Work of other Specification Sections.
  - 2. Design of all temporary bracing not indicated on Drawings.
  - 3. Design of systems and components, including but not limited to:
    - a. Stairs.
    - b. Landings.
    - c. Ladders.
    - d. Modular framing system.

##### 1.2 QUALITY ASSURANCE

- A. Referenced Standards:
  - 1. Aluminum Association (AA):
    - a. ADM 1, Aluminum Design Manual.
  - 2. American Association of State Highway and Transportation Officials (AASHTO):
    - a. HB, Standard Specifications for Highway Bridges.
  - 3. American Institute of Steel Construction (AISC):
    - a. 325, Manual of Steel Construction.
    - b. 360, Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
  - 4. American National Standards Institute (ANSI):
    - a. A14.3, Ladders - Fixed - Safety Requirements.
  - 5. American Society of Civil Engineers (ASCE):
    - a. 7, Minimum Design Loads for Buildings and Other Structures.
  - 6. ASTM International (ASTM):
    - a. 1 A6, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
    - b. A36, Standard Specification for Carbon Structural Steel.
    - c. A47, Standard Specification for Ferritic Malleable Iron Castings.
    - d. A48, Standard Specification for Gray Iron Castings.
    - e. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
    - f. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
    - g. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - h. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - i. A197, Standard Specification for Cupola Malleable Iron.
    - e. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
    - f. A276, Standard Specification for Stainless Steel Bars and Shapes.
    - g. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
    - h. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.

- i. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105ksi Minimum Tensile Strength.
- j. A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
- k. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- l. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- m. A536, Standard Specification for Ductile Iron Castings.
- n. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
- o. A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- p. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- q. A668, Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
- r. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- s. A786, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
- t. A992, Standard Specification for Steel for Structural Shapes.
- u. A1064, Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- aa. A1011, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- bb. B26, Standard Specification for Aluminum-Alloy Sand Castings.
- cc. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- dd. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- ee. B308, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
- ff. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube. gg. B632, Standard Specification for Aluminum-Alloy Rolled Tread Plate.
- hh. C478, Standard Specification for Precast Reinforced Concrete Manhole Sections.
- ii. F467, Standard Specification for Nonferrous Nuts for General Use.
- jj. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
- kk. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- ll. F835, Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws.
- mm. F879, Standard Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws.
- nn. F1789, Standard Terminology for F16 Mechanical Fasteners.
- 7. American Welding Society (AWS):
  - a. A5.1/A5.1M, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
  - b. D1.1, Structural Welding Code - Steel.
  - c. D1.2, Structural Welding Code – Aluminum.
  - d. D1.6/D1.6M, Structural Welding Code – Stainless Steel.
- 8. National Association of Architectural Metal Manufacturers (NAAMM):
  - a. AMP 510, Metal Stairs Manual.

- b. AMP 555, Code of Standard Practice for the Architectural Metal Industry (Including Miscellaneous Iron).
  - c. MBG 531, Metal Bar Grating Manual.
- 9. NACE International (NACE).
- 10. Nickel Development Institute (NiDI):
  - a. Publication 11 007, Guidelines for the welded fabrication of nickel-containing stainless steels for corrosion resistant services.
- 11. Occupational Safety and Health Administration (OSHA):
  - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
- 12. Building code:
  - a. International Code Council (ICC):
    - 1) International Building Code and associated standards, 2015 Edition including all amendments, referred to herein as Building Code.
  - b. A117.1, Accessible and Usable Buildings and Facilities.
- B. Qualifications:
  - 1. Qualify welding procedures and welding operators in accordance with AWS.
  - 2. Fabricator shall have minimum of 10 YRS experience in fabrication of metal items specified.
  - 3. Engineer for contractor-designed systems and components: Professional Structural Engineer licensed in the State of Missouri.

### 1.3 DEFINITIONS

- A. Fasteners: As defined in ASTM F1789.
- B. Galvanizing: Hot-dip galvanizing per ASTM A123/A123M or ASTM A153/A153M with minimum coating of 2.0 OZ of zinc per SQFT of metal (average of specimens) unless noted otherwise or dictated by standard.
- C. Hardware: As defined in ASTM A153/A153M.
- D. Installer or Applicator:
  - 1. Installer or applicator is the person actually installing or applying the product in the field at the Work Site.
  - 2. Installer and applicator are synonymous.

### 1.4 SUBMITTALS

- A. Shop Drawings:
  - 1. Comply with Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
  - 2. Fabrication and/or layout drawings and details:
    - a. Submit Drawings for all fabrications and assemblies:
      - 1) Include erection Drawings, plans, sections, details and connection details.
      - 2) Identify materials of construction, shop coatings and third party accessories.
  - 3. Product Technical Data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
    - c. Provide manufacturer's standard allowable load tables for the following:
      - 1) Castings, trench covers and accessories.
      - 2) Modular framing systems.
- B. Informational Submittals:
  - 1. Comply with Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

2. Certification of welders and welding processes:
  - a. Indicate compliance with AWS.

## **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and handle fabrications to avoid damage.
- B. Store above ground on skids or other supports to keep items free of dirt and other foreign debris and to protect against corrosion.

## **PART 2 – PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  1. Mechanical anchor bolts:
    - a. Comply with Section 03 3000.
  2. Epoxy adhesive anchor bolts:
    - a. Comply with Section 03 3000.
  3. Concrete screw anchors:
    - a. Comply with Section 03 3.
  4. Galvanizing repair paint:
    - a. Clearco Products Co., Inc.
    - b. ZRC Products.
  5. Modular framing system:
    - a. Unistrut Building Systems.
    - b. B-Line Systems.
    - c. Kindorf.
    - d. Superstrut.

### **2.2 MATERIALS**

- A. Steel:
  1. Structural:
    - a. W-shapes and WT-shapes: ASTM A992, Grade 50.
    - b. All other plates and rolled sections: ASTM A36.
  2. Pipe: ASTM A53, Types E or S, Grade B or ASTM A501.
  3. Structural tubing:
    - a. ASTM A500, Grade B (46 KSI minimum yield).
  4. Bolts, nuts and washers, high strength:
    - a. ASTM A325.
    - b. Provide two washers with all bolts.
  5. Bolts and nuts:
    - a. ASTM A307, Grade A.
  6. Welding electrodes: AWS D1.1, E70 Series.
  7. Steel forgings: ASTM A668.
- B. Iron:
  1. Ductile iron: ASTM A536.
  2. Gray cast iron: ASTM A48 (minimum 30,000 PSI tensile strength).
  3. Malleable iron: ASTM A47, ASTM A197.
- C. Stainless Steel:
  1. Stainless steel in welded applications: Low carbon 'L' type.
  2. Minimum yield strength of 30,000 PSI and minimum tensile strength of 75,000 PSI:

- a. Bars, shapes: ASTM A276, Type 304.
- b. Tubing and pipe: ASTM A269, ASTM A312 or ASTM A554, Type 304 or 316.
- c. Strip, plate and flat bars: ASTM A666, Type 304 or 316.
- d. Bolts and nuts: ASTM F593, Type 304 or 316.
- 3. Minimum yield strength of 25,000 PSI and minimum tensile strength of 70,000 PSI:
  - a. Strip, plate and flat bar for welded connections, ASTM A666, Type 304L or 316L.
- 4. Welding electrodes: In accordance with AWS for metal alloy being welded.
- D. Aluminum:
  - 1. Alloy 6061-T6, 32,000 PSI tensile yield strength minimum:
    - a. ASTM B221 and ASTM B308 for shapes including beams, channels, angles, tees and zees.
    - b. Weir plates, baffles and deflector plates, ASTM B209.
  - 2. Alloy 6063-T5 or T6, 15,000 PSI tensile yield strength minimum:
    - a. ASTM B221 and ASTM B429 for bars, rods, wires, pipes and tubes.
  - 3. ASTM B26 for castings.
  - 4. ASTM F468, alloy 2024 T4 for bolts.
  - 5. ASTM F467, alloy 2024 T4 for nuts.
  - 6. Electrodes for welding aluminum: AWS D1.2, filler alloy 4043 or 5356.
- E. Washers: Same material and alloy as found in accompanying bolts and nuts.
- F. Embedded Anchor Bolts:
  - 1. Comply with Section 03 15 19.
- G. Mechanical Anchor Bolts and Adhesive Anchor Bolts:
  - 1. Comply with Section 03 15 19.
- H. Galvanizing Repair Paint:
  - 1. High zinc dust content paint for regalvanizing welds and abrasions.
  - 2. ASTM A780.
  - 3. Zinc content: Minimum 92 PCT in dry film.
  - 4. ZRC "ZRC Cold Galvanizing" or Clearco "High Performance Zinc Spray".

### 2.3 MANUFACTURED UNITS

- A. Metal Stairs:
  - 1. Treads: Grating as specified:
    - a. Provide integral corrugated non-slip nosing.
- B. Risers:
  - 1. Grating treads:
    - a. Solid plate welded to trailing edge of tread or landing.
    - b. Minimum 3/16 IN thick by 4 IN high.
- C. Landings:
  - 1. Grating as specified.
    - a. Provide integral corrugated non-slip nosing at edge acting as stair tread/nosing.
  - 2. Design live load for landing platform and supporting structure:
    - a. 100 PSF, uniform load.
    - b. 300 LBS concentrated load on 4 IN square area.
    - c. All components to be adequate for the uniform load or the concentrated load, whichever requires the stronger component.
    - d. Maximum deflection: 1/300 of span under a superimposed live load of 100 PSF.
    - e. Design, fabricate, and install in compliance with NAAMM and applicable Codes:
      - 1) NAAMM AMP 510:
        - a) Exterior at Site structures and equipment: Industrial Class.
- D. Handrails and guardrails: Refer to Section 05 52 02.
  - 1. Material:

- a. Aluminum
- E. Aluminum Grating:
1. NAAMM MBG 531.
    - a. Minimum depth: 1-1/2 IN.
    - b. Minimum rectangular bearing bar size:
      - 1) 3/16 IN thick.
      - 2) Maximum 1-3/16 IN OC spacing.
    - c. Minimum I-bar flange width: 1/4 IN.
    - d. Design live load:
      - 1) 100 PSF, uniform load.
      - 2) 300 LBS concentrated load on 4 SQIN area.
      - 3) All components to be adequate for the uniform load or the concentrated load, whichever requires the stronger component.
      - 4) Maximum deflection: 1/300 of span under a superimposed live load of 50 PSF.
    - e. Cross bars:
      - 1) Welded, swaged or pressure locked to bearing bars.
      - 2) Maximum 4 IN OC spacing.
    - f. Top edges of bars: Grooved or serrated.
- F. Access Cover:
1. Tank type manhole frame and solid lid: ASTM A48 or ASTM A536, cast iron.
  2. Unless shown otherwise, design of cover shall be such that top of frame extends several inches above slab to prevent surface water from entering tank.
  3. Equip lid with four stainless steel screws to secure lid to frame.
- G. Modular Framing System:
1. Materials:
    - a. Steel: ASTM A1011, stainless steel, Grade 33:
      - 1) Hot-dipped galvanized, ASTM A123 or ASTM A153.
    - b. Aluminum: ASTM B221 or ASTM B209.
    - c. Stainless steel: ASTM A666.
  2. Channels and inserts:
    - a. Steel or stainless steel: Minimum 12 GA.
    - b. Aluminum: Minimum 0.080 IN.
    - c. Channels to have one side with a continuous slot with in-turned lips:
      - 1) Width: 1-5/8 IN.
      - 2) Depth and configuration as necessary for loading conditions.
  3. Fittings: Same material as system major components.
  4. Fasteners:
    - a. Nuts: Toothed grooves in top of nuts to engage the in-turned lips of channel.
    - b. Bolts: Hex-head cap screws.
    - c. Same material as system major components.
  5. End caps:
    - a. At each exposed end of each piece mounted on walls, or guardrails, or suspended from framing 7 FT or less above the floor or platform:
      - 1) Plastic for all exposed ends 7 FT or more above floor or platform.
      - 2) Plastic or metallic for all other exposed ends.
  6. Schedule:
    - a. Interior wet areas: Stainless steel:
    - b. Interior corrosive areas: Fiberglass Stainless steel:
    - c. Exterior areas: Aluminum Stainless steel.
    - d. All other areas not listed above: Hot-dipped galvanized steel.
  7. Provide dissimilar materials protection in accordance with Section 09 96 00.
  8. Repair all cut ends or otherwise damaged areas of galvanized steel in accordance with ASTM A780.



## 2.4 FABRICATION

- A. Verify field conditions and dimensions prior to fabrication.
- B. Form materials to shapes indicated with straight lines, true angles, and smooth curves:
  - 1. Grind smooth all rough welds and sharp edges:
    - a. Round all corners to approximately 1/16 IN nominal radius.
- C. Provide drilled or punched holes with smooth edges:
  - 1. Punch or drill for field connections and for attachment of Work by other trades.
- D. Weld Shop Connections:
  - 1. Welds to be continuous fillet type unless indicated otherwise.
  - 2. Full penetration butt weld at bends in stair stringers and ladder side rails.
  - 3. Weld structural steel in accordance with AWS D1.1 using Series E70 electrodes conforming to AWS A5.1/A5.1M.
  - 4. Weld aluminum in accordance with AWS D1.2.
  - 5. Weld stainless steel in accordance with AWS D1.6:
    - a. Treat all welded areas in accordance with ASTM A380.
  - 6. All headed studs to be welded using automatically timed stud welding equipment.
  - 7. Grind smooth welds that will be exposed.
- E. Passivate stainless steel items and stainless steel welds after they have been ground smooth:
  - 1. ASTM A380.
- F. Conceal fastenings where practicable.
- G. Fabricate Work in shop in as large assemblies as is practicable.
- H. Tolerances:
  - 1. Rolling:
    - a. ASTM A6.
    - b. When material received from the mill does not satisfy ASTM A6 tolerances for camber, profile, flatness, or sweep, the Contractor is permitted to perform corrective work by the use of controlled heating and mechanical straightening, subject to the limitations of the AISC Specification.
  - 2. Fabrication tolerance:
    - a. Member length:
      - 1) Both ends finished for contact bearing: 1/32 IN.
      - 2) Framed members:
        - a) 30 FT or less: 1/16 IN.
        - b) Over 30 FT: 1/8 IN.
    - b. Member straightness:
      - 1) Compression members: 1/1,000 of axial length between points laterally supported.
      - 2) Non-compression members: ASTM A6 tolerance for wide flange shapes.
    - c. Specified member camber (except compression members):
      - 1) 50 FT or less: Minus 0/plus 1/2 IN.
      - 2) Over 50 FT: Minus 0/plus 1/2 IN (plus 1/8 IN per 10 FT over 50 FT).
      - 3) Members received from mill with 75 PCT of specified camber require no further cambering.
      - 4) Beams/trusses without specified camber shall be fabricated so after erection, camber is upward.
      - 5) Camber shall be measured in fabrication shop in unstressed condition.
    - d. At bolted splices, depth deviation shall be taken up by filler plates:
      - 1) At welded joints, adjust weld profile to conform to variation in depth.
      - 2) Slope weld surface per AWS requirements.
    - e. Finished members shall be free from twists, bends and open joints:
      - 1) Sharp kinks, bends and deviation from above tolerances are cause for

rejection of material.

## 2.5 SOURCE QUALITY CONTROL

- A. Surface Preparation:
  - 1. Refer to Section 09 9600 for surface preparation requirements:
  - 2. All miscellaneous metal fabrication item surfaces shall be inspected and approved by NACE certified coatings inspector prior to application of shop-applied coatings:
    - a. Inspection shall be performed to determine depth of blast profile and cleanliness of surface.
    - b. Fabricator shall re-blast and/or re-clean surfaces as required until acceptable.
- B. Shop Applied Coating Application:
  - 1. After surface has been accepted in writing by NACE certified coatings inspector, fabricator may proceed with application of coatings.
  - 2. Application of coatings shall be observed and certified by NACE certified coatings inspector.

## PART 3 – EXECUTION

### 3.1 PREPARATION

- A. Provide items to be built into other construction in time to allow their installation:
  - 1. If such items are not provided in time for installation, cut in and install.
- B. Prior to installation, inspect and verify condition of substrate.
- C. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation:
  - 1. Field welding aluminum is not permitted unless approved in writing by Engineer.

### 3.2 INSTALLATION

- A. Set metal Work level, true to line, plumb:
  - 1. Shim and grout as necessary.
- B. Contractor is solely responsible for safety:
  - 1. Construction means and methods and sequencing of Work is the prerogative of the Contractor.
  - 2. Take into consideration that full structural capacity of many structural members is not realized until structural assembly is complete; e.g., until slabs, decks, and diagonal bracing or rigid connections are installed.
  - 3. Partially complete structural members shall not be loaded without an investigation by the Contractor.
  - 4. Until all elements of the permanent structure and lateral bracing system are complete, temporary bracing for the partially complete structure will be required.
- C. Adequate temporary bracing to provide safety, stability and to resist all loads to which the partially complete structure may be subjected, including construction activities and operation of equipment is the responsibility of the Contractor:
  - 1. Plumb, align, and set structural steel members to specified tolerances.
  - 2. Use temporary guys, braces, shoring, connections, etc., necessary to maintain the structural framing plumb and in proper alignment until permanent connections are

- made, the succeeding Work is in place, and temporary Work is no longer necessary.
3. Use temporary guys, bracing, shoring, and other Work to prevent injury or damage to adjacent Work or construction from stresses due to erection procedures and operation of erection equipment, construction loads, and wind.
  4. Contractor shall be responsible for the design of the temporary bracing system and must consider the sequence and schedule of placement of such elements and effects of loads imposed on the structural steel members by partially or completely installed Work, including Work of all other trades:
    - a. If not obvious from experience or from the Drawings, the Contractor shall confer with the Engineer to identify those structural steel elements that must be complete before the temporary bracing system is removed.
  5. Remove and dispose of all temporary Work and facilities off-Site.
- D. Examine Work-in-place on which specified Work is in any way dependent to ensure that conditions are satisfactory for the installation of the Work:
1. Report defects in Work-in-place which may influence satisfactory completion of the Work.
  2. Absence of such notification will be construed as acceptance of Work-in-place.
- E. Field Measurement:
1. Take field measurements as necessary to verify or supplement dimensions indicated on the Drawings.
  2. Contractor responsible for the accurate fit of the Work.
- F. Check the elevations of all finished footings or foundations and the location and alignment of all anchor bolts before starting erection:
1. Use surveyor's level.
  2. Notify Engineer of any errors or deviations found by such checking.
- G. Welding:
1. Conform to AWS D1.1 and requirements of the FABRICATION Article in PART 2 of this Section.
  2. When joining two sections of steel of different ASTM designations, welding techniques shall be in accordance with a qualified AWS D1.1 procedure.
- H. Shore existing members when unbolting of common connections is required:
1. Use new bolts for rebolting connections.
- I. Clean stored material of all foreign matter accumulated prior to the completion of erection.
- J. Bolt Field Connections: Where practicable, conceal fastenings.
- K. Field Welding:
1. Follow AWS procedures.
  2. Grind welds smooth where field welding is required.
- L. Field cutting grating or checkered plate to correct fabrication errors is not acceptable:
1. Replace entire section.
- M. Remove all burrs and radius all sharp edges and corners of miscellaneous plates, angles, framing system elements, etc.
- N. Unless noted or specified otherwise:
1. Connect aluminum to aluminum with 3/4 IN DIA stainless bolts.
  2. Connect aluminum to structural steel using 3/4 IN DIA stainless steel bolts:
    - a. Provide dissimilar metals protection.
  3. Connect aluminum and steel members to concrete and masonry using stainless steel mechanical anchor bolts or adhesive anchor bolts unless shown otherwise:
    - a. Provide dissimilar materials protection.
  4. Provide washers for all bolted connections.
  5. Where exposed, bolts shall extend a maximum of 3/4 IN and a minimum of 1/2 IN

above the top of installed nut:

- a. If bolts are cut off to required maximum height, threads must be dressed to allow nuts to be removed without damage to the bolt or the nuts.
- O. Secure metal to wood with lag screws of adequate size with appropriate washers.
  - P. Do not field splice fabricated items unless said items exceed standard shipping length or change of direction requires splicing:
    1. Provide full penetration welded splices where continuity is required.
  - Q. Provide each fabricated item complete with attachment devices as indicated or required to install
  - R. Anchor such that Work will not be distorted nor fasteners overstressed from expansion and contraction.
  - S. Tie anchor bolts in position to embedded reinforcing steel using wire:
    1. Tack welding prohibited:
      - a. Coat projecting bolt threads and nuts with heavy coat of clean grease.
    2. Anchor bolt location tolerance:
      - a. In accordance with Section 03 3000.
  - T. Provide abrasive stair nosings in each tread and landing of all concrete stairs and at each concrete stair landing having metal stair structure attaching to the concrete landing:
    1. Center stair nosings in stair width.
  - U. Accurately locate and place frames for openings before casting into floor slab so top of plate is flush with surface of finished floor:
    1. Keep screw holes clean and ready to receive screws.
  - V. Attach grating to end and intermediate supports with grating saddle clips and bolts:
    1. Maximum spacing: 2 FT OC with minimum of two per side.
    2. Attach individual units of aluminum grating together with clips at 2 FT OC maximum with a minimum of two clips per side.
  - W. Coat aluminum surfaces in contact with dissimilar materials in accordance with Section 09 96 00.
  - X. Repair damaged galvanized surfaces in accordance with ASTM A780:
    1. Prepare damaged surfaces by abrasive blasting or power sanding.
    2. Apply galvanizing repair paint to minimum 6 MIL DFT in accordance with manufacturer's instructions.

### **3.3 FIELD QUALITY CONTROL**

- A. Tolerances (unless otherwise noted on the Drawings):
  1. Frame placement, after assembly and before welding or tightening:
    - a. Deviation from plumb, level and alignment: 1 IN 500, maximum.
    - b. Displacement of centerlines of columns: 1/2 IN maximum, each side of centerline location shown on the Drawings.
    - c. Displacement of centerlines of columns: 1/2 IN maximum, each side of centerline location shown on the Drawings.

### **3.4 CLEANING**

- A. After fabrication, erection, installation or application, clean all miscellaneous metal fabrication surfaces of all dirt, weld slag and other foreign matter.
- B. All stainless steel products in addition to Paragraph A above:

1. Remove all heat tint, rusting, discoloration by passivation, ASTM A380, or other acceptable means as listed in NiDI 11 007 as approved by the Engineer.

**END OF SECTION 05 5000**

**SECTION 06 1000**  
**ROUGH CARPENTRY**

**PART 1 - GENERAL**

1.1 SUMMARY

- A. Section Includes:
1. Framing with dimension lumber.
  2. Framing with engineered wood products.
  3. Shear wall panels.
  4. Rooftop equipment bases and support curbs.
  5. Wood blocking, cants, and nailers.
  6. Wood furring and grounds.
  7. Wood sleepers.
  8. Plywood backing panels.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements
  2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

1.3 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preservative-treated wood.
  2. Fire-retardant-treated wood.
  3. Engineered wood products.
  4. Shear panels.
  5. Power-driven fasteners.
  6. Powder-actuated fasteners.
  7. Expansion anchors.
  8. Metal framing anchors.
  - 9.

**PART 2 - PRODUCTS**

2.1 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship for the following:
1. Dimension lumber framing.
  2. Laminated-veneer lumber.
  3. Parallel-strand lumber.
  4. Prefabricated wood I-joists.
  5. Rim boards.

6. Miscellaneous lumber.
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  1. Factory mark each piece of lumber with grade stamp of grading agency.
  2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
  3. Provide dressed lumber, S4S, unless otherwise indicated.
- C. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.
- D. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
  1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
  3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
  5. Wood floor plates that are installed over concrete slabs-on-grade.

## 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
  1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
  - D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
  - E. Application: Treat items indicated on Drawings, and the following:
    1. Framing for raised platforms.
    2. Framing for stages.
    3. Concealed blocking.
    4. Framing for non-load-bearing partitions.
    5. Framing for non-load-bearing exterior walls.
    6. Roof construction.
    7. Plywood backing panels.
- 2.4 DIMENSION LUMBER FRAMING
- A. Non-Load-Bearing Interior Partitions: Standard, Stud, or No. 3 grade.
    1. Application: Interior partitions not indicated as load-bearing.
    2. Species:
      - a. Mixed southern pine; SPIB.
      - b. Northern species; NLGA.
      - c. Eastern softwoods; NeLMA.
      - d. Western woods; WCLIB or WWPA.
  - B. Framing Other Than Non-Load-Bearing Interior Partitions: As shown on the drawings.
    1. Application: Framing other than interior partitions not indicated as load-bearing.
    2. Species:
      - a. Hem-fir (north); NLGA.
      - b. Southern pine; SPIB.
      - c. Douglas fir-larch; WCLIB or WWPA.
      - d. Mixed southern pine; SPIB.
      - e. Spruce-pine-fir; NLGA.
      - f. Douglas fir-south; WWPA.
      - g. Hem-fir; WCLIB or WWPA.
      - h. Douglas fir-larch (north); NLGA.
      - i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
  - C. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
    1. Application: Exposed exterior and interior framing indicated to receive a stained or natural finish.
    2. Species and Grade: As indicated above for load-bearing construction of same type.
- 2.5 ENGINEERED WOOD PRODUCTS
- A. Engineered Wood Products, General: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."



- B. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
  - 1. Extreme Fiber Stress in Bending, Edgewise: As shown on drawings.
  - 2. Modulus of Elasticity, Edgewise: As shown on drawings.
- C. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Provide units complying with material requirements of and with structural capacities established and monitored according to ASTM D 5055.
  - 1. Web Material: Either oriented strand board or plywood, complying with DOC PS 1 or DOC PS 2, Exposure.
  - 2. Structural Properties: Provide units with depths and design values not less than those indicated.
  - 3. Provide units complying with APA PRI-400, factory marked with APA trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA standard.
- D. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.
  - 1. Material: Product made from any combination solid lumber, wood strands, and veneers.
  - 2. Thickness: 1-1/4 inches (32 mm).
  - 3. Provide performance-rated product complying with APA PRR-401, rim board grade, factory marked with APA trademark indicating thickness, grade, and compliance with APA standard.

## 2.6 SHEAR WALL PANELS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1. Shear Transfer Systems.
  - 2. Simpson Strong-Tie Co., Inc.
  - 3. Weyerhaeuser Company.

Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I plywood or OSB sheathing.

  - 4. Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Steel-Framed Shear Wall Panels: Prefabricated assembly consisting of cold-formed galvanized steel panel, steel top and bottom plates, and wood studs.
- D. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.7 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Rooftop equipment bases and support curbs.
  - 4. Cants.

5. Furring.
  6. Grounds.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber of any species.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine; No. 2 grade; SPIB.
  2. Eastern softwoods; No. 2 Common grade; NeLMA.
  3. Northern species; No. 2 Common grade; NLGA.
  4. Western woods; Construction or No. 2 Common; WCLIB or WWPA.
- 2.8 PLYWOOD BACKING PANELS
- A. Equipment Backing Panels: DOC PS 1, Exterior, AC in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.
1. Plywood shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- 2.9 FASTENERS
- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or Type 304 stainless steel.
- B. Power-Driven Fasteners: NES NER-272.
- C. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- 2.10 METAL FRAMING ANCHORS
- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Cleveland Steel Specialty Co.
  2. KC Metals Products, Inc.
  3. Phoenix Metal Products, Inc.
  4. Simpson Strong-Tie Co., Inc.
  5. USP Structural Connectors.
- C. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- D. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
1. Use for interior locations unless otherwise indicated.
- E. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
1. Use for wood-preservative-treated lumber and where indicated.

## 2.11 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- C. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm)

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Shear Wall Panels: Install shear wall panels to comply with manufacturer's written instructions.
- F. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- G. Do not splice structural members between supports unless otherwise indicated.
- H. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
  - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

### 3.2 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

**END OF SECTION 06 1000**

## SECTION 07 3113 - ASPHALT SHINGLES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Glass-fiber-reinforced asphalt shingles.
  - 2. Underlayment materials.
  - 3. Ridge vents.
  - 4. Metal flashing and trim.

#### 1.2 DEFINITIONS

- A. Roofing Terminology: See ASTM D1079 for definitions of terms related to roofing Work in this Section.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .
  - 1. Owner, Contractor/Subcontractors, Architect, Structural Engineering Consultant .

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Asphalt shingles.
  - 2. Ridge vents.
- B. Samples for Verification: For the following products, in sizes indicated:
  - 1. Asphalt Shingles: Full size.
  - 2. Ridge and Hip Cap Shingles: Full size.
  - 3. Ridge Vent: **12-inch**- long Sample.
  - 4. Exposed Valley Lining: **12 inches** square.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For manufacturer's materials warranty.

## **1.6 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For asphalt shingles to include in maintenance manuals.
- B. Roofing Installer's warranty.

## **1.7 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Asphalt Shingles: **100 sq. ft.** of each type and in each color and blend, in unbroken bundles.

## **1.8 QUALITY ASSURANCE**

- A. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.

## **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture in accordance with manufacturer's written instructions.
- B. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double-stack rolls.
- C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing Work is not in progress.
- D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

## **1.10 FIELD CONDITIONS**

- A. Environmental Limitations: Proceed with installation only when existing and forecasted weather conditions permit product installation and related Work to be performed in accordance with manufacturer's written instructions and warranty requirements.
  - 1. Install self-adhering, polymer-modified bitumen sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

## **1.11 WARRANTY**

- A. Materials Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Manufacturing defects.

2. Materials Warranty Period: 40 years from date of Substantial Completion, prorated, with first 10 years non-prorated.
  3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to **110 mph** for 15 years from date of Substantial Completion.
  4. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 20 years from date of Substantial Completion.
  5. Workmanship Warranty Period: 20 years from date of Substantial Completion.
- B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 SOURCE LIMITATIONS**

- A. Obtain each type of product from single source from single manufacturer.

### **2.2 PERFORMANCE REQUIREMENTS**

- A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
- B. Wind Resistance: Provide asphalt shingles that comply with requirements of ASTM D3161/D3161M, Class F, and with ASTM D7158/D7158M, Class H.

### **2.3 GLASS-FIBER-REINFORCED ASPHALT SHINGLES**

- A. Impact-Resistant, Laminated-Strip Asphalt Shingles: ASTM D3462/D3462M, laminated, multi-ply overlay construction; glass-fiber reinforced, mineral-granule surfaced, and self-sealing; with impact resistance complying with UL 2218, Class 4.
1. Basis-of-Design - Certainteed, Landmark, Landmark Pro, laminated fiberglass, architectural grade shingles
  2. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
    - a. Certainteed; SAINT-GOBAIN.
    - b. GAF.
  3. Butt Edge: Straight cut.
  4. Strip Size: Manufacturer's standard .
  5. Algae Resistance: Granules resist algae discoloration.
  6. Color and Blends: As selected by Architect from manufacturer's full range.

- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles .

## 2.4 UNDERLAYMENT MATERIALS

- A. Self-Adhering, Polymer-Modified Bitumen Sheet: ASTM D1970/D1970M, minimum **40-mil-** thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-resistant top surface and release backing; cold applied. Provide primer for adjoining concrete, masonry, and metal surfaces to receive underlayment.

## 2.5 RIDGE VENTS

- A. Rigid Ridge Vent: Manufacturer's standard, rigid-section, high-density, UV-stabilized plastic ridge vent for use under ridge shingles.
  - 1. Minimum Net Free Area: 18 square inches per foot. .
  - 2. Width: 12 inches. .
  - 3. Thickness: 1 inch. .
  - 4. Features:
    - a. Nonwoven geotextile filter strips.
    - b. External deflector baffles.

## 2.6 ACCESSORIES

- A. Elastomeric Flashing Sealant: ASTM C920, Type S, Grade NS, one-part, non-sag, elastomeric polymer sealant; of class and use classifications required to seal joints and remain watertight; recommended in writing by manufacturer for installation of flashing systems.
- B. Roofing Nails: ASTM F1667, aluminum, stainless steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum **0.120-inch-** diameter, sharp-pointed, with a **3/8- to 7/16-inch-** diameter flat head and of sufficient length to penetrate **3/4 inch** into solid wood decking or extend at least **1/8 inch** through sheathing less than **3/4 inch** thick.
  - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

## 2.7 METAL FLASHING AND TRIM

- A. Comply with requirements in Section 07 6200 "Sheet Metal Flashing and Trim."
  - 1. Sheet Metal: Stainless steel .
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item unless otherwise specified in this Section or indicated on Drawings.
  - 1. Open-Valley Flashings: Fabricate from metal sheet not less than **24 inches** wide in lengths not exceeding **10 feet**, with **1-inch-**high, inverted-V profile water diverter at center of valley and equal flange widths of not less than **11 inches**.
    - a. Hem flange edges for fastening with metal cleats.

- b. Add stiffening ribs in flashings to promote drainage.
2. Drip Edges: Fabricate in lengths not exceeding 10 feet with minimum 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
3. Vent-Pipe Flashings: ASTM B749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

## **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.
  1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
  2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provisions have been made for flashings and penetrations through asphalt shingles.
  3. Verify that vent stacks and other penetrations through roofing are installed and securely fastened.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION OF UNDERLAYMENT MATERIALS**

- A. Comply with asphalt shingle and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.
- B. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free, on roof deck.
  1. Comply with low-temperature installation restrictions of underlayment manufacturer.
  2. Install lapped in direction that sheds water.
    - a. Lap sides not less than 4 inches.
    - b. Lap ends not less than 6 inches, staggered 24 inches between succeeding courses.
    - c. Roll laps with roller.
  3. Prime concrete, masonry, and metal surfaces to receive self-adhering sheet.
  4. Eaves: Extend from edges of eaves 48 inches beyond interior face of exterior wall.
  5. Rakes: Extend from edges of rakes 48 inches beyond interior face of exterior wall.
  6. Valleys: Extend from lowest to highest point 48 inches on each side of centerline.
  7. Hips: Extend 48 inches on each side.
  8. Ridges: Extend 48 inches on each side without obstructing continuous ridge vent slot.
  9. Cover underlayment within seven days.



- C. Metal-Flashed, Open-Valley Underlayment: Install two layers of minimum **36-inch-** wide underlayment centered in valley.
  - 1. Use same underlayment as installed on field of roof.
  - 2. Stagger end laps between layers at least **72 inches**.
  - 3. Lap ends of each layer at least **12 inches** in direction that sheds water, and seal with asphalt roofing cement.
  - 4. Fasten each layer to roof deck with underlayment nails located as far from valley center as possible and only to extent necessary to hold underlayment in place until installation of valley flashing.
  - 5. Lap roof-deck underlayment over first layer of valley underlayment at least **6 inches**.

### **3.3 INSTALLATION OF METAL FLASHING AND TRIM**

- A. Install metal flashings and trim to comply with requirements in Section 07 6200 "Sheet Metal Flashing and Trim."
  - 1. Install metal flashings in accordance with recommendations in ARMA's "Asphalt Roofing Residential Manual - Design and Application Methods" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
  - 2. Bed flanges of metal flashings using asphalt roofing cement or elastomeric flashing sealant.
- B. Open-Valley Flashings: Install centered in valleys, lapping ends at least **12 inches** in direction that sheds water. Fasten upper end of each length to roof deck beneath overlap.
  - 1. Secure hemmed flange edges into metal cleats spaced **12 inches** apart and fastened to roof deck.
  - 2. Adhere minimum **9-inch-**wide strips of self-adhering, polymer-modified bitumen sheet to metal flanges and to underlying self-adhering sheet, polymer-modified bitumen sheet.
    - a. Place strips parallel to and over flanges so that they will be just concealed by installed shingles.
  - 3. Provide a closure at the end of the inverted-V profile of the valley metal to minimize water and ice infiltration.
- C. Rake Drip Edges: Install over underlayment materials and fasten to roof deck.
- D. Eave Drip Edges: Install below underlayment materials and fasten to roof deck.
- E. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

### **3.4 INSTALLATION OF ASPHALT SHINGLES**

- A. Install asphalt shingles in accordance with manufacturer's written instructions and recommendations in ARMA's "Asphalt Roofing Residential Manual - Design and Application Methods" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip at least **7 inches** wide with self-sealing strip face up at roof edge.
  - 1. Extend asphalt shingles **1/2 inch** over fasciae at eaves and rakes.

2. Install starter strip along rake edge.
- C. Install first and remaining courses of laminated asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install first and remaining courses of three-tab-strip asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- E. Fasten asphalt shingle strips with a minimum of four roofing nails, but not less than the number indicated in manufacturer's written instructions for roof slope and design wind speed indicated on Drawings and for warranty requirements specified in this Section.
1. Locate fasteners in accordance with manufacturer's written instructions.
  2. When ambient temperature during installation is below **50 deg F**, hand seal self-sealing asphalt shingles by applying asphalt roofing cement spots between course overlaps after nailing the upper course.
- F. Open Valleys: Cut and fit asphalt shingles at open valleys, trimming upper concealed corners of shingle strips.
1. Maintain uniform width of exposed open valley from highest to lowest point.
  2. Extend shingle a minimum of **4 inches** over valley metal.
  3. Set valley edge of asphalt shingles in a **3-inch-** wide bed of asphalt roofing cement.
  4. Do not nail asphalt shingles to metal open-valley flashings.
- G. Ridge Vents: Install continuous ridge vents over asphalt shingles in accordance with manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.
- H. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing-shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds.
1. Fasten with roofing nails of sufficient length to penetrate sheathing.
  2. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

**END OF SECTION 07 3113**

## **SECTION 07 4646 – FIBER CEMENT SIDING**

### **PART 1 GENERAL**

#### **A. SECTION INCLUDES**

- A. Fiber-cement siding.

#### **B. RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Siding substrate.
- B. Section 07 3113 - Asphalt Shingles

#### **C. SUBMITTALS**

- A. See Section 01 3300 - Administrative Requirements, for submittal procedures.
- B. 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 fastener patterns.
- C. Shop Drawings: Indicating siding layout, fastening, support and edge treatment details.
- D. Samples for verification: Submit one samples minimum 4-inches by 6-inches of each color and finish specified.

#### **D. QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section with minimum three years of experience.

#### **E. DELIVERY, STORAGE, AND HANDLING**

- A. Store products under waterproof cover and elevated above grade, on a flat surface.
- B. Plastic should be removed if material is to be stored for a long period of time.
- C. Storage area should be well ventilated.
- D. Condensation on sheets under shrink wrap should be avoided.
- E. Care is to be taken to protect the edges of material from damage on construction site.

### **PART 2 PRODUCTS**

#### **A. FIBER-CEMENT SIDING**

- A. Panel Siding: Horizontally-oriented panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C 1186 Type A Grade II; with machined edges, for screw attachment.
  - 1. Product shall be lap siding as produced by James Hardie, Certainteed, GAF or approved equal.
  - 2. Size: Siding shall have a 6" exposed lap
  - 3. Thickness: 5/16 inch, nominal.
  - 4. Finish: Primed and ready for paint.
  - 5. Warranty: 50 year limited; transferable.

#### **B. ACCESSORIES**

- A. Fasteners, sealants, extrusions, furring strips, and rubber gasket fillet material to be in accordance with manufactures written rules for installing and fastening exterior fiber cement cladding.
- B. Furring Strips: As indicated in drawings.
- C. Trim: Same material and texture as siding and soffit.
- D. Fasteners: Screws and Astro rivets to be stainless steel as specified in manufacturers written rules; length as required to penetrate minimum 1-1/4 inch.
- E. Exterior Soffit Vents: One piece, perforated, ASTM B221 (ASTM B221M), 6063 alloy, T5 temper, aluminum, with edge suitable for direct application to gypsum board and manufactured especially for soffit application, and provide continuous vent.
- F. Joint Sealer: 3-1/2-inch EDPM rubber strips.
- G. Joint Sealer: As specified by manufacturer.

### **PART 3 EXECUTION**

#### **A. EXAMINATION**

- A. All framing must be straight, plumb, true, and provide a firm support for the panels.
- B. Refer to the manufacturer's recommendations for spacing of wood furring for the type of fiber cement board specified and its intended use.
- C. Examine substrate, clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- D. Verify that weather barrier has been installed over substrate completely and correctly.
- E. Do not begin until unacceptable conditions have been corrected.
- F. Install sheet metal flashing as indicated on drawings.
- G. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### **B. INSTALLATION**

- A. Install in accordance with manufacturer's instructions and recommendations.
  1. Read warranty and comply with terms necessary to maintain warranty coverage.
  2. Install in accordance with conditions stated in model code evaluation report applicable to location of project.
  3. Use trim details indicated on drawings.
  4. Touch up and or seal all field cut edges per manufacturer's written instructions before installing.
  5. Pre-drill nail holes if necessary to prevent breakage.
- B. Over weather barrier: Install furring strips as indicated on drawings. Leave space at top and bottom open; top may be behind soffit; at bottom install insect screen over opening by wrapping a strip of screen over bottom ends of vertical furring channels.
- C. Allow space between both ends of siding panels (as indicated in drawings) that butt against trim for thermal movement; seal joint between panel and trim with exterior grade sealant.

- D. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations indicated on drawings, and provide vent area specified.

**C. 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  
74 4646**

## SECTION 08 1119– STAINLESS STEEL DOORS FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Stainless steel doors and frames.
- B. Related Requirements:

#### 1.2 COORDINATION

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

#### 1.3 ACTION SUBMITTALS

- A. Product Data Submittals: For each product.
  - 1. Include construction details, material descriptions, core descriptions, and finishes.
- B. Shop Drawings: Include the following:
  - 1. Elevations of each door type.
  - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
  - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  - 4. Locations of reinforcement and preparations for hardware.
  - 5. Details of each different wall opening condition.
  - 6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
  - 7. Details of anchorages, joints, field splices, and connections.
  - 8. Details of accessories.
  - 9. Details of moldings, removable stops, and glazing.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver stainless steel doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store stainless steel doors and frames under cover at Project site with head up. Place units on minimum 4-inch- high wood blocking.
- D. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

### **2.2 STAINLESS STEEL DOORS AND FRAMES**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Ceco Door; AADG, Inc.; ASSA ABLOY.
  - 2. Curries, AADG, Inc.; ASSA ABLOY Group.
  - 3. Mesker Door; Mesker Openings Group.
  - 4. Steelcraft; Allegion plc.
- B. Construct stainless steel door and frame assemblies to comply with NAAMM-HMMA 866 for the application indicated, including materials, fabrication methods, hardware reinforcement, tolerances, and clearances, and as specified. Comply with SDI ANSI/A250.4, for Physical Performance Level A.
- C. Frames for Moderately Corrosive Environments: At locations indicated in the Door and Frame Schedule on Drawings .
  - 1. Stainless Steel Frames:
    - a. Materials: Type 304 stainless steel sheet.
    - b. Door Frames for Openings 48 Inches (1219 mm) Wide or Less: Fabricate from stainless steel sheet, minimum thickness 0.078 inch .
    - c. Construction: Face welded .
  - 2. Finish: ASTM A480/A480M No. 6, Dull Satin .

### **2.3 MATERIALS**

- A. Stainless Steel Sheet: ASTM A240/A240M, austenitic stainless steel, Type 304 .
- B. Inserts, Bolts, and Anchor Fasteners:
  - 1. Stainless steel components complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2 for bolts and nuts.

## 2.4 FRAME ANCHORS

- A. Provide anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
- B. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- C. Number and Spacing:
  - 1. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c.
  - 2. Compression Type: Not less than two anchors in each jamb.
  - 3. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
- D. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- E. Material:
  - 1. Stainless steel sheet. Same type as door face.

## 2.5 FABRICATION

- A. Stainless Steel Frame Fabrication: Provide stainless steel frames rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
  - 1. Tolerances: Fabricate frames to tolerances indicated in NAAMM-HMMA 866.
  - 2. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
  - 3. Provide countersunk, flat-, or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 4. Door Silencers: Except on weather-stripped and gasketed frames, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.
    - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
  - 5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.
- B. Hardware Preparation: Factory prepare stainless steel doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping, in accordance with the Door Hardware Schedule on Drawings, and templates.



1. Comply with ANSI/BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

## **2.6 FINISHES**

- A. **Stainless Steel Finishes:** Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform finish, free of cross scratches. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- B. **Grain Direction:** For finishes exhibiting grain, run grain vertically on door faces and frame jambs.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation and with installation spreaders in place, adjust and securely brace stainless steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
  1. **Squareness:** Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb, and perpendicular to frame head.
  2. **Alignment:** Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  3. **Twist:** Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  4. **Plumbness:** Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

### **3.2 INSTALLATION**

- A. Install stainless steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with approved Shop Drawings and with manufacturer's written instructions.
- B. **Stainless Steel Frames:**
  1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, without damage to completed Work.
  2. **Floor Anchors:** Secure with postinstalled expansion anchors.

- a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Solidly pack mineral-fiber insulation inside frames.
4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors.
5. Installation Tolerances: Adjust stainless steel frames for squareness, alignment, twist, and plumb to the following tolerances:
  - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb, and perpendicular to frame head.
  - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Stainless Steel Doors: Fit and adjust stainless steel doors accurately in frames within clearances specified below:
  1. Non-Fire-Rated Doors: Comply with NAAMM-HMMA 841 and NAAMM-HMMA 866.
  2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
  3. Smoke-Control Doors: Install doors in accordance with NFPA 105.

### **3.3 ADJUSTING AND CLEANING**

- A. Clean grout and other bonding material off stainless steel doors and frames immediately after installation.
- B. Stainless Steel Touchup: Immediately after erection, smooth any scratched or damaged areas of stainless steel; polish to match undamaged finish.

**END OF SECTION 08 1119**

## SECTION 08 1743 – FIBERGLASS DOORS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. AF-219 Rustic Wood Grain Composite Fiberglass Door with PP Polypropylene Honeycomb Core..

B. Related Requirements:

1. Section 08 1119 "Stainless-Steel Doors & Frames".
2. Section 08 7100 "Door Hardware".

#### 1.2 ACTION SUBMITTALS

A. Product Data Submittals: For each product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door frame construction.
5. Factory-machining criteria.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of frame for each frame type, including dimensions and profile.
4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
5. Dimensions and locations of blocking for hardware attachment.
6. Dimensions and locations of mortises and holes for hardware.
7. Clearances and undercuts.
8. Finishes.

C. Samples for Verification:

1. Door face materials, approximately **8 by 10 inches**, Submit manufacturer's door sample composed of door face sheet, core, framing and finish.
2. Submit manufacturer's sample of standard colors for door face and frame.

3. For each material. For each wood species, provide set of three (3) Samples showing typical range of color and grain to be expected in finished Work.

### **1.3 INFORMATIONAL SUBMITTALS**

- A. Sample Warranty: For material and finish warranty.
  1. Standard Period; Covers failure of corner joinery, core deterioration, and delamination or bubbling of door skin and corrosion of all-fiberglass products while the door is in its specified application in its original installation.
    - a. Ten years from the date of shipment.
  2. Finish:
    - a. SpecLite3® face sheets 10 years from the date of shipment.

### **1.4 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications.
  1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 25 years concurrent successful experience.

### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery:
  1. Deliver materials to site in manufacturer's original, unopened, containers and packaging.
  2. 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.
- B. Storage:
  1. Store materials in a clean, dry area, indoors in accordance with manufacturer's instructions.
- C. Handling:
  1. Protect materials and finish from damage during handling and installation.

## **PRODUCTS**

### **1.6 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.

## **1.7 WOOD PANEL PRODUCTS**

- A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- B. Factory mark panels to indicate compliance with applicable standard.

## **1.8 PRESERVATIVE-TREATED PLYWOOD**

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

## **1.9 FIRE-RETARDANT-TREATED PLYWOOD**

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than **10.5 feet** beyond the centerline of the burners at any time during the test.
  1. Use treatment that does not promote corrosion of metal fasteners.
  2. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
  3. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings, and the following:
  - 1. Roof and wall sheathing within 48 inches of fire walls.
  - 2. Roof sheathing.
  - 3. Subflooring and underlayment for raised platforms.
  - 4. Wall sheathing concealed by metal wall panels .

### **1.10 COMPOSITE FIBERGLASS DOORS**

- A. Manufacturer: Basis-of-Design Product: Special-Lite, Inc., AF-219 Rustic Wood Grain Composite Fiberglass Door.
- B. Construction.
  - 1. Door Thickness.
    - a. 1-3/4”.
  - 2. Stiles & Rails.
    - a. Pultruded fiberglass with integral channels for securing corner reinforcing clip.
  - 3. Corners.
    - a. Mitered.
    - b. Secured with pultruded fiberglass corner clip chemically welded to stiles and rails.
    - c. Mechanical fasteners to secure corner joints not acceptable.
  - 4. Core.
    - a. PP Polypropylene Honeycomb.
    - b. 5.0 pcf density. Face Sheet.
  - 2. Face Sheet:
    - a. 0.120” thick, rustic wood grain, stained FRP sheet.

### **1.11 FINISHES**

- A. Door.
  - 1. FRP Face Sheets
    - a. Stained – Architect to select from Manufacturer’s full range of standard and custom colors.

## **PART 2 - EXECUTION**

### **2.1 EXAMINATION**

- A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  2. Reject doors with defects.
- B. Ensure openings to receive frames are plumb, level, square, and in tolerance.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 2.2 INSTALLATION

- A. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- B. Install frames level, plumb, true, and straight.
1. Shim as required with concealed shims. Install level and plumb to a tolerance of **1/8 inch in 96 inches**.
  2. Anchor frames to anchors or blocking built in or directly attached to substrates.
    - a. Secure with countersunk, concealed fasteners and blind nailing.
    - b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
      - 1) For factory-finished items, use filler matching finish of items being installed.
  3. Install fire-rated doors and frames in accordance with NFPA 80.
- C. Job-Fitted Doors:
1. Align and fit doors in frames with uniform clearances and bevels as indicated below.
    - a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
  2. Machine doors for hardware.
  3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
  4. Clearances:
    - a. Provide **1/8 inch** at heads, jambs, and between pairs of doors.
    - b. Provide **1/8 inch** from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
    - c. Where threshold is shown or scheduled, provide **1/4 inch** from bottom of door to top of threshold unless otherwise indicated.
    - d. Comply with NFPA 80 for fire-rated doors.
  5. Bevel non-fire-rated doors **1/8 inch in 2 inches** at lock and hinge edges.
  6. Bevel fire-rated doors **1/8 inch in 2 inches** at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Adjusting:

1. Adjust doors, hinges and locksets for smooth operation with binding.

E. Cleaning:

1. Clean doors promptly after installation in accordance with manufacturer's instructions.
2. Do not use harsh cleaning materials or methods that would damage finish.

F. Protection:

1. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

**END OF SECTION 081743**



## SECTION 09 9113 – EXTERIOR PAINTING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on exterior substrates.
- B. Related Requirements:
  - 1. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

#### 1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Step coats on Samples to show each coat required for system.

3. Label each coat of each Sample.
4. Label each Sample for location and application area.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

#### 1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

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

1. Benjamin Moore & Co.
2. Diamond Vogel Paints.
3. ICI Paints.
4. Kwal Paint.
5. PPG Architectural Finishes, Inc.
6. Pratt & Lambert.
7. Sherwin-Williams Company (The).

## 2.2 PAINT, GENERAL

### A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

### B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

### C. Colors: As indicated in a Section 099123 "Interior Painting."

## 2.3 METAL PRIMERS

### A. Primer, Alkyd, Anti-Corrosive for Metal:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin Williams; ProCryl Universal Primer, or equal product by one of the manufacturers indicated.

## 2.4 WATER-BASED PAINTS

### A. Light Industrial Coating, Exterior, Water Based

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin Williams; Duration Exterior Latex Coatings, or equal product by one of the manufacturers indicated.

## 2.5 SOURCE QUALITY CONTROL

### A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
  - 1. SSPC-SP 3, "Power Tool Cleaning."
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
  - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
  - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

### 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.6 EXTERIOR PAINTING SCHEDULE

#### A. Steel and Galvanized-Metal Substrates:

1. Water-Based Light Industrial Coating System:
  - a. Prime Coat: Primer, acrylic, anti-corrosive.
  - b. Intermediate Coat: Light industrial coating.
  - c. Topcoat: Light industrial coating.
2. Locations: At all exterior bollards and miscellaneous metals to be painted as indicated on the Drawings.

#### B. Other Existing Substrates:

1. Prime Coat: As recommended by the manufacturer.
2. Intermediate Coat: Light industrial coating.
3. Topcoat: Light industrial coating.

**END OF SECTION 099113**

## SECTION 09 9123 – INTERIOR PAINTING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
  - 1. Steel and iron.
  - 2. Wood..
- B. Related Requirements:
  - 1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.

#### 1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
  - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Apply coats on Samples in steps to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

#### 1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.



## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Benjamin Moore & Co.
  2. Coronado Paint; Benjamin Moore Company.
  3. Diamond Vogel Paints.
  4. Kwal Paint; Comex Group.
  5. PPG Architectural Coatings.
  6. Pratt & Lambert.
  7. Sherwin-Williams Company (The).
  8. Valspar Corporation - Architectural (Pro).

### 2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
  2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
  3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
  4. Floor Coatings: VOC not more than 100 g/L.
  5. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
  6. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
  7. Dry-Fog Coatings: VOC content of not more than 400 g/L.
  8. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
  9. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.
- D. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following

chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:
  - a. Acrolein.
  - b. Acrylonitrile.
  - c. Antimony.
  - d. Benzene.
  - e. Butyl benzyl phthalate.
  - f. Cadmium.
  - g. Di (2-ethylhexyl) phthalate.
  - h. Di-n-butyl phthalate.
  - i. Di-n-octyl phthalate.
  - j. 1,2-dichlorobenzene.
  - k. Diethyl phthalate.
  - l. Dimethyl phthalate.
  - m. Ethylbenzene.
  - n. Formaldehyde.
  - o. Hexavalent chromium.
  - p. Isophorone.
  - q. Lead.
  - r. Mercury.
  - s. Methyl ethyl ketone.
  - t. Methyl isobutyl ketone.
  - u. Methylene chloride.
  - v. Naphthalene.
  - w. Toluene (methylbenzene).
  - x. 1,1,1-trichloroethane.
  - y. Vinyl chloride.

E. Colors: See Paint Color Schedule at the end of this section.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  1. Fiber-Cement Board: 12 percent.

2. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
  1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
  2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. New and Existing Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
  1. SSPC-SP 3.
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Wood Substrates:
  1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  2. Sand surfaces that will be exposed to view, and dust off.
  3. Prime edges, ends, faces, undersides, and backsides of wood.
  4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
  - 1. Paint the following work where exposed in equipment rooms:
    - a. Walls and Ceilings only.

### 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.6 INTERIOR PAINTING SCHEDULE

- A. Wood Substrates: Wood Wall and Ceiling Plywood.
  - 1. Latex over Latex Primer System MPI INT 6.3T:
    - a. Prime Coat: Primer, latex, for interior wood, MPI #39.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior (MPI Gloss Level 4), MPI #43.
    - d. Topcoat: Latex, interior, semi-gloss (MPI Gloss Level 5), MPI #54.
    - e. Color to be White.

**END OF SECTION 099123**

## SECTION 22 0519

### METERS AND GAUGES FOR PLUMBING PIPING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. Section Includes:
  - 1. Dial-type pressure gages.
  - 2. Gage attachments.

##### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

##### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

#### PART 2 - PRODUCTS

##### 2.1 PRESSURE GAGES

- A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AMETEK, Inc.; U.S. Gauge.
    - b. Ashcroft Inc.
    - c. Ernst Flow Industries.
    - d. Flo Fab Inc.
    - e. Marsh Bellofram.
    - f. Miljoco Corporation.
    - g. Noshok.

- h. Palmer Wahl Instrumentation Group.
  - i. REOTEMP Instrument Corporation.
  - j. Tel-Tru Manufacturing Company.
  - k. Terice, H. O. Co.
  - l. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
  - m. Weiss Instruments, Inc.
  - n. WIKA Instrument Corporation - USA.
  - o. Winters Instruments - U.S.
2. Standard: ASME B40.100.
  3. Case: Sealed cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
  4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
  5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
  6. Movement: Mechanical, with link to pressure element and connection to pointer.
  7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
  8. Pointer: Dark-colored metal.
  9. Window: Glass or plastic.
  10. Ring: Metal.
  11. Accuracy: Grade B, plus or minus 2 percent of middle half of scale range or better.

## 2.2 GAGE ATTACHMENTS

- A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston or porous-metal-type surge-dampening device. Include extension for use on insulated piping.
- B. Valves: Brass ball, with NPS 1/4 or NPS 1/2 ASME B1.20.1 pipe threads.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.
- B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.
- C. Install thermowells with extension on insulated piping.
- D. Fill thermowells with heat-transfer medium.
- E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.
- F. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.
- G. Install thermometers in the following locations:



1. Outlet of each water heater.
2. Hot water recirculation piping near the water heater.
3. Inlets and outlets of each domestic water heat exchanger.
4. Inlet and outlet of each domestic hot-water storage tank.

H. Install pressure gages in the following locations:

1. Building water service entrance into building.
2. Inlet and outlet of each pressure-reducing valve.
3. Suction and discharge of each domestic water pump.

I. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

J. Adjust faces of meters and gages to proper angle for best visibility.

### 3.2 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Water Piping: 0 to 100 psi

**END OF SECTION 220519**

## SECTION 22 0523

### VALVES FOR PLUMBING PIPING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Bronze ball valves.
  - 2. Bronze swing check valves.
  - 3. Bronze globe valves.

##### 1.2 QUALITY ASSURANCE

- A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
- B. NSF Compliance: NSF 61 for valve materials for potable-water service.

#### PART 2 - PRODUCTS

##### 2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
  - 1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
  - 2. Handwheel: For valves other than quarter-turn types.
  - 3. Handlever: For quarter-turn valves NPS 6 and smaller.
- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
  - 1. Gate Valves: With rising stem.
  - 2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
  - 3. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Solder Joint: With sockets according to ASME B16.18.
3. Threaded: With threads according to ASME B1.20.1.

2.2 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Valve, Inc.
  - b. Conbraco Industries, Inc.; Apollo Valves.
  - c. Crane Co.; Crane Valve Group; Crane Valves.
  - d. Hammond Valve.
  - e. Lance Valves; a division of Advanced Thermal Systems, Inc.
  - f. Legend Valve.
  - g. Milwaukee Valve Company.
  - h. NIBCO INC.
  - i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
  - j.
2. Description:
  - a. Standard: MSS SP-110.
  - b. SWP Rating: 150 psig.
  - c. CWP Rating: 600 psig.
  - d. Body Design: Two piece.
  - e. Body Material: Bronze.
  - f. Ends: Threaded.
  - g. Seats: PTFE or TFE.
  - h. Stem: Bronze.
  - i. Ball: Chrome-plated brass.
  - j. Port: Full.

2.3 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Valve, Inc.
  - b. Crane Co.; Crane Valve Group; Crane Valves.
  - c. Crane Co.; Crane Valve Group; Jenkins Valves.
  - d. Crane Co.; Crane Valve Group; Stockham Division.
  - e. Hammond Valve.
  - f. Kitz Corporation.

- g. Milwaukee Valve Company.
- h. NIBCO INC.
- i. Powell Valves.
- j. Red-White Valve Corporation.
- k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

- a. Standard: MSS SP-80, Type 3.
- b. CWP Rating: 200 psig.
- c. Body Design: Horizontal flow.
- d. Body Material: ASTM B 62, bronze.
- e. Ends: Threaded
- f. Disc: Bronze

2.4 GLOBE VALVES

A. Class 125, Bronze Globe Valves with Nonmetallic Disc:

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

- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Crane Co.; Crane Valve Group; Stockham Division.
- c. NIBCO INC.
- d. Red-White Valve Corporation.

2. Description:

- a. Standard: MSS SP-80, Type 2.
- b. CWP Rating: 200 psig.
- c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
- d. Ends: Threaded or solder joint.
- e. Stem: Bronze.
- f. Disc: PTFE or TFE.
- g. Packing: Asbestos free.
- h. Handwheel: Malleable iron, bronze.

PART 3 - EXECUTION

3.1 VALVE INSTALLATION

- A. Install valves with unions or flanges at every piece of equipment arranged to isolate individual piece of equipment and allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.

- D. Install valves in position to allow full stem movement.
- E. Install swing check valves for proper direction of flow and in horizontal position with hinge pin level.

### 3.2 VALVE MAP

- A. Provide a minimum 8-1/2x11 laminated floor plan of the building indicating the locations of all water shut off valves.

### 3.3 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

### 3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
  - 1. Shutoff Service: Ball, butterfly, or gate valves.
  - 2. Throttling Service: Globe valves.
  - 3. Pump-Discharge Check Valves:
    - a. NPS 2 and Smaller: Bronze swing check valves with bronze .
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
  - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
  - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
  - 3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
  - 4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
  - 5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
  - 6. For Steel Piping, NPS 5 and Larger: Flanged ends.

### 3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
  - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
  - 2. Bronze Angle Valves: Class 125, bronze disc.
  - 3. Ball Valves: Two piece, full port, bronze with bronze trim.
  - 4. Bronze Swing Check Valves: Class 125, metallic disc.

5. Bronze Gate Valves: Class 125, NRS.
6. Bronze Globe Valves: Class 125, nonmetallic disc.

**END OF SECTION 220523**

## **SECTION 22 0529**

### **HANGERS & SUPPORTS FOR PIPING SYSTEMS**

#### **PART 1 – GENERAL**

##### **1.1 RELATED DOCUMENTS**

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

##### **1.2 SCOPE**

- A. The Contractor shall furnish and install all pipe hangers, supports, and supplementary structural steel beams as required for the plumbing piping and equipment systems.

##### **1.3 DELEGATED DESIGN**

- A. Detailed design of mechanical pipe supports and seismic restraints is the responsibility of the wastewater treatment plant equipment provider. Pipe supports shall be modelled and provided where required by the supplier.
- B. Provide pipe supports and seismic-restraints complying with the requirements of the applicable International Building Codes, ASME Codes, and industry standards (e.g. MSS SP-58, Pipe Hangers and Supports and MSS SP-127, Bracing For Piping Systems: Seismic - Wind - Dynamic Design, Selection, And Application).

##### **1.4 SUBMITTALS**

- A. Product data sheets for pipe hangers, supports, expansion bolts, adhesive anchors, dielectric materials, and spring hangers.
- B. Shop drawings for pipe support structural steel and seismic restraints.

#### **PART 2 – PRODUCTS**

##### **2.1 PIPE SUPPORT COATINGS**

- A. All pipe support materials located outdoors shall be galvanized, or stainless steel.

##### **2.2 HANGER RODS**

- A. Hanger rods shall be stainless steel with threads conforming to ANSIB1.1.
- B. Minimum rod size shall be as follows:

<u>Pipe Size</u>	<u>Hanger Rod Diameter</u>
2" and under	3/8"
2-1/2", 3"	1/2"
4"	5/8"
6"	3/4"
8" thru 12"	7/8"
14" thru 18"	1"
20" thru 24"	1-1/4"

## 2.3 UPPER ATTACHMENTS

- A. Unless otherwise shown or specified upper attachments shall be as follows:
- 2" and under (optional): C-clamp with locknut (Fig. 86)
  - 4" and under: Malleable beam clamp with extension piece (Fig. 229) or welded beam attachment (Fig. 66) with bolt and weldless eye nut (Fig. 290).
  - 6" and above: Beam clamp with weldless eye nut (Fig. 292) or welded beam attachment (Fig. 66) with bolt and weldless eye nut (Fig. 290).
- B. Unless otherwise shown or specified upper attachments for structural concrete ceilings shall be as follows:
- Concrete single lug plate (Anvil Fig. 47 or equal) or clevis plate (Anvil Fig. 49 or equal). Expansion anchors shall be stainless steel.
  - For pipe 3" and under (optional): Carbon steel, drop-in type female expansion anchor.
- C. Provide medium welded steel brackets (Fig. 195) for small bore pipe (2" or less) supported from concrete or masonry walls, if shown on Drawings.
- D. Piping 2-1/2" and smaller may be supported eccentrically (9" maximum) with 3 x 3 x 1/4" angles welded to columns or beams which are at least 8" deep.
- E. Not more than one eccentric attachment per beam will be permitted.

## 2.4 U-BOLTS

- A. U-bolts for stainless steel pipe shall be stainless steel furnished with four hex nuts and two jam nuts.

## 2.4 PIPE STANCHIONS

- A. Pipe stanchions shall be fabricated from Schedule 40 pipe and 3/8" thick base plate.
- B. Stanchion size shall be half the size of the pipe being supported but not less than 2" diameter.
- C. Bolt base plate to floor with minimum 1/2" stainless steel expansion anchors.

## 2.5 EXPANSION BOLTS



- A. Expansion bolts and nuts used in connection with pipe support structures shall be stainless steel, Hilti “Kwik Bolt III” or approved equal by Powers or RedHead.
- B. Embedment shall be as follows, unless noted otherwise:

<u>Bolt Diameter, in.</u>	<u>Embedment, in.</u>
1/2	3-1/2
5/8	4
3/4	4-3/4
1	6

**2.5 ADHESIVE ANCHORS**

- A. Anchors for fastening to concrete shall be adhesive type consisting of a two-part resin adhesive contained in a cartridge and 304SS anchor bolts with washer and nut, Hilti HIT HY200 with HIT-Z-R anchor bolt with minimum 6” embedment, or approved equal by Powers or Red Head.
- B. Anchors for fastening to masonry shall be adhesive type consisting of a two-part resin adhesive contained in a cartridge, 304SS screen tube (for hollow construction) and 304SS thread rod with washer and nut, Hilti HIT HY20 or approved equal by Powers or Red Head.
  - 1. Pipe supports from masonry shall be installed only after review and approval by the Engineer.

**PART 3 – EXECUTION**

**3.1 INSTALLATION**

- A. All piping shall be supported by suitable hangers to prevent excessive stress, swaying, sagging, or vibration.
- B. Piping shall not be so restrained, however, as to cause it to snake or buckle between supports or anchors or to prevent movement due to expansion and contraction.
- C. Hangers and supports shall be complete, including lock nuts, clamps, rods, bolts, couplings, swivels, inserts, required accessory items and secondary structural steel members.
- D. Pipes shall be supported individually unless shown otherwise on drawings.
- E. Provide supports, where pipe changes direction and at equipment connections.
- F. Provide at least one hanger adjacent to each joint with mechanical couplings.
- G. Weld pipe saddles to pipe.
- H. Provide supplemental pipe support structural steel suitable for the applied loads as necessary to properly support all pipe.

**3.2 SPACING**

- A. Unless otherwise shown on the Drawings the maximum spacing of supports for horizontal piping shall be as follows:

<u>Steel Pipe:</u>	<u>Maximum Spacing, ft.</u>	
	<u>Steam, Liquids</u>	<u>Air &amp; Gases</u>
1/2"	5	6
3/4"	6	8
1"	7	9
1-1/4"	8	10
1-1/2"	9	11
2"	10	13
2-1/2"	11	14
3"	12	15
4"	14	17
6"	17	21
8"	19	24
10"	21	27
12"	23	30
16"	27	
18"	34	
24"	40	

- B. Vertical pipe runs shall be supported and laterally braced at every floor level in multi-story structures and laterally braced only, at intervals not exceeding 15' (10' for 3" pipe and under) in other structures.

### 3.3 EXPANSION & ADHESIVE ANCHORS

- A. Install in accordance with manufacturer's instructions.

### 3.4 SEISMIC BRACING

- A. Provide seismic (lateral and longitudinal) bracing for all piping with hanger length greater than 12" from the top of the pipe to the bottom of the support for the hanger.
- B. Bracing shall be installed in such location and manner so as not to restrict thermal movement for hot piping.
- C. Unless otherwise shown or approved, a pipe hanger used for lateral and longitudinal bracing shall include the following:
1. Clevis type hanger with pipe sleeve over horizontal through bolt.
  2. 2 x 2 x 3/16 diagonal (1:1 slope) angle struts attached with bent clip angle to one side of hanger at through bolt. Weld or bolt other end of diagonal to support structure.
  3. 2x 2 x 3/16 angle to brace hanger rod for rods over 3' long. Weld angle to rod with 1/8" weld spaced 1" at 24" on center.

**END OF SECTION 22 0529**

**SECTION 22 1116**  
**DOMESTIC WATER PIPING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Copper tube and fittings.
  - 2. Piping joining materials.
  - 3. Transition fittings.
  - 4. Dielectric fittings.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For transition fittings and dielectric fittings.
- B. RFI's related to coordination items will not be reviewed unless coordination drawings have been submitted.

**1.4 INFORMATIONAL SUBMITTALS**

- A. System purging and disinfecting activities report.
- B. Field quality-control reports.

**1.5 FIELD CONDITIONS**

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
  - 1. Notify Owner no fewer than 4 days in advance of proposed interruption of water service.
  - 2. Do not interrupt water service without Owner's written permission.

## 1.6 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for potable domestic water piping and components.
- C. To assure uniformity and compatibility of piping components in grooved end piping systems, all grooved products utilized shall be supplied by the same manufacturer. Grooving tools shall be supplied by the same manufacturer as the grooved components.

## 1.7 REFERENCES

- A. ASTM International (ASTM):
  1. ASTM D 2765 - Test Methods for Determination of Gel Content and Swell Ratio of Crosslinked Ethylene Plastics.
  2. ASTM D 6394 - Specification for Sulfone Plastics (SP).
  3. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  4. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
  5. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

## PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."
- C. Comply with NSF 372 for low lead.

## 2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
- B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.
- C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
- D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- F. Copper Unions:
  - 1. MSS SP-123.
  - 2. Cast-copper-alloy, hexagonal-stock body.
  - 3. Ball-and-socket, metal-to-metal seating surfaces.
  - 4. Solder-joint or threaded ends.
- G. Copper Press-Connect Fittings:
- H. Press fitting: copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of ASME B16.51 and IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press ends shall have Smart Connect® technology. In ProPress ½" to 4" dimensions, Smart Connect technology allows identification of an unpressed fitting during pressure testing. The function of this feature is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation

## 2.3 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials:
  - 1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
  - 2. Full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys.
- D. Flux: ASTM B 813, water flushable.
- E. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
- F. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

## 2.4 TRANSITION FITTINGS

### A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

### B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

### C. Sleeve-Type Transition Coupling: AWWA C219.

### D. Plastic-to-Metal Transition Fittings:

#### 1. Description:

- a. CPVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
- b. One end with threaded brass insert and one solvent-cement-socket or threaded end.

### E. Plastic-to-Metal Transition Unions:

#### 1. Description:

- a. CPVC four-part union.
- b. Brass or stainless-steel threaded end.
- c. Solvent-cement-joint or threaded plastic end.
- d. Rubber O-ring.
- e. Union nut.

## 2.5 DIELECTRIC FITTINGS

### A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

### B. Dielectric Flanges:

1. Standard: ASSE 1079.
2. Factory-fabricated, bolted, companion-flange assembly.
3. Pressure Rating: 125 psig minimum at 180 deg F.
4. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

### C. Dielectric-Flange Insulating Kits:

1. Nonconducting materials for field assembly of companion flanges.
2. Pressure Rating: 150 psig.
3. Gasket: Neoprene or phenolic.
4. Bolt Sleeves: Phenolic or polyethylene.
5. Washers: Phenolic with steel backing washers.

D. Dielectric Nipples:

1. Standard: IAPMO PS 66.
2. Electroplated steel nipple complying with ASTM F 1545.
3. Pressure Rating and Temperature: 300 psig at 225 deg F.
4. End Connections: Male threaded or grooved.
5. Lining: Inert and noncorrosive, propylene.

### PART 3 - EXECUTION

#### 3.1 EARTHWORK

- A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

#### 3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install underground copper tube and ductile-iron pipe in PE encasement according to ASTM A 674 or AWWA C105/A21.5.
- D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."
- E. Install shutoff valve immediately upstream of each dielectric fitting.
- F. Install valves to isolate at a minimum each wing of a building, each room, each mechanical room, each piece of equipment and elsewhere as shown on the plans.
- G. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

- H. Install domestic water piping level with 0.25 percent slope downward toward drain.
- I. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- K. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- L. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- M. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- N. Install piping to permit valve servicing.
- O. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- P. Install piping free of sags and bends.
- Q. Install fittings for changes in direction and branch connections.
- R. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- S. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping."
- T. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 221123 "Domestic Water Pumps."
- U. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."
- V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- W. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- X. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."



### 3.3 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Braze Joints" chapter.
- E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
- G. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- H. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

### 3.4 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Underground Domestic Water Piping:
  - 1. Fittings for NPS 1-1/2 and Smaller: Fitting-type coupling.
  - 2. Fittings for NPS 2 and Larger: Sleeve-type coupling.
- C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

### 3.5 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings.

- C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flange kits.
- D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

### 3.6 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices.
- B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
  - 1. Vertical Piping: MSS Type 8 or 42, clamps.
  - 2. Individual, Straight, Horizontal Piping Runs:
    - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
  - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
  - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
  - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
  - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
  - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
  - 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
  - 6. NPS 6: 10 feet with 5/8-inch rod.
  - 7. NPS 8: 10 feet with 3/4-inch rod.
- F. Install supports for vertical copper tubing every 10 feet.
- G. Support piping and tubing not listed in this article according to MSS SP-58 and manufacturer's written instructions.

### 3.7 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
  - 1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
  - 2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
  - 3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
  - 4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

### 3.8 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."
- B. Label pressure piping with system operating pressure.

### 3.9 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Piping Inspections:
    - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
    - b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
      - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
    - c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
    - d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

- a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
- b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
- c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
- d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
- e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
- f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
  - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
  - b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.

**END OF SECTION 22 1116**

## **SECTION 22 1218 PUMPING EQUIPMENT**

### **PART 1 – GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Sewage Pumps
  - 2. Water Well Pumps

#### **1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Iron and Steel Institute (AISI):
    - a. Steel Products Manual.
  - 2. ASTM International (ASTM):
    - a. A48, Standard Specification for Gray Iron Castings.
    - b. B62, Standard Specification for Composition Bronze or Ounce Metal Castings.

#### **1.3 SUBMITTALS**

- A. Shop Drawings
  - 1. Product Technical Data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
    - b. Manufacturer's installation instructions.
- B. Operation and Maintenance Manuals:
  - 1. The mechanics and administration of the submittal process.
  - 2. The content of Operation and Maintenance Manuals.

### **PART 2 – PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. All pumps:
    - a. Franklin
    - b. Pentair
    - c. Approved Equals to be review by Engineer

#### **2.2 MATERIALS**

- A. Vertical Pumps:

1. Pump casing:
  - a. Stainless steel, AISI Type 304
2. Impeller:
  - a. Stainless steel, AISI Type 304
3. Shaft:
  - a. Stainless steel, AISI Type 304.
4. Lifting Cables: Stainless steel.

## 2.3 EQUIPMENT

- A. Performance and Configuration Requirements:
  1. WELL PUMPS
    - a. Franklin TRI-SEAL
    - b. Horsepower – 3
    - c. 1 Phase – 230 Volts
    - d. 35 GPM SERIES PUMP
    - e. Pump configuration: Submersible.
  2. SEPTIC EFFLUENT PUMPS
    - a. PENTAIR STA-RITE STEP PLUS D SERIES
    - b. Model 20DOMO5121+1
    - c. Horsepower – 0.5
    - d. 1 Phase – 230 Volts
    - e. Pump configuration: Submersible.

## 2.4 INSTRUMENTATION AND CONTROLS

- A. Control Panel – Pumping equipment:
  1. Furnish and install locally mounted automatic control panel at location shown on Drawings and rated for area classification.
  2. Include a terminal board for connection of level sensors.
  3. Provide the following features:
    - a. UL 698A.
    - b. NEMA 4X stainless steel watertight enclosure with continuous hinge, neoprene gasket in cover and continuous seam weld. Include locking mechanism complete with padlock.
    - c. Hand-Off-Automatic selector switches.
    - d. Surge protection.
    - e. Condensation heater.
    - f. Moisture detector alarm light and pump shutdown.
    - g. Control power transformer or power supply as necessary.
    - h. Remote leak/temperature alarm contact to shutdown pump as shown on the Drawings.
    - i. Inner door in cabinet-mounted on a continuous vertical steel hinge; size to completely cover wiring and components mounted on the back panel; provide for mounting of controls and instruments on inner door.
    - j. Wall mounting brackets as needed.
    - k. Pole mounting brackets as needed.
  4. Float switch assembly:
    - d. Stainless steel float.
    - e. Provide pump off float.

- f. Provide float to operate at elevation shown on the Drawings.
  - g. Provide intrinsic safety barrier for float switch.
  - h. Design float to be field-adjustable.
- B. Temperature Monitor - All Pumps:
- 1. Furnish each phase of the motor with a temperature monitor embedded in the motor windings.
  - 2. Provide pump supervision relay for temperature and moisture sensor control. Coordinate with MCC manufacturer for integration of pump supervision relay into MCC
  - 3. Set temperature of the pump supervision relay temperature monitors at not higher than 90 PCT of insulation temperature rating.
- C. Moisture Sensor - All Sump Pumps:
- 1. Provide electrical probe as needed for detecting presence of water in the seal chamber and motor housing:
    - a. If water enters, the probe shall energize electrical circuit through pump supervision relay for external alarm.
    - b. See pump supervision relay requirements under temperature monitor section.

## **2.5 FABRICATION**

- A. General:
- 1. Pump casing uniform and free from blowholes or other defects and designed to withstand 150 PCT of shutoff head.
  - 2. Equipped with bolted-on strainer with opening equal to specified solids passage of pump.
- B. Impeller:
- 1. Key to pump shafts with same material as shaft.
  - 2. Provide positive means of external axial adjustment of shaft and impeller.

## **PART 3 – EXECUTION (NOT USED)**

**END OF SECTION 221218**

**SECTION 22 1313**  
**FACILITY SANITARY SEWERS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section. Also refer to:
  - 1. Section 31 1000 – Site Clearing
  - 2. Section 31 2000 – Earth Moving

**1.2 SUMMARY**

- A. Section includes:
  - 1. Pipe and fittings.
  - 2. Cleanouts.
  - 3. Encasement for piping.
  - 4. Manholes.

**1.3 DEFINITIONS**

- A. FRP: Fiberglass-reinforced plastic.

**1.4 SUBMITTALS**

- A. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Do not store plastic pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals, from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

**1.6 PROJECT CONDITIONS**

- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Architect, Construction Manager, and Owner no fewer than one week in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of service without Owner's written permission.



## **PART 2 - PRODUCTS**

### **2.1 PVC PIPE AND FITTINGS**

- A. PVC Gravity Sewer Piping:
  - 1. Pipe and Fittings: ASTM F 679 PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

### **2.2 CLEANOUTS**

- A. Cast-Iron Cleanouts:
  - 1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
  - 2. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

### **2.3 MANHOLES**

- A. Standard Precast Concrete Manholes:
  - 1. Description: ASTM C 478 precast, reinforced concrete, of depth indicated, with provision for sealant joints.
  - 2. Diameter: 48 inches minimum unless otherwise indicated.
  - 3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
  - 4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
  - 5. Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
  - 6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
  - 7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
  - 8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
  - 9. Steps: Individual ASTM A 615, deformed, ½-inch steel reinforcing rods encased in ASTM D 4101, PP 12-inches wide and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls uniformly at 16-inch intervals max. Omit steps if total depth from floor of manhole to finished grade is less than 24-inches.
  - 10. Grade Rings: Reinforced-concrete rings, 8-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.
- B. Manhole Frames and Covers:
  - 1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch- minimum-width flange and 26-inch diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
  - 2. Material: ASTM A 48, Class 35 gray iron unless otherwise indicated.

### **2.4 CONCRETE**

- A. General: Cast-in-place concrete complying with ACI 318, ACI 350/350R, and the following:
  - 1. Cement: ASTM C 150, Type ii
  - 2. Fine Aggregate: ASTM C 33, sand

3. Coarse Aggregate: ASTM C 33, crushed gravel
  4. Water: potable
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
1. Reinforcing Fabric: ASTM A 185, steel, welded wire fabric, plain.
  2. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel.

## **PART 3 - EXECUTION**

### **3.1 EARTHWORK**

- A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

### **3.2 PIPING INSTALLATION**

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fitting for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure, drainage piping according to the following:
1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
  2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
  3. Install piping with 36-inch cover unless otherwise noted.
  4. Install PVC gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
- G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

### **3.3 PIPE JOINT CONSTRUCTION**

- A. Join gravity-flow, nonpressure, drainage piping according to the following:

1. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints for ASTM D 3034 for elastomeric-gasket joints.
  2. Join dissimilar pipe materials with nonpressure-type flexible couplings.
- B. Pipe couplings, expansion joints, and deflection fitting with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
    - a. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

### **3.4 MANHOLE INSTALLATION**

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Form continuous concrete channels and benches between inlets and outlet.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

### **3.5 CONCRETE PLACEMENT**

- A. Place cast-in-place concrete according to ACI 318.

### **3.6 CLEANOUT INSTALLATION**

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
  1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
  2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
  3. Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
  4. Extra-Heavy-Duty, top-loading classification cleanout in roads.
- B. Set cleanout frames and covers in earth cast-in-place-concrete block, 24 by 24 by 6 inches deep. Set with tops 1 inch above surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

### **3.7 CONNECTIONS**

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Division 22 Section "Sanitary Waste and Vent Piping."
- B. Make connections to existing piping and underground manholes.
  1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

### **3.8 CLOSING ABANDONED SANITARY SEWER SYSTEMS**

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below.
  1. Close open ends of piping with at least 8-inch thick, brick masonry bulkheads.
  2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:
  1. Remove manhole and close open ends of remaining piping.
  2. Remove top of manhole down to at least 36 inches below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade abandoned to Division 31 Section "Earth Moving."

### **3.9 IDENTIFICATION**

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
  1. Use detectable warning tape over ferrous piping.
  2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

### **3.10 FIELD QUALITY CONTROL**

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
  1. Submit separate report for each system inspection.
  2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.
  3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
  4. Reinspect and repeat procedure until results are satisfactory.

- B. Test new piping systems, and parts of existing that have been altered, extended, or repaired, for leaks and defects.
  - 1. Do not enclose, cover, or put into service before inspection and approval.
  - 2. Test completed piping systems according to requirements of authorities having jurisdiction.
  - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.
  - 4. Submit separate report for each test.
  - 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
    - a. Fill sewer piping and water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
    - b. Close openings in systems and fill with water.
    - c. Purge air and refill with water.
    - d. Disconnect water supply.
    - e. Test and inspect joints for leaks.
  - 6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
    - a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
    - b. Option: Test concrete gravity sewer piping according to ASTM C 924.
  - 7. Manholes: Perform hydraulic test according to ASTM C 969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

### **3.11 CLEANING**

- A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

**END OF SECTION 22 1313**

## SECTION 22 1353 – SEPTIC TANKS & PIPING

### PART 1 - GENERAL

#### 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.

#### 2. SUMMARY

- a. Section Includes:
  - 1) Septic tanks.
  - 2) Dosing tanks.
  - 3) Distribution boxes.
  - 4) Pipe and fittings.
  - 5) Absorption systems.

#### 3. ACTION SUBMITTALS

- a. Product Data: For each type of product indicated.
  - 1) Include construction details, material descriptions, dimensions of individual components, and profiles.
  - 2) Include manhole openings, covers, and pipe connections.
  - 3) Provide shop drawings of all septic tanks including anchorage systems to prevent tank flotation and/or calculations proving tanks are not capable of flotation.
- b. Shop Drawings: For drip irrigation absorption systems
  - 1) Include manhole openings, covers, pipe connections, and accessories.
  - 2) Include piping with sizes and invert elevations, fittings, tees and unions
  - 3) Include underground structures.
  - 4) Include other utilities.
  - 5) Include Drip Irrigation Tubing and Connectors
  - 6) Include Hydro-indexing Control Valves
  - 7) Include Air Release Valves
  - 8) Include Disc Filters
  - 9) Include level control Floats
  - 10) Include Shop Drawings of Aerated Treatment Units
  - 11) Include Shop Drawings of Air Blower Systems

#### **4. PROJECT CONDITIONS**

- a. Interruption of Existing Sewer System Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1) Notify Owner no fewer than two days in advance of proposed interruption of service.
  - 2) Do not proceed with interruption of service without Owner's written permission.

### **PART 2 - PRODUCTS**

#### **1. CONCRETE SEPTIC TANKS AND AERATED TREATMENT UNITS**

- a. Description: ASTM C1227, precast, reinforced-concrete tank and covers; quantity of chambers as shown on plans and details
- b. Design: For HS-10 traffic loading in vehicular traffic areas and HS-10 loading in pedestrian areas according to ASTM C890.
- c. Manholes: 24" minimum diameter opening with reinforced-concrete risers to grade and access lid with steel lift rings. Include manhole in center of each septic tank compartment top.
- d. Filter Access: Reinforced-concrete access hole, large enough to remove filter, over filter position.
- e. Inlet and Outlet Access: 24" minimum diameter, cast iron lids. Include access centered over inlet and outlet.
- f. Resilient Connectors: ASTM C923, of size required for piping, fitted into inlet and outlet openings.
- g. Advanced Treatment unit basis of design shall be Eco-Pod N Series with Air Blower System. System shall meet NSF/ANSI 40 Certifications. Substitutions shall be requested in writing.
- h. Capacity and Characteristics:
  - 1) Capacity: As shown on Plans
  - 2) Inlet and Outlet Size: As shown on Plans

#### **2. FILTERS**

- a. Description: Removable manual 100-micron disc filter prior to drip field equal to Netafim Manual Disc Filter
- b. Housing: HDPE or PVC.
- c. Outlet Size: As shown on Plans

#### **3. DOSING TANKS**

- a. Description: Comply with ASTM C913 for precast, reinforced-concrete tank and cover; designed for structural loading according to ASTM C890.

- b. Design: For HS-10 traffic loading in vehicular traffic areas and HS-10 loading in pedestrian areas according to ASTM C890
- c. Manholes: 24" minimum diameter opening with reinforced-concrete risers to grade and access lid with steel lift rings. Include manhole in center of each septic tank compartment top.
- d. Resilient Connectors: or other watertight seal, of size required for piping, fitted into inlet and outlet openings.
- e. Capacity and Characteristics:
  - f. Capacity and Characteristics:
    - 1) Capacity: As shown on Plans
    - 2) Inlet and Outlet Size: As shown on Plans

#### **4. HYDRO-INDEXING VALVE**

- a. Description: Provide Fimco 2000 series Hydro-indexing Valve or approved equal.
- b. Valve shall be 1.25" size and made for the quantity of zone outlets as shown on the plans, but no more than 6 zones.

#### **5. PE DISTRIBUTION PIPE AND FITTINGS**

- a. Tube and Fittings: ASTM F405, perforated corrugated tube with solid-wall fittings.
- b. Couplings: PE band, matching tube and fitting dimensions.
- c. Basis of Design for Drip Irrigation Tubing shall be either Netafim for GeoFlow. Any other substitution requests shall be presented to the engineer for review.

#### **6. PVC DISTRIBUTION PIPE AND FITTINGS**

- a. Pipe and Fittings: ASTM D2729, perforated, for solvent-cemented joints.
- b. Solvent Cement: ASTM D2564. Include primer according to ASTM F656.

#### **7. NONPRESSURE PIPE COUPLINGS**

- a. Description: Comply with ASTM C1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, with corrosion-resistant-metal tension band and tightening mechanism on each end.
  - 1) Sleeve Materials for Plastic Pipes: ASTM F477, elastomeric seal or ASTM D5926, PVC.
  - 2) Sleeve Materials for Dissimilar Pipes: ASTM D5926, PVC or other material compatible with pipe materials being joined.



## **PART 3 - EXECUTION**

### **1. EARTHWORK**

- a. Excavating, trenching, and backfilling for piping are specified in Section 312000 "Earth Moving."
  - 1) Stockpile topsoil for reuse in finish grading without intermixing with other excavated material. Stockpile materials away from edge of excavation and do not store within drip line of remaining trees.
  - 2) Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- b. Excavating and Backfilling for Septic and Dosing Tanks:
  - 1) Excavate sufficient width and length for tanks to depth determined by tank inlet elevation. Provide level bottom.
  - 2) Backfill with excavated soil, mounding soil above original grade without compacting.

### **2. SEPTIC TANK INSTALLATION**

- a. Install precast concrete septic tanks according to ASTM C891.
- b. Install septic tanks level.
- c. Connect septic tank to concrete ballast pad or provide anti-flotation anchorage system.
- d. Install filter in septic tank outlet where shown on plans
- e. Fill septic tank with water.

### **3. DOSING TANK INSTALLATION**

- a. Install dosing tanks according to ASTM C891.
- b. Install dosing tanks level.
- c. Install automatic siphons embedded in precast-concrete dosing tank. Make direct connections to distribution piping.
- d. Set submersible effluent pumps on dosing tank floor. Make direct connections to distribution piping. Comply with requirements for effluent pumps specified in Section 221329 "Sanitary Sewerage Pumps."
- e. Fill dosing tanks with water.

### **4. PIPING INSTALLATION**

- a. Comply with requirements for sewer pipe installation specified in Section 221313 "Facility Sanitary Sewers."
- b. Install distribution piping according to the following:
  - 1) PE Tube and Fittings: ASTM F481.
  - 2) PVC Sewer Pipe and Fittings: ASTM F481.

## **5. PIPE JOINT CONSTRUCTION**

- a. Join distribution piping with or according to the following:
  - 1) Install pipe and fittings for drip irrigation systems with closed joints unless otherwise indicated.
  - 2) PE Tube and Fittings: With PE band couplings.
  - 3) PVC Sewer Pipe and Fittings: With solvent-cemented joints according to ASTM F402 and ASTM D2321.
- b. Join dissimilar pipe materials according to ASTM D5926, with couplings and gaskets compatible with pipe materials being joined.

## **6. CLEANOUT INSTALLATION**

- a. Install cleanouts according to the following:
  - 1) Inlet and Outlet of Septic Tanks: PVC cleanouts.
  - 2) Inlet and Outlet of Dosing Tanks: PVC cleanouts.
  - 3) At Each Change in Direction of Sewer Piping: PVC cleanouts.
- b. Comply with requirements for cleanouts specified in Section 221313 "Facility Sanitary Sewers."
- c. Cast-Iron Cleanouts: Install with PVC riser from sewer and distribution piping to cast-iron cleanout housing at grade. Use SDR 35 PVC sewer pipe and fittings with solvent-cemented joints for risers. Attach riser to cleanout housing with rubber gasket or coupling.
- d. PVC Cleanouts: Install with PVC riser from sewer and distribution piping to PVC cleanout at grade. Use SDR 35 PVC sewer pipe and fittings with solvent-cemented joints for risers and cleanout fitting.
- e. Set top of cleanout 1" above surrounding rough grade, or set flush with grade if installed in pavement.

## **7. DRIP IRRIGATION -SYSTEM INSTALLATION**

- a. Install drip irrigation tubing as flat as possible, but not over 0.5% slope in any direction.
- b. Drip irrigation tubing should be plowed in 10" deep into the soil with minimal disturbance to the surrounding soil.

## **8. IDENTIFICATION**

- a. Identification materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green, detectable warning tape directly over piping, at outside edges of underground structures, and at outside edges of absorption systems.

## **9. FIELD QUALITY CONTROL**

- a. System Tests: Perform testing of completed septic tank system piping and structures according to authorities having jurisdiction.

- b. Additional Tests: Fill underground structures with water and let stand overnight. If water level recedes, locate and repair leaks and retest. Repeat tests and repairs until no leaks exist.

**10. CLEANING**

- a. Clear interior of piping and structures of dirt and other superfluous material as work progresses.
- b. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of workday or when work stops.

**END OF SECTION 22 1353**

## SECTION 23 0501

### GENERAL MECHANICAL REQUIREMENTS FOR HVAC

#### 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 SCOPE

- A. The requirements of this section are applicable to all work performed under Division 23 – Heating, Ventilating, and Air Conditioning (HVAC).

##### 1.3 COORDINATION

- A. It is the intent of the Mechanical Division of these Specifications that all mechanical work specified herein be coordinated as required with the work of all other Divisions of the Specifications and Drawings so that all installations shall operate as designed.
- B. All systems shall be completely assembled, tested, adjusted and demonstrated to be ready for operation to the satisfaction of the Owner's Representative.
- C. The Contractor shall note that piping, ductwork and equipment as shown on the Drawings provide general location and routing information only. The Contractor shall be responsible for providing interference free systems with proper clearance to facilities and equipment.
- D. The Contractor shall note that configuration and dimensions of equipment may vary from that shown on the Drawings depending on the equipment supplied. The Contractor shall be responsible for making the necessary modifications to connecting piping, ducts, bases, etc. required by the equipment supplied.
- E. Where the word "provide" is used, it shall mean "furnish and install" unless otherwise noted or specified.

##### 1.4 SUBMITTALS

- A. Submittals shall be furnished under this Division for approval in accordance with the procedures outlined in Division 1 and the separate sections of this Division.
- B. Submittals shall include complete data including physical dimensions and other information required for installation as well as performance capabilities and limitations. Provide schedules indicating locations when more than one type of an item is to be used. All shop drawings must be certified as being correct for the proposed work.
- C. Shop drawings, brochures or catalog cuts showing more than one size or model shall be marked to indicate the size or model proposed for the particular application.

- D. Prior to submitting for approval, submittals shall be coordinated with the work of all other trades.
- E. Submittals shall be identified as to the specific equipment for which the submittal relates. Identification shall be by reference to equipment numbers as shown on the Drawing or by reference to the appropriate Article of the Specifications in which the equipment is specified.

## **1.5 INSTRUCTION MANUALS**

- A. Instruction manuals shall be furnished to Owner's Representative prior to start-up. Manuals shall be bound with table of contents and tabs for each section. Each set is to include the following information for all equipment furnished:
  - 1. Manufacturer's parts list identified with the make, model and serial number of the equipment furnished.
  - 2. Schematic control, flow and wiring diagrams identifying the location and function of all system components, valves and controls.
  - 3. Installation, operation, lubrication and maintenance instructions.
  - 4. Manuals shall incorporate design basis, drawings, flow diagrams, brochures and operating instruction in sufficient detail to enable operators to understand the equipment or system, its operation, limitations and maintenance needs.

## **1.6 CODES AND STANDARDS**

- A. Governing federal, state and local laws, codes and standards constitute minimum requirements and strict compliance therewith is required unless supplemented and/or modified by more stringent requirements of the Contract Documents.
- B. Installation of HVAC systems and equipment shall comply with all applicable codes. These shall include the latest edition of the following:
  - 1. International Mechanical Code
  - 2. International Plumbing Code
- C. All equipment, apparatus and systems shall be fabricated and installed in complete accordance with the latest edition or revision of the following applicable regulations, standards and codes:
  - 1. ANSI - American National Standards Institute
  - 2. ARI - Air Conditioning and Refrigeration Institute
  - 3. AABC - American Air Balance Council
  - 4. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
  - 5. ASME - American Society of Mechanical Engineers
  - 6. ASSE - American Society of Sanitary Engineering
  - 7. ASTM - American Society for Testing and Material

8. AMCA - Air Moving and Conditioning Association
9. AWS - American Welding Society
10. BOCA - Building Officials and Code Administrators
11. NFPA – National Fire Prevention Association
12. IMC – International Mechanical Code
13. IPC – International Plumbing Code
14. NEC – National Electric Code
15. NEMA – National Electric Manufacturers Association
16. NSF – National Sanitation Foundation
17. PDI – Plumbing and Drainage Institute
18. OSHA – Occupational Safety and Health Administration
19. SMACNA – Sheet Metal and Air Conditioning Contractors National Association
20. UL – Underwriters Laboratories, Inc.

## **1.7 QUALITY STANDARDS**

- A. All materials and equipment furnished under these Specifications shall be new and to the extent possible, standard products of the various manufacturers except where special construction or performance features are called for. Where more than one of the specific items is required, all shall be of the same type and manufacture.
- B. The product of manufacturers shall be acceptable only when that product complies with or is modified as necessary to comply with all specified and indicated requirements in the Contract Documents.
- C. Materials and equipment not herein specified or indicated as to manufacture but necessary for complete functioning systems shall be provided from sources conforming to the quality levels and functional requirements for corresponding materials and equipment set forth herein.

## **PART 2 – PRODUCTS**

### **2.1 NAMEPLATES**

- A. All equipment shall have factory applied permanent nameplates indicating the manufacturer's name, model and serial numbers, temperature and pressure design and any other data necessary to conform with specified requirements.

### **2.2 LIFTING ATTACHMENTS**

- A. All equipment requiring hoisting for installation and/or maintenance shall be provided with suitable lifting attachments by the manufacturer. Manufacturer's installation instructions shall detail correct lifting procedures to preclude equipment damage.

### **2.3 EQUIPMENT GUARDS**

- A. All rotating equipment including couplings, gear trains and belt drives shall be provided with adequate guards for personnel protection. Wherever possible, the guards shall be provided by the equipment manufacturer. The guards shall be supported to prevent vibration or interference with the rotating equipment and shall be removable. Guards shall conform to OSHA requirements.

### **2.4 EQUIPMENT PROTECTION**

- A. Equipment openings and connections shall be provided with adequate covers at the factory to protect the internals, threads and flanges and prevent entrance of any foreign matter prior to installation.
- B. Exposed machined surfaces of equipment such as shafts, bearing surfaces, gasket surfaces, gears, etc., shall be provided with adequate protection at the factory to prevent physical damage and corrosion prior to installation.

### **2.5 PAINTING AND FINISHES**

- A. All purchased equipment shall have a factory applied standard finish of the manufacturer's standard color unless otherwise specified.
- B. Finishes which are marred during shipping, handling or installation shall be touched up to match the original finish.
- C. Field fabricated bare iron or steel items required for installation of work under this Division shall have rough or sharp edges removed, be thoroughly cleaned of dirt, rust, weld slag, grease or oil.
- D. Comply with Division 09 requirements regarding paints and finishes.
  - 1. Subject to approval of Construction Representative, small field-fabricated bare iron or steel items such as small pipe support members may be painted with one prime coat of rust inhibiting primer.

### **2.6 LUBRICATION AND TOOLS**

- A. Provide a fresh charge of lubricant in accordance with the manufacturer's recommendations to all equipment requiring lubrication prior to start-up and maintain lubrication as required until acceptance by the Owner.
- B. Provide for each piece of equipment any special tools and a list of such tools required for the operation or adjustment of the equipment and turn over to the Owner's Representative prior to final acceptance of the equipment.

### **2.7 GROUT**

- A. Unless otherwise required by the equipment manufacturer, grout shall be non-metallic, non-shrink type, with 5000 psi compressive strength at 28 days.

## **PART 3 – EXECUTION**

### **3.1 WORK VERIFICATION AND FIELD MEASUREMENTS**

- A. All dimensions and clearances affecting the installation of work shall be verified in the field in relation to established datum, to building openings and to the work of other trades.
- B. Location of all equipment and systems shall be coordinated to preclude interferences with other construction.
- C. Should interferences occur which will necessitate deviations from layout or dimensions shown on the Drawings, the Owner's Representative shall be notified and any changes approved before proceeding with the work.

### **3.2 PERMITS AND INSPECTIONS**

- A. Contractor shall be responsible for obtaining the required permits governing the work from authorities having jurisdiction and shall assume the cost of permits and inspections.
- B. Upon completion of work, Contractor shall furnish to the Owner certificates of inspection or approval from the authorities having jurisdiction, if certificates of inspection or approval are required by law or regulations.

### **3.3 RECORD DRAWINGS**

- A. Contractor shall keep a written record of all deviations in location or elevation of piping and any underground or concealed installation from that shown on the Drawings. Records shall consist of clearly marked Drawings which shall be submitted to the Engineer after completion of construction.
- B. Underground utility services, both inside and outside of buildings, shall be dimensioned from permanent structures or bench mark. Utility services outside of buildings shall also show depth of burial or flow line with reference to the finished ground floor elevation.

### **3.4 ACCESSIBILITY**

- A. All work shall be installed so as to be accessible for operation, maintenance and repair with particular attention given to locating valves, controls and equipment requiring periodic lubrication, cleaning, adjusting or servicing of anykind.

### **3.5 FASTENING TO BUILDING STRUCTURES**

- A. The methods of attaching or fastening equipment or equipment supports or hangers to the building structure shall be subject to approval by the Owner's Representative at all times.
- B. Cutting, burning, drilling, welding or the use of explosive driven fasteners on building structures shall require prior approval by the Owner's Representative for each type of application unless specifically shown on the Drawings.



- C. Equipment or piping shall not be attached to or supported from the roof deck, from removable or knockout panels, or temporary walls or partitions unless specifically indicated on the Drawings.

### **3.6 THERMAL METAL JOINING AND CUTTING**

- A. All welding, brazing, soldering and cutting work shall conform to applicable provisions of the following codes and requirements:
  - 1. ASME Boiler and Pressure Vessel Code
  - 2. American National Standards Institute (ANSI) B31.1 (latest), Power Piping, and Addenda
  - 3. American Welding Society (AWS) D1.1 (latest) Structural Welding Code
- B. Welding shall be performed only by skilled welders.
- C. Welders and welding procedures employed on pressure vessel or pressure piping work performed under the ASME/ANSI code shall be qualified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code or with local codes where they take precedence. A record shall be maintained on the job showing the date and results of qualification test for each welder employed on the job for code welding. One certified copy of the qualification test for each welder so employed shall be furnished to the Owner.
- D. Welders and welding procedures employed on structural steel pipe and equipment supports shall be qualified by tests in the "Standard Qualification Procedure" of the AWS.
- E. A record shall be maintained on the job showing the date and results of qualification test for each welder employed on the job.
- F. Qualified weld procedures and one certified copy of the qualification test for each welder so employed shall be furnished to the Owner's Representative.
- G. Welding electrode storage shall, at a minimum, comply with the requirements of AWS D1.1, ANSI B31.1, ASME Boiler and Pressure Vessel Code, or the electrode manufacturer, whichever is most stringent.
- H. Contractor shall establish the proper quality control procedures and tests to insure that all welds comply with the applicable requirements of the codes referenced above.
- I. The Contractor shall test all pipe welds for proper quality using nondestructive, ultrasonic testing procedures.
  - 1. Testing shall be completed by Contractor's third party, certified weld inspector.
- J. Contractor shall complete any required repairs at Contractor's cost.
- K. All cutting residue shall be cleaned from the interior of pipes prior to welding or joining.

### **3.7 GROUTING**

- A. All mechanical equipment and pipe supports sitting on concrete shall be properly shimmed with stainless steel metal shims and grouted.
- B. Grout shall be placed to completely fill the area between the equipment and the concrete.
- C. Hollow equipment frames shall be completely filled with grout if recommended by the equipment manufacturer.

### **3.7 GROUTING**

- A. All mechanical equipment and pipe supports sitting on concrete shall be properly shimmed with stainless steel metal shims and grouted.
- B. Grout shall be placed to completely fill the area between the equipment and the concrete.
- C. Hollow equipment frames shall be completely filled with grout if recommended by the equipment manufacturer.

### **3.7 CUTTING AND PATCHING**

- A. All required openings shall be cut by the Contractor.
- B. Under no circumstances shall any structural members, loadbearing walls or footings be cut without first obtaining written permission from the Engineer and Owner's Representative.
- C. Cutting shall be in accordance with the following.
  - 1. Concrete or Masonry: All openings for pipe in concrete or masonry materials shall be core drilled. Square or rectangular openings shall be saw cut as necessary.
  - 2. Grating and Floor Plate: Openings in grating and steel floor plate shall be neatly cut without irregular edges.
  - 3. Roofing: All penetrations of roofing shall be made in strict accordance with manufacturer's recommended details so as not to void warranty.
- D. Patching shall be in accordance with the following.
  - 1. Concrete or Masonry: Install sleeves for piping penetrations in accordance with Section 232000. Patch the opening with grout finished smooth with adjacent surface.
  - 2. Grating: All openings cut in grating shall be banded.
- E. All below grade openings for pipe shall be sealed with interlocking synthetic rubber link assembly, Link-Seal by Thunderline Corporation or equal.

### **3.7 START-UP AND TESTS**

- A. The Contractor shall start-up the mechanical systems with his own personnel after obtaining approval for start-up from Owner's Representative. Owner's personnel shall be in attendance.

- B. The Contractor's performance of the start-up shall not constitute acceptance. The Work shall remain the responsibility of the Contractor until final acceptance.
- C. Any equipment or system placed in temporary operation for testing or for the convenience of Contractor during construction and before Owner takes over operation shall be properly operated and maintained by Contractor.
- D. All equipment and systems shall be protected against freezing, flooding, corrosion or other form of damage prior to acceptance by the Owner's Representative.
- E. Material or equipment damaged, shown to be defective, or not in accordance with the Specifications, shall be repaired or replaced to the satisfaction of Owner's Representative.
- F. Before starting up any system, each piece of equipment comprising a part of the system, shall be checked for proper lubrication, drive rotation, belt tension, continuity of controls, and any other condition which may cause damage to equipment or endanger personnel.
- G. Contractor shall provide a competent service representative trained in starting up and servicing the respective equipment for which he is responsible. Service representative shall be present to supervise the start-up of equipment and/or systems and training the Owner's personnel.
- H. Test runs shall be made over the full design load range when possible, or simulated to the satisfaction of Owner's Representative for other conditions. Tests shall continue for as long as necessary to demonstrate that systems will operate as designed.
- I. During start-up all necessary adjustments shall be made, controls checked for proper operation, motors checked for possible overload, and the entire system checked by Contractor for any abnormal condition.
- J. During the start-up and prior to acceptance of any system, Owner's designated operating personnel shall be instructed in the operation and maintenance of the system.
- K. After start-up has been concluded and systems have been demonstrated to be satisfactory and ready for permanent operation, all permanent pipe line strainers and filters shall be cleaned, air filters cleaned or replaced, valve and pump packings properly adjusted, belt tensions adjusted, drive guards secured in place, lubrication checked and replenished if required. Temporary piping, ducting, wiring, instrument connections, etc., shall be removed, and openings restored in a permanent manner acceptable to Owner's Representative.
- L. All tests shall be made after notification to and in the presence of the Owner's Representative and the authorities having jurisdiction.

**END OF SECTION 23 0501**

## **SECTION 26 0519**

### **LOW VOLTAGE ELECTRIC POWER CONDUCTORS**

#### **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 SCOPE**

- A. The Contractor shall furnish and install all conductors, wiring, and cables as specified herein and as shown on the Drawings.

##### **1.3 RELATED SECTIONS**

- A. Section 260500 – Common Work Results for Electrical
- B. Section 260526 – Grounding and Bonding for Electrical Systems
- C. Section 260533.13 – Conduit for Electrical Systems
- D. Section 260533.16 – Boxes for Electrical Systems
- E. Section 260553 – Identification for Electrical Systems
- F. Section 260583 – Wiring Connections

##### **1.4 SUBMITTALS**

- A. Manufacturer's product data sheets shall be submitted for each of the following items:
  - 1. 600-volt building wire
  - 2. 600-volt multiconductor control cable
  - 3. 600-volt shielded instrumentation cable
  - 4. CAT 5e copper Ethernet cable
- B. Submit test report indicating results for copper wire and cable continuity and resistance testing.

#### **PART 2 – PRODUCTS**

##### **2.1 GENERAL**

- A. All cable and wire shall have copper conductors; aluminum shall not be substituted nor permitted.

- B. All conductors shall be new, shall be approved and listed by Underwriters' Laboratories, Inc., (UL), shall bear UL identification, and shall have been manufactured within six months from date of the Contract. If requested by the Designer, the Contractor shall supply authenticated data from the wire manufacturer stating the manufacturing date of the wire.
- C. All wire sizes are expressed in American Wire Gauge (AWG) or in circular mils. Unless otherwise indicated, all conductors shall have 90°C rated insulation (wet or dry). The current rating of all conductor sizes shall be calculated using the correction factors and ambient temperature adjustment factors in NEC Article 310-15(B) but under no circumstance shall exceed the values listed in the 60°C temperature column of the tables for circuits 100 amps and below or the 75°C temperature column for circuits over 100amps.
- D. Conductors for all branch circuits and feeders shall be color coded in accordance with the National Electrical Code (NEC).

## 2.2 600-VOLT BUILDING WIRE

- A. All conductors for lighting and power systems, including equipment grounding conductors and single conductor control wiring shall be copper, 600-volt, single conductor building wire.
  1. Conductor: ASTM B3, annealed copper. Conductor sizes 12 and 10 AWG shall be solid, 8 AWG and larger and 14 AWG single conductor control wiring shall be stranded per ASTM B8. Minimum conductor size shall be 12 AWG except for single conductor control wiring which shall be 14 AWG.
  2. Insulation: 600-volt, Flame Retardant, thermoset Cross-linked Polyethylene (XLPE) per ICEA S-95-658/NEMA WC70 Section 3; thickness per UL 44 and ICEA S-98-658/WC70, Table 3-4, Column B
  3. Temperature Rating, Continuous Use: 90°C wet or dry locations
  4. UL Listed: Type XHHW-2
  5. Testing: All cables shall be tested in accordance with the applicable requirements of ICEA S-95-658/NEMA WC70.
  6. Certification: All cables shall be certified to be in conformance with all applicable requirements of ICEA S-95-658/NEMA WC70.
  7. Identification: Surface printing on the cable shall show manufacturer's name, conductor size and metal, voltage rating, UL symbol, insulation type and color per NEC Article 310-110 – Conductor Identification and Section 260553 – Identification for Electrical Systems.
  8. Manufacturer: Alanwire, Cerrowire, General Cable Company, Service Wire Company, Southwire Company or approved equal.
- B. Leads to special equipment shall be as recommended or supplied by the fixture or equipment manufacturer and as shown on the Drawings or as required by applicable codes.

## 2.3 600-VOLT MULTI-CONDUCTOR CONTROL CABLE

- A. Low voltage control cable shall be copper, 600-volt, unshielded, multi-conductor control cable conforming to ICEA S-73-532/NEMA WC57.

1. Conductors: ASTM B33 and B8; Class B stranded annealed copper conforming to ICEA S-73-532/NEMA WC57. Size 18 AWG, 16 AWG or 14 AWG as indicated on the Drawings. Where no size is indicated use size 14 AWG.
2. Insulation: 600-volt, Flame Retardant, Ethylene Polyethylene Rubber (FR-EPR) Type II per ICEA S-73-532/NEMA WC57; thickness 25 mils per ICEA S-73-532/NEMA WC57, Table 3-1 or flame-retardant cross-linked polyethylene (XLPE) per ICEA S-73-532/NEMA WC57, thickness 30 mils per ICEA S-73-532/NEMA WC57, Table 3-1. Color coding shall be ICEA Method 1,E-2. Where wire colors white and/or green are required, color coding shall be ICEA Method 1, E-1.
3. Jacket: Lead-free, Cross-linked Chlorinated Polyethylene (XL-CPE) with thickness per UL 1277 and ICEA S-73-532/NEMA WC57, Table 4-1 as follows:
  - a. 14 AWG, 2 to 7 conductors: 45 mils
  - b. 14 AWG, 9 to 19 conductors: 60 mils
  - c. 16 AWG, 2 to 4 conductors: 45 mils
  - d. 16 AWG, 5 to 12 conductors: 60 mils
  - e. 16 AWG, 15 to 19 conductors: 80 mils
  - f. 18 AWG, 2 to 12 conductors: 45 mils
  - g. 18 AWG, 15 to 19 conductors: 60 mils
4. Temperature Rating: Cable shall be suitable for continuous use as 90 degrees Celcius wet or dry ((CEA S-73-532/NEMA WC57, Section 3, Paragraph 3.4.1)
5. UL Listed: Type TC Power and Control Tray Cable per UL 1277
6. Testing: All cables shall be tested in accordance with the applicable requirements of ICEA S-73-532/NEMA WC57 and IEEE 383.
7. Certification: All cables shall be certified to be in conformance with all applicable requirements of ICEA S-73-532/NEMA WC57 and IEEE 383.
8. Flame Test Certification: Passes IEEE-383 ribbon burner flame test
9. Identification: Surface printing on the cable shall show the manufacturer's name, number and size of conductors, voltage rating, UL information, insulation type, jacket type, and numbered footage markers.
10. Manufacturer: General Cable Type CHTC, or approved equal by Basic Wire and Cable, Belden, Dekoron or Okonite.

## **2.4 600-VOLT SHIELDED INSTRUMENTATION CABLE**

- A. Shielded instrumentation cable with shielded twisted pairs shall be 600-volt rated conforming to ICEA S-73-532/NEMA WC57.
  1. Conductors: ASTM B33 AND B8; Class B stranded coated annealed copper conforming to ICEA S-73-532/NEMA WC57, size 18 AWG or 16 AWG as indicated on the Drawings. Where no size is indicated use size 16 AWG.
  2. Insulation: 600-volt, flame retardant, cross-linked, polyethylene (XLPE) per ICEA S-73-532/NEMA WC57; thickness: 25 mils per ICEA S-73-532/NEMA WC57 Table 3-

1. Color coding shall be by Method 1 per ICEA S-73-532/WC57 Appendix E using color-pigmented compounds. Each pair shall have one (1) white and one (1) black conductor. When multiple pairs are used, group identification shall be by printed numbers on one conductor of each pair in consecutive order.
3. Pair Shield: Aluminized Mylar or aluminized polyester tape in contact with a tinned copper drain wire. Shields to be isolated from all other assemblies.
4. Cable Shield: Aluminized Mylar or aluminized polyester tape in contact with a tinned copper drain wire
5. Jacket: Lead-free, cross-linked, chlorinated polyethylene (XL-CPE) per ICEA S- 73-532/NEMA WC57 Section 4, Paragraph 4.2 with thickness per ICEA S-73- 532/NEMA WC57, Table 4-1
6. Identification: Surface printing on the cable shall show the manufacturer's name, insulation type, jacket type, number of pairs, size of conductors, voltage rating, and numbered footage markers.
7. Temperature Rating: Cable shall be suitable for continuous use at 90°C wet or dry (ICEA S-73-532/NEMA WC57, Section 3, Paragraph 3.4.1)
8. Testing: All cables shall be tested in accordance with the applicable requirements of ICEA S-73-532/NEMA WC57 and IEEE 383.
9. Certification: All cables shall be certified to be in conformance with all applicable requirements of ICEA S-73-532/NEMA WC57 and IEEE 383.
10. Manufacturer: General Cable Company Type CHTC or approved equal by Basic Wire and Cable, Belden, Dekoron or Okonite

## 2.5 CAT 5e COPPER ETHERNET CABLE

- A. 300-volt, CAT 5e (200MHz), 4-pair, U/UTP - Unshielded, indoor/outdoor, premise horizontal Ethernet cable conforming to NEC/UL Specification CMR, CMX.
- B. Conductors: Solid bare copper size 24 AWG
- C. Insulation: 300-volt, polyolefin (PO); minimum thickness: 0.023". Color coding shall be:
  1. Pair 1: White/blue strip and blue
  2. Pair 2: White/orange strip and orange
  3. Pair 3: White/green strip and green
  4. Pair 4: White/brown strip and brown
- D. Jacket: Lead-free, flame-retardant, sunlight resistant polyvinyl chloride (PVC)
- E. Temperature Range: -20°C to +75°C – installation, -40°C to +75°C – operating, UL temp rating 90°C
- F. Electrical Characteristics:
  1. Nominal Mutual Capacitance: 15 pF/ft

- 2. Maximum Capacitance Unbalanced: 330pF/100m
- 3. Nominal Velocity of Propagation: 68% @ 100MHz
- 4. Maximum Delay: 537.60ns/100m @ 100MHz
- 5. Maximum Delay Skew: 45ns/100m @ 100MHz
- 6. Maximum Conductor DC Resistance: 9.38 Ω/100m @ 20°C
- 7. Maximum DC Resistance Unbalanced: 3% @ 20°C
- G. UL Listed: Type CMR, CMX
- H. Testing: All cables shall be tested in accordance with CSA Flame Test FT4
- I. Manufacturer: Belden 1594A or approved equal by General Cable or Southwire

**2.6 600-VOLT CONNECTIONS AND TERMINATIONS**

- A. Provide connections and terminations for 600-volt wire and cable in accordance with Section 260583 – Wiring Connections.

**2.7 CABLE PULLING LUBRICANT**

- A. Cable pulling lubricant shall be compatible with all cable jackets. The lubricant shall be UL Listed. The lubricant shall contain no greases, silicones, or polyalkylene glycol oils or waxes.
- B. A 200-gram sample of the lubricant, when placed in a one-foot, split metal conduit and fully dried for 24 hours at 105°C, shall not spread a flame more than three inches beyond a point of ignition at a continued heat flux of 40 KW/M<sup>2</sup>. Total time of test shall be one- half hour.
- C. Cable pulling lubricant shall meet the following minimum specifications:
  - 1. Lubricity at 200 lbs/ft Normal Pressure:
    - a. PVC or XLP jacketed cable/PVC conduit  
Coefficient of dynamic friction.....≤ 0.15
    - b. PVC or XLP jacketed cable/HDPE duct  
Coefficient of dynamic friction.....≤ 0.15
  - 2. Percent Non-Volatile Solids.....≤ 5.5%
  - 3. Temperature Use Range.....20°F to 110°F  
pH.....≥ 6.5, ≤ 9.0
  - 4. Flammability.....No Flash Point
  - 5. Polyethylene Stress Cracking.....None/ASTM D1693
  - 6. Temperature Stability:
    - a. < 10% change in Brookfield viscosity from 40°F to 100°F  
No separation after five freeze/thaw cycles or 24-hour exposure at 120°F



- D. Cable pulling lubricant shall be:
  - 1. POLYWATER<sup>®</sup> J
  - 2. 3M WL
  - 3. Approved equal by Ideal

## **PART 3 – EXECUTION**

### **3.1 GENERAL**

- A. Store all conductors and cable indoors, protected from moisture.
- B. Provide homerun conductors of continuous length without joint or splice from overcurrent protective device to first load termination point.
- C. Provide power feeder conductors of continuous length without joint or splice for their entire length.
- D. Conductors shall be continuous from source to destination without splices or taps in conduit runs, except where indicated on the Drawings to compensate for voltage drop or where required to prevent excessive pulling tension or sidewall pressure on wire or cable. Submit all proposed splice locations to the Designer for approval prior to pulling wire and cable. Where permitted, splices shall be mechanically strong and have an insulation value equal to the wire or cable being spliced. All splices and taps shall be contained within NEC sized junction boxes meeting the requirements of Section 260533.16 – Boxes for Electrical Systems.
- E. All conductors and cables shall be in a raceway (conduit, duct, etc.) approved by the Designer, unless otherwise indicated.
- F. Install conductors and cable with adequate bending radius in accordance with the National Electrical Code and the conductor and cable manufacturer's recommendations:
  - 1. Greater than six (6) times the conductor and cable outside diameter for 600-volt and below wire and cable.
- G. Swab the inside of conduit and raceways to insure they are dry and clean before conductors or cables are pulled. Care shall be exercised in pulling to avoid damage to the conductors or cables. Pull all conductors into a conduit at the same time. An approved type of wire pulling lubricant, UL Listed for the application, shall be used.
- H. All conductors and cables shall be installed directly from reels or coils. Conductors and cables shall not be pulled along the floor or ground or subjected to treatment that may cause abrasion or other damage to conductor and cable insulation.
- I. Use pulling means; including fish tape, cable, rope, and basket weave wire/cable grips that do not damage the conductor, cable or raceway.
- J. All conductors and cables shall be installed as recommended by the manufacturer. The manufacturer's recommended maximum pulling tension and minimum bending radius shall be adhered to during installation. Utilize the necessary guides, pulleys, sleeves, and pulling aids to prevent abrasion and damage to the conductors or cables during installation. Monitor pulling tensions

and associated sidewall pressures to prevent damage to conductors and cables.

- K. Provide individual dedicated full size neutral for each and every branch circuit.
- L. Neatly train and lace wiring inside boxes, panelboards, switchboards and motor control centers. Group and tie single conductors of a circuit together at a minimum of 2-foot intervals. Provide supplemental structural members and materials as required to support wire and cable without transmitting strain to connection points. Group and tie single conductors of a circuit together at a minimum of 2-foot intervals.
- M. Remove and discard conductors and cables cut too short or installed in wrong raceway. Do not install conductors or cables which have been removed from a raceway.
- N. Do not install conductors or cables in conduit which contains wiring already in place.
- O. Do not exceed NEC limits on conduit fill.
- P. Conductors terminating in outlet or device boxes shall have at least 8 inches of free conductor left inside the box.
- Q. Conductors for power shall not be smaller than size 12 AWG except wire supplied with equipment by the equipment manufacturer. Conductors for control wiring shall not be smaller than size 14 AWG unless otherwise indicated.
- R. Leads to special equipment shall be as recommended or supplied by the equipment manufacturer and as shown on the Drawings or as required by the applicable codes.

### **3.2 WIRING SEGREGATION**

- A. Isolate and segregate power wiring circuits from control and instrumentation wiring circuits in conduit runs, boxes, panels, and equipment.
- B. Isolate and segregate "normal" power circuits from "emergency" power circuits in conduit runs, boxes, panels, and equipment.
- C. Isolate and segregate lighting and convenience receptacle wiring circuits from power, control, and instrumentation wiring in conduit and boxes.
- D. Isolate control wiring circuits from instrumentation wiring circuits in conduit runs and boxes.
- E. In boxes, provide isolation and segregation by rigid conduit chase through box interior or continuous metal dividers of same material as the box.

### **3.3 ETHERNET CABLE INSTALLATION**

- A. Comply with ANSI/TIA-568.C.1.
- B. Terminate all conductors. No cable shall contain unterminated elements. Make terminations only at cable connection points at equipment. Pairs shall not be untwisted more than 0.5 inches when terminating.

- C. Cable placement shall conform to industry standards with regard to anchoring, cable support and separation from other facilities.
- D. All Ethernet cable shall be installed in metal conduit in accordance with the requirements of Section 260533.13 – Conduit for Electrical Systems.
- E. Install cable without damaging conductors or cable jacket.
  - 1. Do not install bruised, kinked, scored, deformed, or abraded cable.
  - 2. Remove and discard cable if damaged during installation and replace with new cable.
- F. Cables shall not be spliced. Do not splice cable between termination, tap, or junction points.
- G. Bring cable to a minimum of 60°F before de-reeling. Heat lamps shall not be used for warming cable.
- H. Provide 18 inches of extra cable at each equipment panel to accommodate future cabling system changes.
- I. Do not bend cable in handling or installation to smaller radii than minimums recommended by manufacturer.
- J. Contractor shall be responsible for verifying the actual footages and distances identified on the Drawings.
- K. Install components as indicated and according to the manufacturer’s written instructions. Use techniques, practices and methods that are consistent with the requirements of the Category rating of the components.
- L. Provide minimum separation of cables from EMI sources in accordance with the cable manufacturer’s recommendations.
- M. Test and verify cable installation after terminating at both ends in accordance with industry standards and the manufacturer’s recommendations for the Category rating of the components.
- N. *CAT 5e Ethernet Cable Installation*: Install using techniques, practices, and methods that are consistent with Category 5e rating of components and that ensure Category 5e performance of completed and linked signal paths, end to end.
  - 1. Comply with ANSI/TIA-568-C.2.
  - 2. Do not untwist cables more than 0.5 inches from the point of termination to maintain cable geometry.

### 3.4.1 WIRING CONNECTIONS AND TERMINATIONS

- A. Provide connections and terminations for 600-volt wire and cable in accordance with Section 260583 – Wiring Connections.

### 3.5 FIELD QUALITY CONTROL

- A. General:
  - 1. Testing shall be performed in the presence of Construction Representative. Contractor must provide 48 hours' notice prior to conducting tests.
  - 2. Prepare a test report upon completion of testing activities. Report format shall include the following information:
    - a. Summary of test results
    - b. Test equipment summary (model number, accuracy, calibration date)
    - c. Test personnel names and signoffs
    - d. Completed data sheets
    - e. Test log and observations
    - f. Certificate of Compliance
- B. Inspect wire and cable for physical damage and proper connection.
- C. Verify that all power conductors are properly phased throughout the electrical system.
- D. Torque test conductor connections and terminations to manufacturer's recommended values.
- E. Perform continuity tests.
- F. Perform and record results of megger tests for each phase and neutral conductor for each feeder. Include actual recorded megaohm value for each conductor of each feeder in the feeder conductor insulation test report.
- G. Provide testing for connections and terminations for 600-volt wire and cable in accordance with Section 260583 – Wiring Connections in conjunction with the testing specified herein.

**END OF SECTION 26 0519**

## SECTION 26 0526

### GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

#### PART 1 – GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SCOPE

- A. The Contractor shall furnish, install, and test the grounding systems as specified herein and as shown on the Drawings.

##### 1.3 RELATED SECTIONS

- A. Section 260519 – Low-Voltage Electrical Power Conductors and Cables
- B. Section 260533.13 – Conduit for Electrical Systems
- C. Section 260533.16 – Boxes for Electrical Systems
- D. Section 260583 – Wiring Connections

##### 1.4 SUBMITTALS

- A. Manufacturer's product data sheets shall be submitted for the following items:
  - 1. Grounding conductors
  - 2. Grounding clamps
  - 3. Grounding connectors

#### PART 2 – PRODUCTS

##### 2.1 GROUNDING CONDUCTORS

- A. All grounding conductors shall be insulated, stranded copper, and unless otherwise indicated, shall meet the same specifications, in accordance with Section 260519 – Low-Voltage Electrical Power Conductors and Cables, as the accompanying circuit conductors.
- B. Aluminum shall not be substituted for copper in grounding conductors.

## 2.2 GROUNDING CONNECTORS

- A. Grounding conductor connections to equipment frames, equipment enclosures, and equipment ground lugs shall be made using corrosion resistant compression, bolted, or split-bolt connections. Bolts for equipment ground lugs shall be copper alloy terminal with a twin clamping element. Bolts for equipment enclosures shall be silicon bronze with lock washers. Use products by Burndy Corp., O-Z/Gedney, or approved equal.

## PART 3 – EXECUTION

### 3.1 GENERAL

- A. The entire electrical system and all electrical equipment shall be grounded in strict accordance with Article 250 of the National Electrical Code and as shown on the Drawings.
- B. The grounding system shall be continuous throughout the electrical system.
- C. Insulated grounding conductors shall be identified with green colored insulation or marking tape in accordance with Section 260553 – Identification for Electrical Systems and NEC Article 250-119.
- D. Grounding conductors shall be continuous with no splices.
- E. Protect grounding conductors against unraveling, caging, and abrasion by several wrappings of plastic tape on all ends, where cable leaves concrete, and at necessary intermediate points.
- F. Install individual grounding conductors so as not to be entirely encircled or closely encircled by magnetic material.
- G. Suitably protect grounding conductors against damage during construction. Replace or suitably repair at the discretion of the Designer or Construction Representative if cable is damaged by anyone before final acceptance.
- H. When a conduit, which is fabricated of magnetic materials (e.g., steel conduit), contains only grounding conductors, the grounding conductors shall be bonded to the conduit at both ends of the conduit run, using grounding bushings with a bonding jumper installed between each grounding conductor and the bushing.
- I. All neutral conductors shall be continuous throughout the electrical system and shall be grounded only where indicated on the Drawings or as specified herein.
- J. All metallic conduits shall be properly grounded.
- K. All flexible conduits shall contain a properly connected green insulated copper grounding conductor, sized in accordance with National Electrical Code, Article 250, unless otherwise indicated.
- L. Flexible conduits 1-1/2" size and larger shall have an insulated stranded copper grounding conductor sized per the NEC installed external to the conduit and bonded to grounding type conduit connectors on each end of the conduit. The grounding conductor shall be secured to the conduit using nylon

cable ties at 12" intervals. Cut off excess cable tie. Do not leave sharp edges.

- M. A properly sized green insulated copper equipment grounding conductor shall be installed in each and every conduit.
- N. All flexible cords shall contain an insulated grounding conductor, color coded green, which shall be properly connected at each termination.
- O. All electrical enclosures, panels, boxes, conduits, equipment frames and other non-current-carrying metallic objects shall be grounded and bonded as required by the NEC
- P. 480V, 3-phase, grounded B-Phase power systems shall not have a fuse installed in the grounded (B-Phase) conductor and the grounded conductor shall be identified with white or gray vinyl tape at all equipment and termination points.
- Q. Connections: All grounding conductor connections shall be made in accordance with the manufacturer's written instructions. Chemically degrease and dry completely before exothermically welding. Make up bolted connections clean and tight. All connections shall be low resistance with a resistance drop of less than 1 ohm.
- R. Grounding conductors and bonding jumper connection devices or fittings that depend on solder shall not be used.
- S. Bond all metal conduits to the ground bus bar conductor of the control panel, terminal box, panelboard, switchboard, motor control center, disconnect safety switch or frame of the equipment to which they are connected by terminating each conduit with a threaded steel insulated grounding bushing or insulated throat, grounding type conduit hub having a solderless lug with a bonding jumper sized in accordance with NEC Table 250-66 attached to the ground bus conductor or equipment frame. Where the enclosure does not contain a ground bus bar, bond to the enclosure using a mechanical lug. Scrape away paint at grounding lug attachment location.
- T. All control panel, panelboard, switchboard and motor control center ground bus conductors, power transformer cases, all transformer neutrals, and all rotating electrical equipment shall be solidly and directly grounded to the nearest approved grounding point, or as shown on the Drawings, using a conductor sized in accordance with the NEC Table 250-66 or as indicated on the Drawings.
- U. Power system neutrals shall be grounded only at the transformer where each system neutral is derived in accordance with NEC Article 250.
- V. Equipment grounds shall be made where indicated on the Drawings. Total resistance to ground shall not exceed five (5) ohms.

### **3.2 MOTOR GROUNDING**

- A. All motors rated 10 horsepower and below shall be grounded by an equipment grounding conductor, sized per the NEC, installed in the conduit with the power conductors that supply the motor.
- B. All motors rated 11 to 74 horsepower shall be grounded with a bare, stranded No. 6 AWG grounding conductor in addition to an equipment grounding conductor sized per the NEC carried with the power conductors that supply the motor. The No. 6 grounding conductor shall be bonded

to the motor frame. Mechanically attach the grounding conductor to the outside of the conduit carrying the power conductors that supply the motor.

### **3.3 RACEWAY SYSTEM GROUNDING**

- A. Ground/bond metallic conduits at all termination points.

**END OF SECTION 26 0526**



## **SECTION 26 0529**

### **HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS**

#### **PART 1 – GENERAL**

##### **1.1 RELATED DOCUMENTS**

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

##### **1.2 SCOPE**

- A. The Contractor shall furnish and install all supports and fastening devices for mounting and anchoring all raceways and electrical equipment as specified herein and as shown on the Drawings.

##### **1.3 RELATED SECTIONS**

- A. Section 260533.13 – Conduit for Electrical Systems
- B. Section 260533.16 – Boxes for Electrical Systems

##### **1.4 SUBMITTALS**

- A. Manufacturer's product data sheets shall be submitted for the following items:
  - 1. Expansion anchors
  - 2. U-channel steel supports including associated hardware and accessories

#### **PART 2 – PRODUCTS**

##### **2.1 GENERAL**

- A. Weld Rod: Use E70 electrodes for shielded metal arc welding.
- B. Provide materials, sizes, and types of supports, anchors, and fasteners to carry the loads of conduit, boxes, and equipment. Include weight of wire and cable when selecting products for conduit, equipment and box supports.

##### **2.2 ANCHORS & FASTENERS**

- A. Provide anchors and fasteners as required to install all conduit, boxes, electrical enclosures, and equipment.
- B. Expansion Anchors: Utilize expansion anchors for attachment of electrical equipment, boxes and

raceways to concrete and solid masonry surfaces.

1. Expansion anchors shall be Type 304 stainless steel or galvanized steel, stud type expansion anchor with a single-piece, three-section wedge, Hilti Kwik Bolt III or approved equal installed per the manufacturer's written recommendations. The anchors shall meet the description in Federal Specification FF-S-325, Group II, Type 4, Class 1, for concrete expansion anchors. All bolts shall have length identification
- C. Provide adequate corrosion resistance for all fastening systems.
- D. Bolts and Nuts: ANSI regular series, semi-finished, hexagon
1. Indoor dry areas: Cadmium plated steel
  2. In water treatment and RO system areas: Type 304 stainless steel
- E. Flat Washers:
1. Indoor dry areas: Cadmium plated steel
  2. In water treatment and RO system areas: Type 304 stainless steel
- F. Lock Washers: ANSI medium, spring type
1. Indoor dry areas: Cadmium plated steel
  2. In water treatment and RO system areas: Type 304 stainless steel
- G. Beam Clamps: Steel beam and angle clamps by B-Line or Thompson
1. Indoor dry areas: Cadmium, zinc plated or hot-dipped galvanized
  2. In water treatment and RO system areas: Type 304 stainless steel

## 2.3 STRUCTURAL SUPPORT SYSTEMS

- A. Steel Supports: Brackets, frames and hangers shall be fabricated from standard cold rolled structural steel shapes or prefabricated structural systems, as manufactured by B-Line Systems, Inc., Unistrut Corporation, Kindorf Electrical Products Co., or approved equal.
1. Steel supports and accessories used in indoor dry areas shall be made from steel meeting the minimum mechanical properties of ASTM A1011 SS Grade 33, then electro-plated with zinc per ASTM B633. Fittings shall be manufactured from steel meeting the minimum requirements of ASTM A907 SS, Grade 33. All fittings and hardware shall be zinc plated in accordance with ASTM B633 (SC3 for fittings, SC1 for threaded hardware).
  2. Steel supports and accessories used in water treatment and RO system areas shall be Type 304 stainless steel.
  3. Steel supports shall be 14-gauge or 12-gauge and either 1-5/8" x 13/16" or 1-5/8" x 1-5/8" as required based on equipment to be supported.
- B. Hanger Supports: Threaded rods

1. Indoor dry areas: Electro-galvanized steel
2. In water treatment and RO system areas: Type 304 stainless steel

**PART 3 – EXECUTION**

**3.1 GENERAL**

- A. The methods of attaching or fastening equipment or equipment supports or hangers to the building structure shall be subject to the approval of the Construction Representative.
- B. Do not drill or cut any structural steel members.
- C. Do not cut any structural concrete members.
- D. Welding on any structure shall require prior written approval from the Construction Representative for each type of application except where specifically shown on the Drawings. Weld in accordance with AWS.
- E. Do not use piping, ductwork, raceways, or equipment as structural members for support.
- F. Equipment or raceways shall not be attached to or supported from the roof deck, from removable or knockout panels, or temporary walls or partitions unless specifically indicated on the Drawings.
- G. A minimum of four (4) anchor points shall be provided for electrical equipment enclosures and dimensioned boxes.
- H. In water treatment and RO system areas, supports shall be installed to provide a minimum of 13/16” air space between wall mounted electrical equipment enclosures and mounting surface.

**3.2 ANCHORS & FASTENERS**

- A. Unless noted otherwise on the Drawings, expansion anchor embedment shall be as follows:
 

1. <u>Bolt Diameter, in.</u>	<u>Embedment, in.</u>
1/4	2
3/8	2-1/2
1/2	3-1/2
5/8	4
- B. Utilize welded fasteners or beam clamps for attachment of electrical equipment and raceways to structural steel surfaces in accordance with the requirements of the Designer or Construction Representative. Weld in accordance with AWS.
- C. Utilize toggle bolts, hollow wall fasteners or through-wall bolt fasteners for attachment of electrical equipment, boxes and raceways to hollow masonry surfaces.
- D. Utilize machine screws for attachment of electrical equipment, boxes, and raceways to metal

surfaces.

- E. Utilize wood screws for attachment of electrical equipment, boxes, and raceways to wood surfaces.
- F. Nails shall not be used as a means of fastening.
- G. Do not use spring steel clips.
- H. Do not use powder-actuated anchors.

### **3.3 STRUCTURAL SUPPORT SYSTEMS**

- A. Weld in accordance with AWS.
- B. Any galvanizing damaged by welding or erection shall be repaired with cold galvanizing per ASTM A780. Surface preparation shall include power disk sanding the abraded or welded area to bright metal.
- C. Do not use chain.
- D. Do not use perforated strap or wire.

#### **3.4.1 SEISMIC BRACING**

- A. All electrical equipment shall be bolted down, and conduit shall be braced in accordance with the seismic design requirements of the International Building Code (latest adopted edition), utilizing the seismic loading factors noted on the Structural Drawings.
- B. Conduit trapeze hangers shall be stabilized both horizontally and vertically to prevent swaying or movement.
- C. Transverse and longitudinal braces shall be no more than 45° above or below the centerline of the conduit.
- D. When bracing trapeze type hangers, the bracing shall be attached directly to the trapeze hanger assembly, and the conduit shall be secured to the trapeze assembly with conduit straps.
- E. Seismic bracing shall not limit the expansion and contraction of the conduit system.
- F. Contractor shall field locate bracing as required unless otherwise shown on the Drawings.
- G. Seismic restraints may be omitted from the following installations:
  - 1. All conduit suspended by individual hangers 12 inches or less in length from the top of the conduit to the bottom of the support for the hanger.
  - 2. All electrical conduit less than 2-1/2 inches inside diameter

**END OF SECTION 26 0529**

## **SECTION 26 0533.13**

### **CONDUIT FOR ELECTRICAL SYSTEMS**

#### **PART 1 – GENERAL**

##### **1.1 RELATED DOCUMENTS**

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

##### **1.2 SCOPE**

- A. The Contractor shall furnish and install all supports and fastening devices for mounting and anchoring all raceways and electrical equipment as specified herein and as shown on the Drawings.

##### **1.3 RELATED SECTIONS**

- A. Section 260519 – Low-Voltage Electrical Power Conductors and Cables
- B. Section 260526 – Grounding and Bonding for Electrical Systems
- C. Section 260529 – Hangers and Supports for Electrical Equipment
- D. Section 260533.16 – Boxes for Electrical Systems
- E. Section 260553 – Identification for Electrical Systems

##### **1.4 SUBMITTALS**

- A. Manufacturer's product data sheets shall be submitted for the following items:
  - 1. Each type of conduit (galvanized rigid steel, rigid aluminum, liquidtight flexible metallic)
  - 2. Conduit hubs
  - 3. Conduit bodies
  - 4. Conduit mounting clamps
  - 5. Fire-stopping materials

#### **PART 2 – PRODUCTS**

##### **2.1 CONDUIT**

- A. All conduit shall be new and shall be approved and listed by Underwriters' Laboratories, Inc. (UL) and shall bear the UL label of approval.
  
- B. All conduit shall be one of the following:
  - 1. Galvanized rigid steel conduit, "Heavywall" (GRC), shall be Schedule 40 steel conduit, hot dipped galvanized on both the outside and the inside. Conduit as obtained from the manufacturer shall have been cut and threaded before galvanizing, thereby insuring the galvanizing of these areas. Conduit shall conform to the latest editions of ANSI Standard C80.1 and UL Standard No. 6 and shall meet the requirements of NEC Article 344.
    - a. Minimum conduit size shall be 3/4"
    - b. Running threads are not permitted.
    - c. GRC shall be used indoors in unfinished areas.
  
  - 2. Rigid aluminum conduit (RAC), heavywall, copper-free threaded aluminum in accordance with ANSI C80.5 and shall meet the requirements of NEC Article 344.
    - a. Minimum conduit size shall be 1-1/2-inch.
    - b. Running threads are not permitted.
    - c. Rigid aluminum conduit may be substituted for GRC in sizes 1-1/2" and larger.
  
  - 3. Liquidtight flexible metal conduit (LFMC) shall be square locked galvanized steel flexible tubing having an extruded liquidtight thermoplastic or polyvinyl chloride (PVC) jacket, making the conduit moisture proof, oil proof, and sunlight resistant LFMC shall conform to U.L. Standard 360 and shall meet the requirements of NEC Article 350. Liquidtight flexible metal conduit shall be used at all locations where a flexible conduit connection is required.
    - a. Minimum conduit size shall be 1/2-inch.
    - b. Conduit and fittings shall be rated for 90°C conductors or cable and for use in direct sunlight.
    - c. Liquidtight flexible metal conduit shall contain a continuous copper ground built into the core in sizes 1/2-inch through 1-1/4-inch, and all sizes shall be approved and listed by Underwriters' Laboratories, Inc. (UL). Liquidtight flexible metal conduit shall be rated for a minimum temperature range of -20°C (-4°F) to +60°C (+140°F), and shall be as manufactured by the following:
      - 1) Anamet, Inc., Type UA
      - 2) Electri-Flex Company, Type LA Liguatite
      - 3) Southwire/Alflex, Type UL Ultratite
    - d. All connectors and couplings for liquidtight flexible metal conduit shall be malleable iron with hot-dipped galvanized or steel with zinc plated finish, compression ring, positive ground, positive grip, liquid tight, rain-tight and oil tight.
    - e. All connectors and fittings shall be UL Listed as suitable for grounding in sizes 1/2-inch through 1-1/4-inch.

- f. All connectors shall be insulated throat type. All connectors shall be terminated with a bonding type locknut. Threaded steel insulated grounding bushings having solderless lugs shall be used where required.
- g. All connectors in sizes 1-1/2-inch and larger shall have a grounding lug on the gland nut for connection of an external grounding conductor in accordance with Section 260526 - Grounding and Bonding for Electrical Systems.
- h. Neither flexible metal conduit ("greenfield") nor liquidtight flexible nonmetallic conduit shall be substituted for liquidtight flexible metal conduit.
- i. Unless otherwise indicated, liquidtight flexible metal conduit shall only be used for the final connection to:
  - 1) Vibrating type equipment, such as motors and transformers (flexible connection not to exceed 3 feet)
  - 2) All remotely located control devices and instrumentation such as level switches, solenoid valves, position switches, limit switches, level transmitters, etc. (flexible connection not to exceed 2 feet)
  - 3) As permitted elsewhere in these Specifications or Drawings

## 2.2 CONDUIT HUBS

- A. Conduit hubs shall be insulated throat, liquid-tight "copper-free" aluminum for aluminum conduit and stainless steel enclosures and zinc plated steel or malleable iron for rigid galvanized steel conduit and galvanized steel and painted steel enclosures, grounding type with ground lug/screw on the lock nut.
- B. Conduit hubs shall be Myers Type STAG or STG Scru-Tite or approved equal.

## 2.3 CONDUIT BODIES

- A. Conduit bodies shall be provided as required or where indicated on the Drawings and shall be hot-dipped galvanized malleable iron with galvanized steel gasketed covers or cast, "copper-free" aluminum having threaded hubs and stainless steel or "copper-free" aluminum, neoprene gasketed covers fastened with stainless steel screws, rain-tight, suitable for wet locations, Crouse-Hinds, Appleton or O-Z Gedney Form 35, Form 8, Mark 9, or Mogul. Die-cast aluminum types are not acceptable.
- B. Conduit body cover screws shall thread directly into the conduit body. Conduit body covers with wedge-clamp type covers are not acceptable.
- C. Conduit body hub configuration shall be as required based on conduit routing for the cover to be readily accessible for easy removal.
- D. Conduit bodies enclosing size 6 AWG or smaller conductors shall have a cross-sectional area not less than twice the cross-sectional area of the largest conduit to which the conduit body is attached.
- E. Only those conduit bodies that are durably and legibly marked by the manufacturer with their cubic

inch capacity shall be permitted to contain splices, taps, or devices. The maximum number of conductors shall be computed in accordance with NEC Article 314-16(C).

## **2.4 CONDUIT MOUNTING CLAMPS**

- A. Conduit mounting clamps for securing conduits inside buildings shall be one-hole, two-hole or H-Type (mini's); galvanized steel in indoor dry areas and Type 304 stainless steel in water treatment and RO system areas.
- B. Conduit mounting clamps for securing rigid metal conduits to concrete or masonry surfaces inside buildings in dry areas shall be one piece "copper-free" aluminum or zinc plated malleable iron one hole type, Crouse-Hinds Cat. No. 5XX or approved equal with Crouse- Hinds Cat. No. CBX or approved equal "copper-free" aluminum or zinc plated malleable iron clamp backs/spacers.
- C. Conduit mounting clamps for mounting conduits to channel supports shall be zinc plated steel, hot-dipped galvanized steel or Type 304 stainless steel to match channel support material, B-Line B2000 Series or approved equal.

## **2.5 FIRESTOPPING MATERIALS**

- A. The following fire-resistant penetration sealing materials are approved:
  - 1. 3M Caulk CP 25
  - 2. 3M Wrap/Strip FS-195
  - 3. Damming materials – 3M Composite Sheet CS-195
  - 4. SpecSeal Series 100 sealant
  - 5. Rector Seal Corporation, Metacaulk 835 fire stopping sealant
  - 6. Dow Corning 3-6548 silicone RTV foam
  - 7. General Electric GE RTV850 or GE RTV6428
  - 8. Chase Technology Corporation CTC PR-855 fire-resistant silicone foam

## **2.5 CONDUIT PULL STRING**

- A. Conduit pull string shall be Greenlee or equal with a minimum of 240 lbs. tensile strength, and shall be rot and mildew resistant. Pull string shall have permanently printed sequential measurements at one-foot increments.

## **PART 3 – EXECUTION**

### **3.1 INSTALLATION**

- A. CONDUIT
  - 1. Verify routing and termination locations of conduit runs prior to rough-in.
  - 2. Conduit routing shown on Drawings is approximate. Route as required to



complete wiring.

3. Design, layout, and detail conduit runs to permit installation.
4. Coordinate conduit routing with the Construction Representative to avoid equipment operational and maintenance interferences and to permit easy removal of all conduit body and box covers.
5. Conduit or fittings having any type of defects shall not be used in the work.
6. Exposed conduit shall be run perpendicular or parallel to building walls. Where more than one conduit in a bank of exposed conduit changes direction, all bends shall be concentric.
7. The Contractor shall consult all of the other trade drawings to ascertain where conflicts may occur and shall install all conduit as required to avoid conflicts.
8. Conduits shall be continuous from outlet to outlet, from outlet to junction or pull boxes, from source panel to equipment, and shall be terminated to all boxes and enclosures in such a manner that the conduit system is mechanically and electrically continuous throughout the system.
9. The contractor shall furnish and install NEC sized pull boxes or conduit bodies wherever necessary in order that a run of conduit between conductor/cable pulling points does not contain more than the equivalent of 4 quarter (90 degree) bends (360 degrees total).
10. Conduit bends shall not be less than the standard radius, unless otherwise indicated.
11. A minimum clearance of nine inches (9") shall be maintained between all conduits and pipes carrying steam, hot liquids, or hot gases, except at points of cross over, in which case the clearance may be reduced to six inches (6"). Any exceptions to this shall be presented to the Designer for approval on an individual case by case basis.
12. Maintain adequate clearance between conduit and piping, allowing for the maintenance of insulation and outer protective covering on piping.
13. Couplings for conduits in a group shall be staggered at least six (6) inches.
14. Conduit shall not be routed along floors.
15. Conduits shall be concealed in finished spaces and exposed in unfinished spaces.
16. In unfinished spaces, arrange conduit to maintain minimum 7'-6" headroom above floors, unless otherwise approved by the Construction Representative.
17. All rigid metal conduit, threaded joints and couplings shall be made up wrench tight with at least five full threads engaged. The use of running threads at conduit couplings and terminations is prohibited. All cut ends of conduits shall be reamed to remove rough edges and shall be free of burrs and sharp edges. An approved aluminum lubricant shall be used with rigid aluminum conduit.
18. Coat all field cut threads, scars, or wrench abrasions in rigid galvanized steel conduit with an approved organic zinc rich primer equivalent to Koppers' "Organic Zinc."
19. Conduit shall be supported on approved types of steel brackets, channels, ceiling trapeze, pipe straps or hangers secured by means of toggle bolts, hollow wall fasteners or through wall bolt fasteners on hollow masonry or clay tile blocks; or expansion anchors in concrete or brick; or machine screws on metal surfaces; or wood screws on

wood construction. Nails or powder-actuated anchors shall not be used as a means of fastening. Perforated flat steel straps or wire shall not be used for supporting conduit. All conduit shall be properly supported in accordance with Section 260529 – Hangers and Supports for Electrical Equipment in order to deter any possible vibration, noise or chatter.

20. Conduit shall be supported from building structures. Do not use piping, ductwork, other raceways or equipment for supporting conduits. Support all conduit runs at a minimum of every 10 feet and within 3 feet of all terminations.
21. Where possible, group conduits on U-channel conduit racks.
22. Utilize U-channel supports and associated fittings and hardware for conduit support in accordance with Section 260529 – Hangers and Supports for Electrical Equipment.
23. Terminate rigid metal conduits at all NEMA Type 1 junction and pull boxes and equipment enclosures inside buildings with a minimum of two (2) locknuts, one inside and one outside the enclosure, and a steel or malleable iron insulated throat, grounding bushing having a solderless lug and a copper bonding jumper, sized in accordance with NEC Article 250, to connect the conduit to the equipment grounding bus bar located inside the enclosure. Provide a grounding lug where the enclosure does not contain an equipment grounding bus bar.
24. Provide insulated throat, liquid tight, grounding type conduit hubs to terminate rigid metal conduits at all NEMA Type 3, 3R, 4, 4X, 12 and 13 enclosures without integral cast threaded hubs. Provide a copper bonding jumper, sized in accordance with NEC Article 250, to connect the conduit hub locknut to the equipment grounding bus bar located inside the enclosure. Provide a grounding lug where the enclosure does not contain an equipment grounding bus bar.
25. Grounding and bonding of conduit shall be in accordance with Section 260526 – Grounding and Bonding for Electrical Systems.
26. Identify all conduit runs; both new conduit and existing that is reused, in accordance with Section 260553 – Identification for Electrical Systems.
27. Prior to installing any cables in any existing conduit that is to be reused, demonstrate to the Construction Representative that the conduit is clear of obstructions by pulling a mandrel 1/2-inch smaller than the nominal size of the conduit through the entire length of the conduit.

#### B. CONDUIT BODIES

1. Conduit bodies shall be sized for the conductor fill of the conduits to which it is connected. Use Mogul type conduit bodies if/as required.
2. Conduit body sizing shall be based on the maximum number of conductors permitted accordance with NEC Article 314-16(C).
3. Conduit bodies enclosing size 6 AWG or smaller conductors shall have a cross-sectional area not less than twice the cross-sectional area of the largest conduit to which the conduit body is attached.
4. Conduit bodies are not permitted to contain splices, taps, or devices.
5. Conduit bodies shall be supported in a rigid and secure manner.

C. CONDUIT MOUNTING CLAMPS

1. Conduit shall not be mounted in direct contact with any concrete or masonry wall or ceiling. Utilize U-channel supports or clamp backs/spacers to hold conduits a minimum of 3/16 inch away from concrete or masonry surfaces. Clamp backs/spacers shall be stackable to allow the conduit to be spaced further away from the mounting surface as required.

D. CONDUIT OPENINGS

1. Provide conduit openings in floors and walls as required to install conduit runs. Openings shall be kept to a minimum, as small as possible, and installed in a neat manner. All damage to existing surrounding surfaces when installing openings shall be repaired to original condition.
2. Locations of all openings shall be approved by the Construction Representative before beginning work.
3. Core drill all openings in existing concrete or masonry surfaces using a dustless method.
4. After installation of conduit, openings in concrete or masonry shall be formed, grouted, and caulked to provide a moisture and fire barrier that is equivalent to the fire rating of the wall or floor.
5. All openings through which a conduit passes in walls and floors shall be properly sealed after the conduit is installed to prevent transmission or leakage of liquids, dust, fire, smoke, or sound. Openings in non-fire rated concrete or masonry construction through which conduit passes shall be sealed, after the conduit is installed, with material similar to that which surrounds the opening. Openings in fire-rated construction through which conduit passes shall be sealed, after the conduit is installed, with an APPROVED fire-resistant penetration seal. All fire-resistant penetration seals shall be installed in accordance with the manufacturer's instructions.

**END OF SECTION 26 0533.13**

## **SECTION 26 0533.16**

### **BOXES FOR ELECTRICAL SYSTEMS**

#### **PART 1 – GENERAL**

##### **1.1 RELATED DOCUMENTS**

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

##### **1.2 SCOPE**

- A. The Contractor shall furnish and install all electrical boxes as specified herein and as shown on the Drawings.

##### **1.3 RELATED SECTIONS**

- A. Section 260519 – Low-Voltage Electrical Power Conductors and Cables
- B. Section 260526 – Grounding and Bonding for Electrical Systems
- C. Section 260529 – Hangers and Supports for Electrical Equipment
- D. Section 260533.13 – Conduit for Electrical Systems
- E. Section 260553 – Identification for Electrical Systems

##### **1.4 SUBMITTALS**

- A. Manufacturer's product data sheets shall be submitted for the following items:
  - 1. Outlet and non-dimensioned junction and pull boxes and device boxes
  - 2. Dimensioned junction and pull boxes

#### **PART 2 – PRODUCTS**

##### **2.1 GENERAL**

- A. All electrical boxes, including extension rings, plaster rings, covers and other accessories, shall be UL Listed and Labeled.
- B. All outlet, device and nondimensioned junction and pull boxes shall be sized in accordance with the allowable wiring fill permitted by the National Electrical Code (NEC).

- C. Junction boxes and pull boxes shall be sized as per the NEC or as shown on the Drawings.
- D. Outlet boxes shall be of the size and type to accommodate the structural conditions, the size and number of raceways, conductors or cables entering, and the wiring device with which the box is intended to be used. Install blank plates on all outlet boxes where apparatus is installed which does not, in itself, provide a cover for the box.
- E. Unless otherwise indicated, all junction or pull box covers shall be fastened with cadmium plated or galvanized steel screws or bolts for indoor applications and stainless-steel screws or bolts for outdoor applications. The removable cover shall be fabricated from the same material as the box, and the cover shall be on the largest accessible side of the box unless otherwise indicated. The cover of the box shall be designed for quick removal.
- F. Boxes shall be as manufactured by Appleton Electric Company, Eaton Crouse-Hinds, Steel City, Racor, Killark Electric Manufacturing Company, O-Z/Gedney Company, Hoffman Engineering Company, Wiegmann or approved equal.

## 2.2 BOXES FOR NONHAZARDOUS AREAS

- A. Nondimensioned junction and pull boxes and device boxes located in indoor dry areas shall be hot-dipped galvanized drawn steel, 4-inch square, 4-11/16-inch square or octagon, 1-1/2 inch minimum depth, NEMA Type 1 with plaster ring, if/as required. Sectional boxes are not acceptable.
- B. Nondimensioned junction and pull boxes and device boxes located in water treatment and RO system areas shall be cast, cadmium or zinc plated malleable iron or "copper-free" aluminum, having threaded hubs and neoprene gasketed covers fastened with four (4) stainless steel screws, NEMA Type 4, Crouse-Hinds Type GRFX, or GS, or approved equal, or Crouse-Hinds, Appleton Electric or Killark 2-1/8 inch deep Type FD, or approved equal.
- C. Dimensioned junction and pull boxes located in indoor dry areas shall be painted steel, galvanized steel or code gauge sheet aluminum, NEMA Type 12 having removable neoprene gasketed covers fastened with cadmium plated or galvanized steel screws, and continuously welded seams (ground smooth) with no holes or knockouts
- D. Dimensioned junction and pull boxes located in water treatment and RO system areas shall be painted steel, galvanized steel or code gauge sheet aluminum, NEMA Type 4 having removable neoprene gasketed covers fastened with cadmium plated or galvanized steel screws, and continuously welded seams (ground smooth) with no holes or knockouts.
- E. Pull and junction boxes shall be sized in accordance with NEC Article 314-16 or 314-28 as a minimum. Larger boxes may be provided.
- F. Provide hinged cover enclosures for any box larger than 12 inches in any dimension.
- G. Provide grounded metallic barriers in dimensioned junction and pull boxes as required to isolate power circuits from other types of circuits. Barriers shall be designed so as not to separate the phases of a power circuit. Barriers shall be constructed of the same material as the box in which they are installed.

- H. Inner Back Panels: Provide white painted steel, galvanized steel, or code gauge sheet aluminum inner back panel, to match box construction, inside all boxes in which terminal blocks or control devices are located.

## **PART 3 – EXECUTION**

### **3.1 INSTALLATION**

#### **A. Boxes, General**

1. Locate and install boxes to allow access. Coordinate with other trades to ensure boxes are not made inaccessible by equipment, duct work or piping installation.
2. Locate and install to maintain headroom and to present a neat appearance.
3. Special care shall be taken to set all boxes square and true with the building finish. As far as possible, all boxes shall be secured to the building structure or steel, using adjustable supports where necessary.
4. Outlet boxes in unfinished areas shall be surface (exposed) mounted to columns or walls, unless otherwise indicated.
5. Final correct readjustment shall be made to outlet boxes, if necessary, to give proper centering. In centering and location of outlet boxes, allowance shall be made for overhead pipes, ducts, and other mechanical equipment and for variation in the arrangement and thickness of walls, fireproofing, etc. Any inaccuracy resulting from failure to take the above into consideration shall be corrected by the Contractor without additional expense to the Owner.
6. Boxes located in damp or wet locations shall have stainless steel or other Designer approved corrosion resistant spacers installed to provide a minimum of 1/4-inch air space between the back of the box and the mounting surface.
7. All boxes shall be rigidly mounted.
8. Securely fasten boxes to building structure, independent of the conduit, except for splice boxes that are connected to two metal conduits, both supported within 12 inches of the box.
9. All conduits entering sheet metal junction or pull boxes shall be through holes properly cut with a punch and die. Cast boxes shall be provided with threaded conduit bosses or hubs of proper size and externally located cast feet for mounting.
10. All open conduit knockouts, holes or hubs in electrical enclosures that are not used shall be properly plugged with suitable blanking devices of the same material as the box that maintain the NEMA rating of the box. Utilize stainless steel blanking devices for stainless steel boxes. Utilize NEMA 12 rated hole seals devices to seal all open holes in the top of all panelboards, switchboards, motor control centers and in NEMA 12 rated dimensioned junction and pull boxes. Provide NEMA 4 rated hole seals for NEMA 4 rated junction and pull boxes and electrical enclosures.
11. Junction and pull boxes shall be furnished and installed where indicated on the Drawings, required by code, and wherever else such a box may be deemed necessary to facilitate the pulling or splicing of wires or cables. In general, junction or pull boxes shall be installed to limit conduit runs to 125 feet and conduit bends to a maximum total of 360 degrees. The

Contractor shall furnish and install properly sized pull boxes wherever necessary in order that a run of conduit between outlet and outlet, between fitting and fitting, or between outlet and fitting shall not contain more than the equivalent of four quarter (90 degree) bends (360 degrees total). Additional pull boxes may be needed to facilitate wire pulling. All boxes shall be installed in locations that will be accessible after completion of the construction.

12. Dimensioned pull and junction boxes shall be sized in accordance with NEC Article 314-28 unless a larger size box is indicated on the Drawings.
13. Location of junction and pull boxes shall be approved before installation. Where necessary, conduits may be rerouted with the approval of the Construction Representative.
14. Rigid metal conduits terminating in all NEMA Type 3, 3R, 4, 4X, 12 or 13 boxes and enclosures, without integral cast threaded hubs shall be terminated in insulated throat, grounding type, liquid tight, rigid conduit hubs. Conduit hubs shall be provided in accordance with Section 260533.13 – Conduit for Electrical Systems.
15. Provide a grounding type conduit bushing with solderless lug and copper bonding jumper sized in accordance with NEC Article 250 for all conduits terminating in NEMA Type 1 boxes and enclosures in accordance with Section 260526 – Grounding and Bonding for Electrical Systems.
16. All junction boxes, pull boxes, and wire troughs with a hinged cover shall be installed such that the cover can be opened at least 90°.
17. Junction and pull boxes with a hinged cover that are located on a wall shall be mounted such that the cover opens to the right or to the left but not up or down.
18. manufacturer's instructions.

### **3.2 CIRCUIT IDENTIFICATION**

- A. Junction, pull, outlet, and device boxes shall be identified in accordance with the requirements of Section 260553 – Identification for Electrical Systems.
- B. Cover plates for all junction and pull boxes shall be marked on the inside surface of the cover plate in finished areas or on the outside surface of the cover in unfinished areas in accordance with Section 260553 – Identification for Electrical Systems.
- C. All conductors in a junction or pull box shall be identified in accordance with Section 260553 – Identification for Electrical Systems.

**END OF SECTION 26 0533.16**

## SECTION 26 0543

### UNDERGROUND RACEWAYS FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. Section Includes:

1. Metal conduits and fittings, including GRC and PVC-coated steel conduit.
2. Rigid nonmetallic duct.
3. Flexible nonmetallic duct.
4. Duct accessories.
5. Precast concrete handholes.
6. Polymer concrete handholes and boxes with polymer concrete cover.
7. Fiberglass handholes and boxes with polymer concrete cover.
8. Fiberglass handholes and boxes.
9. High-density plastic boxes.
10. Precast manholes.
11. Cast-in-place manholes.
12. Utility structure accessories.

##### 1.3 DEFINITIONS

- A. Direct Buried: Duct or a duct bank that is buried in the ground, without any additional casing materials such as concrete.
- B. Duct: A single duct or multiple ducts. Duct may be either installed singly or as component of a duct bank.
- C. Duct Bank:
  1. Two or more ducts installed in parallel, with or without additional casing materials.
  2. Multiple duct banks.
- D. GRC: Galvanized rigid (steel) conduit.
- E. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.



## 1.4 ACTION SUBMITTALS

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

1. Include duct-bank materials, including spacers and miscellaneous components.
2. Include duct, conduits, and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
3. Include accessories for manholes, handholes, boxes
4. Include underground-line warning tape.

### B. Shop Drawings:

#### 1. Precast or Factory-Fabricated Underground Utility Structures:

- a. Include plans, elevations, sections, details, attachments to other work, and accessories.
- b. Include duct entry provisions, including locations and duct sizes.
- c. Include reinforcement details.
- d. Include grounding details.
- e. Include dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
- f. Include joint details.

#### 2. Factory-Fabricated Handholes and Boxes Other Than Precast Concrete:

- a. Include dimensioned plans, sections, and elevations, and fabrication and installation details.
- b. Include duct entry provisions, including locations and duct sizes.
- c. Include cover design.
- d. Include grounding details.
- e. Include dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer and testing agency responsible for testing nonconcrete handholes and boxes.
- B. Product Certificates: For concrete and steel used in precast concrete manholes, as required by ASTM C 858.
- C. Source quality-control reports.
- D. Field quality-control reports.

## 1.6 FIELD CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions, and then only after arranging to provide temporary electrical service according to requirements indicated:
- B. Ground Water: Assume ground-water level is at grade level unless a lower water table is noted on Drawings.

## PART 2 - PRODUCTS

### 2.1 METAL CONDUIT AND FITTINGS

- A. GRC: Comply with ANSI C80.1 and UL 6.
- B. Coated Steel Conduit: PVC-coated GRC
  - 1. Comply with NEMA RN 1.
  - 2. Coating Thickness: 0.040 inch (1 mm), minimum.
- C. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.

### 2.2 RIGID NONMETALLIC DUCT

- A. Underground Plastic Utilities Duct: **Type EPC-40-PVC** RNC, complying with NEMA TC 2 and UL 651, with matching fittings complying with NEMA TC 3 by same manufacturer as duct.
- B. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
- C. Solvents and Adhesives: As recommended by conduit manufacturer.

### 2.3 FLEXIBLE NONMETALLIC DUCTS

- A. HDPE Duct: **Type EPEC-40 HDPE**, complying with NEMA TC 7 and UL 651A.
  - 1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.

### 2.4 DUCT ACCESSORIES

- A. Underground-Line Warning Tape: Comply with requirements for underground-line warning tape specified in Section 260553 "Identification for Electrical Systems."

## 2.5 PRECAST CONCRETE HANDHOLES AND BOXES

- A. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or box.
- B. Comply with ASTM C 858 for design and manufacturing processes.
- C. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
- D. Frame and Cover: Weatherproof steel frame, with steel cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
- E. Frame and Cover: Weatherproof steel frame, with hinged steel access door assembly with tamper-resistant, captive, cover-securing bolts.
  - 1. Cover Hinges: Concealed, with hold-open ratchet assembly.
  - 2. Cover Handle: Recessed.
- F. Frame and Cover: Weatherproof aluminum frame with hinged aluminum access door assembly with tamper-resistant, captive, cover-securing bolts.
  - 1. Cover Hinges: Concealed, with hold-open ratchet assembly.
  - 2. Cover Handle: Recessed.
- G. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
- H. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.
- I. Knockout Panels: Precast openings in walls, arranged to match dimensions and elevations of approaching duct, plus an additional 12 inches (300 mm) vertically and horizontally to accommodate alignment variations.
- J. installed before concrete is poured.

## 2.6 POLYMER CONCRETE HANDHOLES AND BOXES WITH POLYMER CONCRETE COVER

- A. Description: Molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two.
- B. Standard: Comply with SCTE 77. Comply with tier requirements in "Underground Enclosure Application" Article.
- C. Color: [Gray]

- D. Configuration: Units shall be designed for flush burial and have **open** bottom unless otherwise indicated.
- E. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
- F. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
- G. Cover Legend: Molded lettering, "**ELECTRIC.**"
- H. Direct-Buried Wiring Entrance Provisions: Knockouts equipped with insulated bushings or end-bell fittings, selected to suit box material, sized for wiring indicated, and arranged for secure, fixed installation in enclosure wall.
- I. Duct Entrance Provisions: Duct-terminating fittings shall mate with entering duct for secure, fixed installation in enclosure wall.

2.7 FIBERGLASS HANDHOLES AND BOXES WITH POLYMER CONCRETE FRAME AND COVER

- A. Description: Sheet-molded, fiberglass-reinforced, polyester resin enclosure joined to polymer concrete top ring or frame.
- B. Standard: Comply with SCTE 77. Comply with tier requirements in "Underground Enclosure Application" Article.
- C. Color: [**Gray**]
- D. Configuration: Units shall be designed for flush burial and have open bottom unless otherwise indicated.
- E. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
- F. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
- G. Cover Legend: Molded lettering, "**ELECTRIC.**"
- H. Direct-Buried Wiring Entrance Provisions: Knockouts equipped with insulated bushings or end-bell fittings, selected to suit box material, sized for wiring indicated, and arranged for secure, fixed installation in enclosure wall.
- I. Duct Entrance Provisions: Duct-terminating fittings shall mate with entering duct for secure, fixed installation in enclosure wall.
- J. Handholes **12 inches wide by 24 inches long** and larger shall have factory-installed inserts for cable racks and pulling-in irons.

## 2.8 SOURCE QUALITY CONTROL

- A. Test and inspect precast concrete utility structures according to ASTM C 1037.
- B. Nonconcrete Handhole and Pull-Box Prototype Test: Test prototypes of manholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
  - 1. Tests of materials shall be performed by an independent testing agency.
  - 2. Strength tests of complete boxes and covers shall be by an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
  - 3. Testing machine pressure gages shall have current calibration certification, complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Coordinate layout and installation of duct, duct bank, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify Architect if there is a conflict between areas of excavation and existing structures or archaeological sites to remain.
- B. Coordinate elevations of duct and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct and duct bank will drain to manholes and handholes, and as approved by Architect.
- C. Clear and grub vegetation to be removed, and protect vegetation to remain according to Section 311000 "Site Clearing." Remove and stockpile topsoil for reapplication according to Section 311000 "Site Clearing."

### 3.2 UNDERGROUND DUCT APPLICATION

- A. Duct for Electrical Feeders 600 V and Less: **Type EPC-40-PVC** RNC, unless otherwise indicated.

### 3.3 UNDERGROUND ENCLOSURE APPLICATION

- A. Handholes and Boxes for 600 V and Less:
  - 1. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete. AASHTO HB 17, H-20 structural load rating.
  - 2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: H-20 structural load rating.

3. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: H-10 structural load rating.
4. Cover design load shall not exceed the design load of the handhole or box.

### 3.4 EARTHWORK

- A. Excavation and Backfill: Comply with Section 312000 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restoration: Replace area after construction vehicle traffic in immediate area is complete.
- C. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
- D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 329200 "Turf and Grasses" and Section 329300 "Plants."
- E. Cut and patch existing pavement in the path of underground duct, duct bank, and underground structures according to "Cutting and Patching" Article in Section 017300 "Execution."

### 3.5 DUCT AND DUCT-BANK INSTALLATION

- A. Where indicated on Drawings, install duct, spacers, and accessories into the duct-bank configuration shown. Duct installation requirements in this Section also apply to duct bank.
- B. Install duct according to NEMA TCB 2.
- C. Slope: Pitch duct a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope duct from a high point between two manholes, to drain in both directions.
- D. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of **48 inches** both horizontally and vertically, at other locations unless otherwise indicated.
  1. Duct shall have maximum of two 90 degree bends or the total of all bends shall be no more 180 degrees between pull points.
- E. Joints: Use solvent-cemented joints in duct and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent duct do not lie in same plane.
- F. End Bell Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10 inches (250 mm) o.c. for 5-inch (125-mm) duct, and vary proportionately for other duct sizes.

1. Begin change from regular spacing to end-bell spacing 10 feet (3 m) from the end bell, without reducing duct slope and without forming a trap in the line.
  2. Expansion and Deflection Fittings: Install an expansion and deflection fitting in each duct in the area of disturbed earth adjacent to manhole or handhole. Install an expansion fitting near the center of all straight line direct-buried duct with calculated expansion of more than 3/4 inch (19 mm).
  3. Grout end bells into structure walls from both sides to provide watertight entrances.
- G. Terminator Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use manufactured, cast-in-place duct terminators, with entrances into structure spaced approximately 6 inches (150 mm) o.c. for 4-inch (100-mm) duct, and vary proportionately for other duct sizes.
1. Begin change from regular spacing to terminator spacing 10 feet (3 m) from the terminator, without reducing duct line slope and without forming a trap in the line.
  2. Expansion and Deflection Fittings: Install an expansion and deflection fitting in each duct in the area of disturbed earth adjacent to manhole or handhole. Install an expansion fitting near the center of all straight line duct with calculated expansion of more than 3/4 inch (19 mm).
- H. Building Wall Penetrations: Make a transition from underground duct to GRC at least 10 feet (3 m) outside the building wall, without reducing duct line slope away from the building and without forming a trap in the line. Use fittings manufactured for RNC-to-GRC transition. Install GRC penetrations of building walls as specified in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
- I. Sealing: Provide temporary closure at terminations of duct with pulled cables. Seal spare duct at terminations. Use sealing compound and plugs to withstand at least 15-psig (1.03-MPa) hydrostatic pressure.
- J. Pulling Cord: Install 200-lbf- (1000-N-) test nylon cord in empty ducts.
- K. Direct-Buried Duct and Duct Bank:
1. Excavate trench bottom to provide firm and uniform support for duct. Comply with requirements in Section 312000 "Earth Moving" for preparation of trench bottoms for pipes less than 6 inches (150 mm) in nominal diameter.
  2. Width: Excavate trench 12 inches (300 mm) wider than duct on each side.
  3. Width: Excavate trench 3 inches (75 mm) wider than duct on each side.
  4. Depth: Install top of duct at least 36 inches (900 mm) below finished grade unless otherwise indicated.
  5. Set elevation of bottom of duct below frost line (36").
  6. Support ducts on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
  7. Elbows: Install manufactured duct elbows for stub-ups, at building entrances, and at changes of direction in duct direction unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
  8. Install manufactured GRC elbows for stub-ups, at building entrances, and at changes of direction in duct.

- a. Couple RNC duct to GRC with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.
  - b. Stub-ups to Outdoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches (1500 mm) from edge of base. Install insulated grounding bushings on terminations at equipment.
    - 1) Stub-ups shall be **minimum 4 inches** finished floor and minimum 3 inches (75 mm) from conduit side to edge of slab.
  - c. Stub-ups to Indoor Equipment: Extend concrete-encased GRC horizontally a minimum of 60 inches (1500 mm) from edge of wall. Install insulated grounding bushings on terminations at equipment.
    - 1) Stub-ups shall be **minimum 4 inches** finished floor and no less than 3 inches (75 mm) from conduit side to edge of slab.
- L. Underground-Line Warning Tape: Bury **nonconducting** underground line specified in Section 260553 "Identification for Electrical Systems" no less than 12 inches (300 mm) above all Primary and secondary duct and duct banks **and approximately 12 inches (300 mm) below grade**. Align tape parallel to and within 3 inches (75 mm) of centerline of duct bank. Provide an additional warning tape for each 12-inch (300-mm) increment of duct-bank width over a nominal 18 inches (450 mm). Space additional tapes 12 inches (300 mm) apart, horizontally.

### 3.6 INSTALLATION OF HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of duct, and seal joint between box and extension as recommended by manufacturer.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas and trafficways, set cover flush with finished grade. Set covers of other handholes 1 inch (25 mm) above finished grade.
- D. Install handholes and boxes with bottom below frost line, 36" below grade.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.

**END OF SECTION 26 0543**



## **SECTION 26 0533**

### **IDENTIFICATION FOR ELECTRICAL SYSTEMS**

#### **PART 1 – GENERAL**

##### **1.1 RELATED DOCUMENTS**

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

##### **1.2 SCOPE**

- A. The Contractor shall furnish and install all conductors, wiring, and cables as specified herein and as shown on the Drawings.

##### **1.3 RELATED SECTIONS**

- A. Section 230515 – Variable-Frequency Motor Controllers
- B. Section 260500 – Common Work Results for Electrical
- C. Section 260519 – Low-Voltage Electrical Power Conductors & Cables
- D. Section 260533.13 – Conduit for Electrical Systems
- E. Section 260533.16 – Boxes for Electrical Systems
- F. Section 260573 – Protective Device Coordination Study and Arc Flash Risk Assessment
- G. Section 262816.16 – Enclosed Switches

##### **1.4 SUBMITTALS**

- A. Submit electrical identification data as follows:
  - 1. Nameplate type product data
  - 2. Nameplate engraving schedule
  - 3. Wire and cable identification label product data
  - 4. Conduit marker product data
  - 5. Arc flash hazard warning labels

#### **PART 2 – PRODUCTS**

##### **2.1 NAMEPLATES**

- A. Nameplates shall be three-layer laminated plastic with engraved black characters on a white

background or engraved white characters on a red background as indicated on the Drawings.

- B. Nameplates that will be located outdoors must be constructed from material that is waterproof and UV resistant.
- C. Nameplate engraving shall be as follows:
  - 1. Lettering font shall be Gothic.
  - 2. Nameplate character shall be:
    - a. 3/8-inch high – Motor control center starter and feeder units, control panels, variable-frequency motor controllers, enclosed switches, terminal boxes, dimensioned junction boxes and dimensioned pull boxes.
    - b. 1/4-inch high – Motor terminal boxes
    - c. 1/8-inch high – Local control stations
  - 3. Lettering shall be centered on nameplate.
  - 4. Nameplates shall have a maximum of forty (40) characters per line with a maximum of four (4) lines.
  - 5. Wording on nameplate shall include the equipment designation as indicated on the Drawings.
  - 6. In addition, the engraved nameplate for each variable-frequency motor controller and motor disconnect switch shall also indicate the source panel it is served from and the service voltage and number of phases/wires such as: “480V-3PH-3W, GRD B-PH” or “208Y/120V-3PH-4W”.
  - 7. Each variable frequency motor controller, motor starter and fusible switch on the 480V, 3-phase delta, grounded B-Phase power system shall also have an engraved nameplate that indicates the fuse size and type such as:

REPLACEMENT FUSES:  
UL CLASS RK1 60A – PHASE A & C  
SOLID NEUTRAL LINK – PHASE B
  - 8. Engraving designations shall be approved by the Designer.
- D. Special nameplates shall be as indicated on the Drawings.

**2.2 CONDUIT MARKERS**

- A. Conduit markers shall be vinyl "peel and stick" type with black characters on an orange background:
  - 1. Conduits 1-1/4" and smaller.....1/2" characters
  - 2. Conduits 1-1/2" and larger .....1" characters
- B. Markers shall identify voltage and functional use of the conduit, such as “480 VOLT - 3 PHASE”, “120 VOLT”, “CONTROL”, “INSTRUMENTATION”, etc.

**2.3 WIRE LABELS AND CABLE MARKERS**

- A. Wire labels for No. 4/0 AWG and smaller wires shall be vinyl film, self-laminating, adhesive wraparound type; W. H. Brady Co. B-292, Thomas & Betts WSL Series or approved equal.
- B. Cable markers for cables and wire labels for all conductors 250 KCM and larger shall be polyester film, non-adhesive, plate type designed for cable tie banding parallel to the cable/conductor.
- C. Wire and cable identification numbers shall be printer generated or typewritten on the labels and markers.
- D. Character size for cable identification numbers shall be a minimum of 1/8" high.
- E. Markers labels, number generation method, and attachment methods shall be subject to the approval of the Engineer.

#### **2.4 ARCH FLASH HAZARD WARNING LABELS**

- A. Warning labels for electrical equipment shall be color printed, waterproof, approved by the Designer and furnished and installed by the Contractor.
- B. For incident energy values less than or equal to  $40 \text{ cal/cm}^2$ , label shall indicate "WARNING" using black lettering on an orange background.
- C. For incident energy values greater than  $40 \text{ cal/cm}^2$ , label shall indicate "DANGER" using white lettering on a red background.
- D. At a minimum, each label shall include the following:
  1. Equipment location
  2. Source protective device name providing the protection (fed from)
  3. Nominal system voltage
  4. Arc flash boundary
  5. Specific arc incident energy available
  6. Bolted fault current available
  7. Label date

NOTE: Print appropriate information on label based on the arc flash risk assessment report provided in accordance with Specification Section 260573 – Overcurrent Protective Device Coordination Study and Arc Flash Risk Assessment.

- E. Size of warning labels shall be:
  1. Equipment main bus rating less than 400A: 3.5" x 5"
  2. Equipment main bus rating 400A or more: 5" x 7"

#### **2.5 COLOR CODE TAPE**

- A. Each conductor, except control and signal conductors, shall be color coded with 3M No. 35 tape, 3/4" width, or colored insulation.

- 1. Color coding for 600-volt conductors shall be:

<u>120/240V 1 Phase</u>	<u>120/208V 3 Phase</u>	<u>480V 3 Phase, GRD B-PH</u>
Phase A Black	Phase A Black	Phase A Brown
Phase B Red	Phase B Red	Phase B White or Gray
Neutral White	Phase C Blue	Phase C Yellow
Equipment Ground Green	Neutral White	Equipment Ground Green
	Equipment Ground Green	

- B. Wiring to contacts powered from an external source shall be yellow.
- C. Conductors for direct current (DC) circuits shall be color coded red for positive (+) conductor and black for negative (-) conductor.

**2.6 PANELBOARD CIRCUIT DIRECTORIES**

- A. Each panelboard shall have a framed circuit directory card with a clear plastic covering mounted on the inside of the door.
- B. The directory card shall provide a space at least 1/4-inch high by 3 inches long, or the equivalent, for each circuit.
- C. The directory card shall be typed to identify the load fed by each circuit for compliance with NEC 408.4.

**PART 3 – EXECUTION**

**3.1 GENERAL**

- A. Degrease and clean surfaces to receive nameplates, markers, labels, and color code tape.

**3.2 NAMEPLATES**

- A. Nameplates shall be provided for each switchgear circuit breaker, panelboard, control panel, terminal box, dimensioned pull box, dimensioned junction box, and local control station.
- B. Nameplates shall be secured with an approved adhesive such as Goodyear "Pliobond" glue or stainless-steel machine screws in tapped holes. Self-tapping screws or sheet metal screws shall not be used.

**3.3 CONDUIT MARKERS**

- A. Attach a conduit identification marker to each conduit at all termination points and at 20' intervals along the entire length of the conduit.

- B. Secure markers parallel to conduit in a readily visible location.

### **3.4 FIELD QUALITY CONTROL**

- A. Branch circuits, control and signal wires and cables shall be identified.
  - 1. Attach a wire identification label to each conductor of a circuit cable group at each termination point.
  - 2. Attach a cable identification marker to each circuit cable group at all termination entry points.
- B. Wire labels and cable markers shall identify each conductor and cable with the circuit number. Identify with branch circuit or feeder number for power circuits and with control wire or cable number as indicated on schematic and interconnection diagrams and equipment shop drawings for control wiring.
- C. Cable markers for cables and wire labels for all conductors 250 KCM and larger shall be secured with heavy duty plastic cable ties. Cut excess tie material off flush with tie clasp. Do not leave sharp edges.

### **3.5 ARC FLASH HAZARD WARNING LABELS**

- A. Provide arc flash hazard warning labels in accordance with NEC Article 110-16 for the following equipment:
  - 1. New variable-frequency motor controllers and motor disconnect switches
  - 2. Existing switchboards, panelboards, motor control centers, low-voltage distribution transformers, motor starters and disconnect switches where circuits have been added or removed or where the main feeder is being replaced.
  - 3. All switchboards, panelboards, low-voltage distribution transformers, and motor control centers in the series electrical path from the electrical equipment specified herein as needing a label up to the main 480V switchboard serving the north portion of the Power Plant.
- B. Labels shall be applied to the outside of the front cover at the center of the cover such that the label is clearly visible with the door closed.
- C. Switchgear, switchboards, panelboards, and motor control centers having multiple sections shall have one 5" x 7" label applied to each section.
- D. Clean the surface to which each label is to be applied with isopropyl alcohol or a similar, fast evaporating cleaning agent that will not damage the paint finish.

### **3.6 COLOR CODE TAPE**

- A. Code all wire and cable not available color coded from manufacturer by application of electrical plastic tape in colors specified. Apply tape in uniform manner circling wire or cable. Half-lap tape for length of cable as required by Local Authorities or NEC but not less than five (5) full wraps.

### **3.7 JUNCTION, PULL, OUTLET AND DEVICE BOX IDENTIFICATION**

- A. Cover plates for all non-dimensioned junction and pull boxes shall be marked on the outside surface of the cover plate with the voltage, panel and circuit number of the branch circuit(s) contained inside the box. Marking shall be with printer generated “peel and stick” labels.
- B. Nameplates shall be provided on the external surface of the cover of all dimensioned junction and pull boxes which shall identify the source voltage of the circuits inside the box as well as the location of the AC power source(s) for these circuits.

**3.8 JUNCTION, PULL, OUTLET AND DEVICE BOX IDENTIFICATION**

- A. Provide new “updated” directory cards for existing panelboards in which circuits have been rearranged, added, or deleted.
- B. The directory card shall be typewritten or printer generated to identify the load served by each circuit.
- C. Trace out unidentified circuits in existing panels and indicate load served on new circuit directory for compliance with NEC 408.4.

**END OF SECTION 26 0533**

**SECTION 26 0583**  
**WIRING CONNECTIONS**

**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 SCOPE**

- A. The Contractor shall furnish and install all wiring connectors and terminations for 600-volt building wire, 600-volt multi-conductor control cable, and 600-volt shielded instrumentation cable as specified herein and as shown on the Drawings.

**1.3 RELATED SECTIONS**

- A. Section 260500 – Common Work Results for Electrical
- B. Section 260519 – Low-Voltage Electrical Power Conductors & Cables
- C. Section 260533.13 – Conduit for Electrical Systems
- D. Section 260533.16 – Boxes for Electrical Systems
- E. Section 262816.16 – Enclosed Switches

**1.4 SUBMITTALS**

- A. Manufacturer's product data sheets shall be submitted for each of the following items:
  - 1. 600-volt connectors
  - 2. 600-volt terminations
  - 3. CAT 5e copper Ethernet connectors

**PART 2 – PRODUCTS**

**2.1 600-VOLT CONNECTIONS AND TERMINATIONS**

- A. Pressure Type Terminal and Splice Connectors: Solderless, color coded, nylon insulated, pressure type, UL Listed 105°C, 600-volt, sized for the cable to be terminated or spliced, tin-plated copper, with crimping tool coded to the connectors with stops to prevent over-crimping and means to prevent under-crimping; 3M Scotchlok or approved equal.
- B. Spring Type Splice Connectors: Solderless, color coded, flame retardant polypropylene and thermoplastic elastomer or flame retardant nylon, spin-on wings, spring steel inner spring with

corrosion resistant coating, UL Listed 105°C, 600-volt, sized for splicing two or more

- C. Control Wiring Connections and Termination: Control wiring connectors shall be vinyl or nylon pre-insulated spade lugs to match stud or screw size with insulation grip sleeve flared to prevent turned-back strands and crimping tool to crimp wire barrel and insulation sleeve.
- D. Power Connections and Terminations:
  - 1. Size 12 AWG through 2/0 AWG connectors shall be non-insulated, one-hole rectangular tongue, for copper conductors, UL Listed 90°C, 600-volt.
  - 2. Size 3/0 AWG and larger conductors shall be non-insulated, two-hole rectangular tongue with long barrel length to permit two (2) crimps for copper conductors, UL Listed 90°C, 600-volt.
  - 3. In-line splices shall only be made where specifically indicated on the Drawings or where pre-approved by the Designer.
    - a. Size 12 AWG through 2/0 AWG connectors, for splicing like sized conductors, shall be non-insulated, standard length barrel, for copper conductors, UL Listed 90°C, 600-volt, compression type.
    - b. Size 3/0 AWG and larger connectors, for splicing like sized conductors, shall be non-insulated, long barrel length to permit two (2) crimps on each conductor, for copper conductors, UL Listed 90°C, 600-volt.
    - c. Size 12 AWG through 3/0 AWG connectors, for splicing different sized conductors, shall be Thomas & Betts C-Tap compression connections or approved equal. Overwrap connectors with a minimum of three (3) half-lapped layers of Thomas & Betts Shrink-Kon TBFT201-36 self-fusing insulation tape.
- E. Power Termination and In-Line Insulation:
  - 1. Insulating Putty: 3M Scotchfil electrical insulating putty or approved equal by Thomas & Betts
  - 2. Insulating Tape: 3M Scotch 23 or Thomas & Betts Shrink-Kon TBF201-36 self-fusing insulating tape
  - 3. Jacketing Tape: 3M Scotch 33+ jacketing tape
  - 4. For in-line splices, provide pre-engineered cold shrink or heat shrink insulating kits by 3M, Raychem, or Thomas & Betts in lieu of tape insulation, when available.
- F. CAT 5e Copper Ethernet Cable Connectors: RJ-45, 8-pin compression type with locking tab meeting the requirements of ANSI/TIA-568-C.2, field installable connector compatible with the cable onto which installed.

## **PART 3 – EXECUTION**

### **3.1 GENERAL**

- A. Conductors shall be continuous from source to destination without splices or taps in conduit runs, except where indicated on the Drawings to compensate for voltage drop or where required to prevent excessive pulling tension or sidewall pressure on wire or cable. Submit all proposed splice



locations to the Designer for approval prior to pulling wire and cable. Where permitted, splices shall be mechanically strong and have an insulation value equal to the wire or cable being spliced. All splices and taps shall be contained within NEC sized junction boxes meeting the requirements of Section 260533.16 – Boxes for Electrical Systems.

### **3.2 CONTROL AND INSTRUMENTATION WIRING CONNECTIONS AND TERMINATIONS**

- A. Thoroughly clean wires before installing connectors.
- B. Tape back spare conductors with the specified jacketing tape.
- C. Where attachment is to a terminal block screw or stud, install using pre-insulated spade type connectors.
- D. Where control cable terminations are split across terminal blocks or are otherwise separated by more than 12 inches distance, identify each conductor group with the circuit number as specified in Section 260553 – Identification for Electrical Systems.
- E. Conductor to conductor splices shall be made using spring type splice connectors. No crimp type connectors shall be used for these types of splices.
  - 1. Apply a minimum of three (3) half-lapped layers of jacketing tape over each and every spring type (wire nut) splice connection.

### **3.3 600-VOLT CONNECTIONS AND TERMINATIONS**

- A. Cut conductors to proper length such that the barrel or inner metal spring of the connector makes full contact with the bare conductor and not the insulation and the plastic skirt of the connector full covers the bare conductor.
  - 1. Conductor to conductor splices for size 10 AWG or smaller conductors shall be made using wire nuts or wing nuts. No crimp type connectors shall be used for these types of splices.
  - 2. Apply a minimum of three (3) half-lapped layers of jacketing tape over each and every spring type (wire nut) splice connection.
- B. Power Connections and Terminations:
  - 1. Cover all exposed live parts such as connectors, bolts, nuts, and bus bar with insulating material to equal or exceed insulation of the connected cable.
  - 2. At equipment with cable leads such as motors, install compression type terminal connectors on equipment leads and power circuit leads, bolt together, and insulate with pre-engineered motor terminal kits or as specified herein.
  - 3. At equipment with integral set screw or clamp type connectors such as terminal blocks and molded case circuit breakers, strip conductor insulation as required to clear contact surfaces, and torque connector in accordance with manufacturer's recommendations.

### **3.4 600-VOLT POWER TERMINATION AND IN-LINE SPLICE INSULATION**

- A. Insulate with pre-engineered cold shrink or heat shrink kits when available, or with a minimum of three (3) half-lapped layers of insulating tape covered with three (3) half-lapped layers of jacketing tape.
- B. Provide electrical insulating putty to fill major irregularities and voids in termination prior to application of insulating tape.
- C. Apply self-fusing insulating tape directly to the conductors or over the electrical insulation putty.
- D. Apply jacketing tape over the insulating tape to provide an outer covering for the cable termination.
- E. Splices made using spring type splice connectors shall be insulated with a minimum of three (3) half-lapped layers of jacketing tape specified.

### **3.5 CAT 5e COPPER ETHERNET CABLE TERMINATIONS**

- A. Utilize the connector manufacturer's recommended installation tool(s) for cutting, stripping, and crimping cable and inserting into the connector.

### **3.6 FIELD QUALITY CONTROL**

- A. General:
  - 1. Testing shall be performed in the presence of Construction Representative. Contractor must provide 48 hours' notice prior to conducting tests.
  - 2. Prepare a test report upon completion of testing activities. Report format shall include the following information:
    - a. Summary of test results
    - b. Test equipment summary (model number, accuracy, calibration date)
    - c. Test personnel names and sign-offs
    - d. Completed data sheets
    - e. Test log and observations
    - f. Certificate of Compliance
- B. Torque test conductor connections and terminations to manufacturer's recommended values.
- C. Provide testing for 600-volt wire and cable in accordance with Section 260519 – Low-Voltage Electrical Power Conductors and Cables in conjunction with the testing specified herein.

**END OF SECTION 26 0583**

**SECTION 26 0923  
LIGHTING CONTROL DEVICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Outdoor motion sensors.
- B. Outdoor photo controls.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0529 - Hangers and Supports for Electrical Systems
- B. Section 26 0533.16 - Boxes for Electrical Systems.
- C. Section 26 5600 - Exterior Lighting.

**1.03 REFERENCE STANDARDS**

- A. 47 CFR 15 - Radio Frequency Devices current edition.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Notify Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

**1.05 SUBMITTALS**

- A. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
  - 1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

**1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

**1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

**1.08 FIELD CONDITIONS**

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

**1.09 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for all occupancy sensors.
- C. Provide two year manufacturer warranty for all daylighting controls.

**PART 2 PRODUCTS**

**2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

**2.02 OUTDOOR MOTION SENSORS**

- A. Description: Factory-assembled wet location listed device suitable for wall or ceiling/eave mounting, with integral swivel for field adjustment of coverage, capable of detecting motion for automatic control of load indicated.

- B. Sensor Technology: Passive Infrared (PIR) designed to detect occupancy by sensing movement of thermal energy between zones.
- C. Operation: Unless otherwise indicated, motion sensor to turn load on when motion is detected and to turn load off when no motion is detected during an adjustable turn-off delay time interval.
- D. Turn-Off Delay: Field adjustable, with time delay settings available up to 15 minutes.
- E. Integral Photocell: For dusk to dawn operation.
- F. Manual Override: Activated by switching power off to unit and then back on.
- G. Load Rating: 1,000 W incandescent and fluorescent load at 120 V ac.
- H. Coverage: Capable of detecting motion within a distance of 100 feet at a mounting height of 20 feet, with a field of view of 270 degrees.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- G. Verify that conditions are satisfactory for installation prior to starting work.

#### 3.02 INSTALLATION

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of lighting control devices provided under this section.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.
- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 2726.
- G. Provide required supports in accordance with Section 26 0529.
- H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

#### 3.03 FIELD QUALITY CONTROL

- A. Inspect each lighting control device for damage and defects.
- B. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area.
- C. Test outdoor photo controls to verify proper operation, including time delays where applicable.
- D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

#### 3.04 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust position of directional occupancy sensors and outdoor motion sensors to achieve optimal coverage as required.

3.05 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of lighting control devices to Owner, and correct deficiencies or make adjustments as directed.
- B. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
  - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

**END OF SECTION 26 0923**

**SECTION 26 2100**  
**LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE**

**PART 1 GENERAL**

1.01 SECTION INCLUDES

- A. Electrical service requirements.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 2300 - Low-Voltage Switchgear: Service entrance equipment.
- F. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

1.03 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code 2017.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Notify Utility Company of anticipated date of service.
- B. Coordination:
  - 1. Verify the following with Utility Company representative:
    - a. Utility Company requirements, including division of responsibility.
    - b. Exact location and details of utility point of connection.
    - c. Utility easement requirements.
    - d. Utility Company charges associated with providing service.
  - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
  - 3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 4. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Utility Company charges associated with providing permanent service to be paid by Contractor.
- E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- F. Scheduling:
  - 1. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.
  - 2. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
  - 1. IEEE C2 (National Electrical Safety Code).
  - 2. NFPA 70 (National Electrical Code).
  - 3. The requirements of the Utility Company.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

### **PART 2 PRODUCTS**

#### 2.01 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Utility Company: As indicated on drawings.
- D. Division of Responsibility: As indicated on drawings.
- E. Products Furnished by Contractor: Comply with Utility Company requirements.

### **PART 3 EXECUTION**

#### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
- C. Verify that conditions are satisfactory for installation prior to starting work.

#### 3.02 PREPARATION

- A. Verify and mark locations of existing underground utilities.

#### 3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required trenching and backfilling in accordance with Section 312000.
- E. Provide required support and attachment components in accordance with Section 26 0529.
- F. Provide grounding and bonding for service entrance equipment in accordance with Section 26 0526.
- G. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 0553.

#### 3.04 PROTECTION

- A. Protect installed equipment from subsequent construction operations.

**END OF SECTION 26 2100**

**SECTION 26 2300  
LOW-VOLTAGE SWITCHGEAR**

**PART 1 GENERAL**

1.01 SECTION INCLUDES

- A. Low-voltage (600V and less) arc-resistant metal-enclosed drawout switchgear and accessories for service and distribution applications.
- B. Low-voltage power circuit breakers for switchgear.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. ANSI C37.50 - American National Standard for Switchgear - Low-Voltage AC Power Circuit Breakers Used in Enclosures - Test Procedures 2012.
- B. ANSI C37.51 - American National Standard for Switchgear - Metal-Enclosed Low-Voltage AC Power Circuit Breaker Switchgear Assemblies - Conformance Test Procedures 2003 (R2010), with Amendment 1, 2010.
- C. IEEE C37.13 - IEEE Standard for Low-Voltage AC Power Circuit Breakers Used in Enclosures 2015.
- D. IEEE C37.16 - IEEE Standard for Preferred Ratings, Related Requirements, and Application Recommendations for Low-Voltage AC (635 V and below) and DC (3200 V and below) Power Circuit Breakers 2009.
- E. IEEE C37.17 - IEEE Standard for Trip Systems for Low-Voltage (1000 V and below) AC and General Purpose (1500 V and below) DC Power Circuit Breakers 2012.
- F. IEEE C37.20.1 - IEEE Standard for Metal-Enclosed Low-Voltage (1000 Vac and below, 3200 Vdc and below) Power Circuit Breaker Switchgear 2015.
- G. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers 2016.
- H. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2018.
- J. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.
- K. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 869A - Reference Standard for Service Equipment Current Edition, Including All Revisions.
- M. UL 1066 - Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures Current Edition, Including All Revisions.
- N. UL 1558 - Switchgear Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
  - 4. Coordinate with manufacturer to provide shipping splits suitable for the dimensional constraints of the installation.
  - 5. Notify Engineer of any conflicts with or deviations Contract Documents. Obtain direction before proceeding with work.
- B. Service Entrance Switchgear:



1. Coordinate with Utility Company to provide switchgear with suitable provisions for electrical service and utility metering, where applicable.
2. Coordinate with Owner to arrange for Utility Company required access to equipment for installation and maintenance.
3. Obtain Utility Company approval of switchgear prior to fabrication.
4. Arrange for inspections necessary to obtain Utility Company approval of installation.

#### 1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for switchgear, enclosures, overcurrent protective devices, and other installed components and accessories.

#### 1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

#### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store switchgear in accordance with manufacturer's instructions and IEEE C37.20.1.
- B. Store in a clean, dry space having a uniform temperature to prevent condensation (including outdoor switchgear, which is not weatherproof until completely and properly installed). Where necessary, provide temporary enclosure space heaters or temporary power for permanent factory-installed space heaters.
- C. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle carefully to avoid damage to switchgear internal components, enclosure, and finish.

#### 1.08 FIELD CONDITIONS

- A. Maintain field conditions within required service conditions during and after installation.

### **PART 2 PRODUCTS**

#### 2.01 LOW-VOLTAGE SWITCHGEAR

- A. Provide switchgear assemblies consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Description: Dead-front standard (non-arc-resistant) type metal-enclosed drawout switchgear complying with IEEE C37.20.1 and ANSI C37.51; listed and labeled as complying with UL 1558; ratings, configurations and features as indicated on the drawings.
- D. Service Entrance Switchgear:
  1. Listed and labeled as suitable for use as service equipment according to UL 869A.
  2. For solidly-grounded wye systems, provide factory-installed main bonding jumper between neutral and ground busses, and removable neutral disconnecting link for testing purposes.
  3. Comply with Utility Company requirements for electrical service.
- E. Service Conditions:
  1. Provide switchgear and associated components suitable for operation under the following service conditions without derating:
    - a. Altitude: Less than 6,600 feet ( 2,000 m ).
    - b. Ambient Temperature: Between -22 degrees F ( -30 degrees C ) and 104 degrees F ( 40 degrees C ).
  2. Provide switchgear and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
- F. Short Circuit Current Rating:
  1. Provide switchgear with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- G. Short-Time Current (30-Cycle Withstand) Rating: Equivalent to specified short circuit current rating.
- H. Main Devices: Configure for top or bottom incoming feed as indicated or as required for the installation. Provide top-mounted pullbox as indicated or as required to facilitate installation of incoming feed.

- I. Bussing: Sized in accordance with UL 1558 temperature rise requirements.
  - 1. Main bus (horizontal cross bus) to be fully rated through full length of switchgear.
  - 2. Provide solidly bonded equipment ground bus through full length of switchgear, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
  - 3. Phase and Neutral Bus Material: Copper.
  - 4. Ground Bus Material: Copper.
- J. Conductor Terminations: Suitable for use with the conductors to be installed.
  - 1. Line Conductor Terminations:
    - a. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
    - b. Main and Neutral Lug Type: Mechanical.
  - 2. Load Conductor Terminations:
    - a. Lug Material: Copper, suitable for terminating copper conductors only.
    - b. Lug Type:
      - 1) Provide mechanical lugs unless otherwise indicated.
- K. Enclosures:
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
    - a. Indoor Clean, Dry Locations: Type 1.
    - b. Outdoor Locations: Type 3R.
  - 2. Finish: Manufacturer's standard unless otherwise indicated.
  - 3. Outdoor Enclosures:
    - a. Color: Manufacturer's standard.
    - b. Access Doors: Lockable, with all locks keyed alike.
- L. Future Provisions:
  - 1. Prepare designated spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- M. Instrument Transformers:
  - 1. Comply with IEEE C57.13.
  - 2. Select suitable ratio, burden, and accuracy as required for connected devices.
  - 3. Current Transformers: Connect secondaries to shorting terminal blocks.
  - 4. Potential Transformers: Include primary and secondary fuses with disconnecting means.

## 2.02 LOW-VOLTAGE POWER CIRCUIT BREAKERS

- A. Description: Quick-make, quick-break, trip-free low-voltage power circuit breakers with two-step stored energy closing mechanism; 100 percent rated; complying with IEEE C37.13, IEEE C37.16, IEEE C37.17, and ANSI C37.50; listed and labeled as complying with UL 1066; ratings, configurations, and features as indicated on the drawings.
- B. Interrupting Capacity: Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated.
- C. Construction: Drawout.
  - 1. Allows withdrawal of circuit breaker into test and disconnected positions, with racking position indication (connected, test, disconnected, withdrawn).
  - 2. Provide safety interlock to prevent racking of circuit breaker while in the ON position.
- D. Trip Units: Solid state, microprocessor-based, true rms sensing.

## 2.03 SOURCE QUALITY CONTROL

- A. Factory test switchgear according to IEEE C37.20.1, including the following production tests on each switchgear assembly or component:
  - 1. Dielectric tests.
  - 2. Mechanical operation tests.
  - 3. Grounding of instrument transformer cases test.
  - 4. Electrical operation and control wiring tests, including polarity and sequence tests.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated.

- B. Verify that the ratings and configurations of the switchgear and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive switchgear.
- D. Verify that conditions are satisfactory for installation prior to starting work.

### 3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install switchgear in accordance with NECA 1 (general workmanship) and IEEE C37.20.1.
- C. Arrange equipment to provide required clearances and maintenance access, including accommodations for drawout circuit breakers.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install switchgear plumb and level.
- F. Unless otherwise indicated, mount switchgear on properly sized 4 inch ( 100 mm ) high concrete pad constructed in accordance with Section 03 3000.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Install all field-installed devices, components, and accessories.
- I. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

### 3.03 FIELD QUALITY CONTROL

- A. Before energizing switchgear, perform preoperation checks in accordance with IEEE C37.20.1.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.1.
- D. Instrument Transformers: Perform inspections and tests listed in NETA ATS, Section 7.10. The dielectric withstand tests on primary windings with secondary windings connected to ground listed as optional are not required.
- E. Correct deficiencies and replace damaged or defective switchgear assemblies or associated components.

### 3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of switchgear covers and doors.

### 3.05 CLEANING

- A. Clean dirt and debris from switchgear enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred surfaces to match original factory finish.

### 3.06 CLOSEOUT ACTIVITIES

- A. Training: Train Owner's personnel on operation, adjustment, and maintenance of switchgear and associated devices.
  - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

### 3.07 PROTECTION

- A. Protect installed switchgear assemblies from subsequent construction operations.

**END OF SECTION 26 2300**

## SECTION 26 2813

### FUSES

#### 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 SCOPE

- A. The Contractor shall furnish and install all fuses as specified herein and as shown on the Drawings.

##### 1.3 RELATED SECTIONS

- A. N/A

##### 1.4 SUBMITTALS

- A. Manufacturer's product data sheets shall be submitted for the following items:
  1. Each type of fuse
  2. Each type of fuse reducer
  3. Each type of solid copper neutral link (dummy fuse)

#### PART 2 – PRODUCTS

##### 2.1 SUBMITTALS

- A. Fuses and their applications shall meet all the requirements of NEMA, the National Electrical Code (NFPA 70) and OSHA Part 1910 Subpart S. Fuse sizes and types shall be as shown on the Drawings and in schedules. Fuses shall be properly coordinated and shall be verified by the Contractor for the final load served. All fuses shall be Underwriters' Laboratories (UL) approved and shall have standard NEC dimensions.
- B. Fuses used on circuits up to 250 volts shall be dual element, time delay, current limiting and shall have a minimum short circuit interrupting capacity of 300,000 RMS symmetrical amperes, UL Class RK1, LPN-RK, 250V for sizes up to 60 amps.
- C. Fuses used on circuits above 250 volts up to 600 volts shall be 600V, dual element, time delay, current limiting and shall have a minimum short circuit interrupting capacity of 300,000 RMS symmetrical amperes, UL Class RK1 or Class J (as indicated on the Drawings or as required to fit existing equipment) for sizes up to 600 amps.

- D. Motor controllers shall be protected from short circuits by dual element, time delay, current limiting fuses to provide Type 2 protection. This level of protection shall allow no damage to the controller, under low and high-level fault conditions.
- E. Control circuit fuses (less than 5 amps) and associated fuse holders shall be as shown on the Drawings.
- F. Fuses shall be as manufactured by the Cooper Bussmann Manufacturing Division of Eaton or approved equal by Mersen or Littlefuse.

## **2.2 NEUTRAL LINKS**

- A. Solid copper link or slug of same dimensions as a standard UL Class R or UL Class J fuse in sizes from 1 amp through 600 amps with verbiage similar to “THIS IS NOT A FUSE”, “NEUTRAL LINK”, or “DUMMY FUSE” permanently engraved into the device such that it is visible when the device is installed in the fuse clips.

## **2.3 FUSE REDUCERS**

- A. Fuse reducers install on fuse ferrules or blades to permit application of smaller dimension fuses than those for which the fuse blocks or holders are designed.
  - 1. 250 volt for UL Class R applications and 600 volt for UL Class R or J applications, ferrule or blade type as required.
  - 2. Short-circuit current rating (SCCR) shall match the rating of the fuses.
  - 3. Shall maintain strong mechanical and electrical contact between the fuse reducer and the fuse clips and the fuse reducer and the fuse.
  - 4. Materials of construction: Copper, brass, and bronze
  - 5. UL Listed and Labeled
- B. Fuse reducers shall be furnished by same manufacturer as the fuses.

## **PART 3 – EXECUTION**

### **3.1 INSTALLATION**

- A. Equipment shall not be shipped and/or delivered to the job site with the fuses installed in place.
- B. Install fuses in fuse clips with fuse label, indicating fuse type, voltage, and ampere rating, facing out such that the information is visible for inspection without removing the fuse from the fuse clips.
- C. Utilize fuse reducers only where specifically called for on the Drawings.

### **3.2 NEUTRAL LINKS**

- A. Install neutral links in the B-Phase fuse clips of all fusible disconnect switches, panelboard and switchboard fusible switch units, motor control center feeder and motor starter units, variable-frequency motor controllers, and in all electrical equipment for 480V, 3-Phase, 3-Wire, Grounded B-Phase power systems for compliance with Article 240-22 of the NEC.
- B. Install neutral links in fuse clips such that the verbiage engraved on the device that states that it is not a fuse visible for inspection without removing the device from the fuse clips.

**END OF SECTION 26 2813**

**SECTION 26 2816.16**  
**ENCLOSED SWITCHES**

**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 SCOPE**

- A. This specification section applies to all disconnect safety switches if the input line disconnect switch is not provided as an integral part of the variable-frequency drive (VFD) enclosures as allowed under Section 230515 – Variable-Frequency Motor Controllers.

**1.3 RELATED SECTIONS**

- A. Section 260526 – Grounding and Bonding for Electrical Systems
- B. Section 260553 – Identification for Electrical Systems
- C. Section 260573 – Protective Device Coordination Study and Arc Flash Risk Assessment
- D. Section 260583 – Wiring Connections
- E. Section 262813 – Fuses

**1.4 SUBMITTALS**

- A. Manufacturer's product data sheets shall be submitted for each type and size of disconnect safety switch used.

**PART 2 – PRODUCTS**

**2.1 DISCONNECT SAFETY SWITCHES**

- A. Each disconnect safety switch shall be heavy duty type, single-throw, fusible or non-fusible type as indicated on the Drawings, dual horsepower rated, dead front and front accessible, having a non-teasible positive quick-make, quick-break contact mechanism rated for the voltages indicated on the Drawings.
- B. Fusible type disconnect switches shall be designed to allow insertion of UL Class J fuses only. Fuse sizes shall be as indicated on the Drawings.
- C. All fusible disconnect switches size 200 amps and below shall be equipped with non-metallic fuse pullers.

- D. The switch operating handle shall physically indicate the ON and OFF positions of the switch. The switch operating handle shall be able to accept a minimum of two padlocks for padlocking the handle in the OFF position and shall have the capability of accepting at least one padlock for padlocking the handle in the ON position. Padlocking provisions for the handle shall be based on using padlocks having heavy duty industrial type shackles 3/8- inch thick. The switch operating handle shall be an integral part of the switching mechanism, providing permanent control of the contacts, and shall be attached to the box or enclosure base and not to the cover or door.
- E. The cover or door shall be mechanically interlocked with the switch operating handle to prevent opening the cover or door when the switch is in the ON position. An interlock override device shall be provided to allow authorized personnel to release the interlock for inspection purposes when the switch is in the ON position.
- F. All switch blades shall be fully visible in the OFF position with the enclosure door open.
- G. The switch voltage and ampere rating and the number of poles for each disconnect switch shall be as indicated on the Drawings.
- H. Terminal lugs shall be Underwriters' Laboratories (UL) listed as being suitable for copper or aluminum conductors and shall be equipped with solderless connectors, front removable. All current carrying parts shall be plated by electrolytic processes to resist corrosion and to promote cool operation.
- I. Heavy duty switches shall have permanently attached arc suppressors, hinged or otherwise, attached to permit easy access to line-side lugs without removal of the arc suppressors.
- J. Each disconnect safety switch shall be equipped with a grounding bar that is bonded to the switch enclosure for termination of all equipment grounding conductors entering or leaving enclosure.
- K. An electrical interlock for wiring into the control circuit shall be provided on each disconnect safety switch where indicated on the Drawings or where required by the equipment manufacturer. The interlock shall have one or two normally open and one or two normally closed sets of contacts, as indicated on the Drawings, which shall be mechanically operated from the switch mechanism, breaking the control circuit before the main switch blades break (open). The contacts shall be rated 120 volts AC/DC, 15 amperes continuous, 60 hertz.
- L. Switch enclosures shall be NEMA Type 4 without knockouts for indoor wet areas.
- M. All enclosures shall be prime coated with a rust-inhibiting phosphate and finished in ANSI- 61 light gray or ANSI-49 gray baked-on enamel paint.
- N. All enclosures shall meet UL Standard 98, shall be UL listed and labeled, and shall meet the applicable requirements of Federal Specifications WS-865c and NEMA Specifications KS1-1983.
- O. Safety switch approved manufacturers are:
  - 1. Eaton Type DH Series
  - 2. ABB-GE Type TH Series
  - 3. Square D Type H Series



## **PART 3 – EXECUTION**

### **3.1 INSTALLATION**

- A. Provide disconnect switches, where required by NFPA 70, where indicated on Drawings, and where required by equipment manufacturer, in a location convenient for maintenance on each switch and adjacent equipment.
- B. Provide fused disconnect switches when required to maintain equipment manufacturer's warranty or UL listing.
- C. Rigidly mount disconnect switches on structural steel members on the equipment skid.
- D. Provide fuses of the proper size and type in all fusible disconnect switches.
- E. Provide durable fuse identification label permanently attached to the inside of the door of each fusible disconnect switch indicating fuse type, size, current limiting ability and device(s) controlled.
- F. Install fuses in fuse clips with fuse label, indicating fuse type, voltage and ampere rating, facing out.

### **3.2 IDENTIFICATION**

- A. Mounted on the outside surface of each disconnect safety switch door shall be a three-layer engraved laminated plastic nameplate meeting the requirements of Section 260553 – Identification for Electrical Systems.

**END OF SECTION 26 2816.16**

## SECTION 26 5100

### LIGHTING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. This Section includes the following:

1. Interior light fixtures.
2. Exterior light fixtures.
3. Emergency lighting units.
4. Exit signs.
5. Lighting fixture supports.

- B. Related Sections include the following:

1. Division 26 Section "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

##### 1.3 DEFINITIONS

- A. BF: Ballast factor.
- B. CRI: Color-rendering index.
- C. CU: Coefficient of utilization.
- D. HID: High-intensity discharge.
- E. IESNA: Illuminating Engineering Society of North America
- F. LER: Luminaire efficacy rating.
- G. Luminaire: Complete lighting fixture, including ballast housing if provided.
- H. RCR: Room cavity ratio.

## 1.4 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
  - 1. Physical description of lighting fixture including dimensions.
  - 2. Emergency lighting units including battery and charger.
  - 3. Energy-efficiency data.
  - 4. LED drivers, including projected driver life and current.
  - 5. Lamps and LED arrays: include life, lumen output, CRI and color temperature for each type.
  - 6. Photometric data, in IESNA format, based on laboratory tests of each lighting fixture type, outfitted with lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project. Upon request, provide electronic photometric data in IESNA format.
- B. Seismic Qualification Data: For luminaires, accessories, and components in the building storm shelter, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
- E. Warranties: Special warranties specified in this Section.

## 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

## 1.6 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

## 1.7 WARRANTIES

### A. LED Light Fixtures Warranty

1. Minimum of five years on drivers, emergency drivers and LED array.
2. Minimum of three years on cold weather emergency LED drivers with batteries.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Fixtures: Refer to the Interior Light Fixture Schedule on drawings for allowable fixture manufacturers. Fixtures must meet requirements noted on drawings and specified below.

B. LED Drivers: Subject to compliance with requirements, provide products by one of the following:

1. GE Lighting: Formerly Lightech.
2. Philips Lighting Electronics North America Corporation: Philips Advance.

C. LED's: Subject to compliance with requirements, provide products by one of the following:

1. Cree, Inc.
2. GE Lighting – Lightech.
3. Nichea Corporation.
4. Philips Lighting Electronics North America Corporation (Philips LumiLEDs).

D. Seismic Performance:

1. Luminaires shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
2. Luminaires and lamps shall be labeled vibration and shock resistant.
3. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

## 2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. LED Fixtures: Comply with UL 1598. Where life expectancy is specified, test according to IESNA LM-80-08. Provide products with the following characteristics, unless otherwise indicated:
  - 1. Life: 50,000 hours minimum.
  - 2. Efficacy: 50 lumens/watt minimum.
  - 3. Color Temperature: 4000° K
  - 4. CRI: 80 minimum
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
  - 1. White Surfaces: 85 percent.
  - 2. Specular Surfaces: 83 percent.
  - 3. Diffusing Specular Surfaces: 75 percent.
  - 4. Laminated Silver Metallized Film: 90 percent.
- G. Plastic Diffusers, Covers, and Globes:
  - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
    - a. Lens Thickness: At least 0.125 inch minimum unless different thickness is indicated.
    - b. UV stabilized.
  - 2. Glass: Annealed crystal glass, unless otherwise indicated.

## 2.3 EXIT SIGNS

- A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
  - 1. Lamps for AC Operation: LEDs, 70,000 hours minimum rated lamp life.

## 2.4 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Suspended direct/indirect and direct fixtures in finished space: Suspend fixtures with manufacturer's standard aircraft cable system unless noted otherwise. Feed fixtures with manufacturer's standard SO cable.
- C. Suspended industrial troffers in unfinished spaces: Suspend fixtures with chains or aircraft cable unless noted otherwise.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.
- E. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- F. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.
- C. Coordinate layout and installation of luminaires with other construction. Do not modify layout or locations of luminaires without documented approval to do so, unless indicated otherwise on the Drawings.
- D. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- E. Adjust luminaires that require field adjustment or aiming to provide optimum illumination. Coordinate and confirm final adjustments with Owner.
- F. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer for fixtures installed in the building storm shelter.
- G. Fasten luminaire to structural support.
- H. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- I. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Do not use grid as a support element.

1. Install ceiling support system wires at a minimum of 2 wires connected directly to each fixture, located not more than 6 inches (150 mm) from opposite fixture corners. Provide additional supports if required by local code or the local authority having jurisdiction.
2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4- inch metal channels spanning and secured to ceiling tees.

J. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

K. Adjust aimable lighting fixtures to provide required light intensities.

L. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.2 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

**END OF SECTION 26 5100**

**SECTION 31 1000**  
**SITE CLEARING**

**PART 1 – GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, include General and Supplementary Conditions, apply to this Section.

**1.2 SUMMARY**

- A. Section includes:
  - a. Protecting existing vegetation to remain.
  - b. Removing existing vegetation.
  - c. Clearing and grubbing.
  - d. Stripping and stockpiling topsoil.
  - e. Removing above and below grade site improvements shown to be removed.
  - f. Disconnecting, capping or sealing, and removing site utilities.
  - g. Temporary erosion and sedimentation control.

**1.3 DEFINITIONS**

- A. **BMPs:** The term Best Management Practices is used to describe the controls and activities used to prevent stormwater pollution.
- B. **Subsoil:** Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than one percent organic matter and few soil organisms.
- C. **Topsoil:** Top layer of the soil profile usually richest in organic matter and nutrients consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay, lumps, gravel, and other objects larger than 2 inches in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials. A pH range of 5.0-7.5 is acceptable.
- D. **Tree Protection Zone:** Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.
- E. **Vegetation:** Trees, shrubs, groundcovers, grass, and other plants.

**1.4 MATERIAL OWNERSHIP**

- A. Except for materials indicated to be stockpiled or otherwise remain on Owner's property, manmade cleared materials shall become Contractor's property and shall be removed from the project site.



## **1.5 ACTION SUBMITTALS**

- A. Product Data: For each type of the following manufactured products required:
  - 1. Erosion control blankets / turf reinforcement mats.
  - 2. Sediment fencing.

## **1.6 INFORMATIONAL SUBMITTALS**

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
  - a. Use sufficiently detailed photographs or video recordings.
  - b. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designed to remain.
- B. Record Drawings: Identify and accurately showing location of capped utilities and other subsurface structural, electrical, and mechanical conditions.

## **1.7 FIELD CONDITIONS**

- A. Traffic; Minimize interference with adjoining roads, streets, walks, and other adjacent occupied of used facilities during site clearing operations.
  - 1. Do not close or obstruct streets, walks or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
  - 1. Do not proceed with work on adjoining property until directed by the Owner.
- C. Utility Locator Service: Notify "Missouri One Call" for area where project is located and obtain and verify all existing utility locations before starting project.
- D. Do not commence site clearing operations until temporary erosion and sediment control and tree protection measures are in place.
- E. Tree-Protection Zones: Protect according to requirements in project plans.
- F. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

## **PART 2 – PRODUCTS**

### **2.1 MATERIALS**

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 2000 "Earth Moving."

## **PART 3 – EXECUTION**

### **3.1 PREPARATION**

- A. Protect and maintain benchmarks and survey control points from disturbance during construction. The owner will provide three survey control points for Contractor use.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in the project plans.
- C. Protect existing site improvements to remain from damage during construction.
  - a. Restore damaged improvements to their original condition, as acceptable to the Owner.

### **3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- A. Provide temporary erosion and sediment control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion and sediment control drawings and requirements of the authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activities do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion control and sediment control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sediment controls, and restore and stabilize areas disturbed during removal.
- E. Completely fill out all aspects of SWPPP prior to any site disturbing activities.
- F. Adhere to all aspects of erosion and sediment control as indicated in the project SWPPP, Plans, and any required site disturbance permits.
- G. Obtain any and all required permits prior to any site disturbing activities.

### **3.3 TREE AND PLANT PROTECTION**

- A. Protect trees and plants remaining on-site according to requirements in project plans.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations.

### **3.4 EXISTING UTILITIES**

- A. Arrange for disconnecting and sealing utilities that serve existing structures before site clearing.
  - a. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Interrupting Existing Utilities: Do not interrupt utilities serving offsite facilities.
- C. Excavate for and remove underground utilities indicated to be removed.
- D. Removal of underground utilities is included in earthwork sections.

### **3.5 CLEARING AND GRUBBING**

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  - a. Do not remove trees, shrubs, and other vegetation indicated to remain or to be protected.
  - b. Root balls in areas of drip irrigation fields should only be stump ground. The root ball should not be removed.
  - c. Woody vegetation shall be mulched and hauled off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  - a. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.
  - b. Finish grade all areas to provide positive drainage.
- C. Burning: Do not burn!

### **3.6 TOPSOIL STRIPPING**

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to a depth of 6 inches or as encountered in the field in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - a. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to protect windblown dust and erosion by water.
  - a. Limit height of topsoil stockpile to 72 inches.
  - b. Do not stockpile topsoil within protection zones.

### **3.7 SITE IMPROVEMENTS**

- A. Remove existing above and below ground improvements as indicated to facilitate new construction.
- B. Remove all slabs, paving, curbs, gutters, foundations, and aggregate bases shown to be removed.
- C. Remove all utilities, both underground and above ground, shown to be removed on the civil drawings.

### **3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS**

- A. Remove all demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

**END OF SECTION 31 1000**

**SECTION 31 2000**  
**EARTH MOVING**

**PART 1 – GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes:
  - a. Excavating and filling for rough grading the Site.
  - b. Preparing subgrades for slab-on-grade, walks, pavements, turf and grasses, and plants.
  - c. Excavating and backfilling for buildings and structures.
  - d. Drainage course for concrete slabs-on-grade.
  - e. Subbase course for concrete walks, and pavements.
  - f. Subbase course and base course for asphalt paving.
  - g. Subsurface drainage backfill for walls and trenches.
  - h. Excavation and backfilling trenches for utilities and pits for buried utility structures.
- B. Related Requirements:
  - a. Section 311000 “Site Clearing” for site stripping, grubbing, stripping, and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
  - b. Section 329200 “Turf and Grasses” for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

**1.3 UNIT PRICES**

- A. N/A

## 1.4 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill excavation.
  - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Course: Satisfactory soil imported from off – site use as fill or backfill.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to line and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Owner. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
  - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Owner. Unauthorized excavation, as well as remedial work directed by Owner, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material  $\frac{3}{4}$  cu. Yard (0.57 cu. m) or more in volume.
- I. Structures; Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above to below the ground surface.
- J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement or aggregate layer placed between the subgrade and a cement concrete pavement or hot-mix asphalt walk.
- K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or back fill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- L. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

## 1.5 SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
  - 1. Warning tapes.

2. Vapor Barrier.
- B. Samples for Verification: For the following products, in sizes indicated below:
1. Warning Tape: 12 inches (300 mm) long; of each color.
  2. Vapor Barrier: 12 inches by 12 inches.

## **1.6 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: for qualified testing agency.
- B. Material Test Reports: For each on-site and borrow soil material for proposed fill and backfill as follows:
- a. Classification according to ASTM D 2487
  - b. Laboratory compaction curve according to ASTM D 698.
- C. Pre-excavation photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surface that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

## **1.7 FIELD CONDITIONS**

- A. Traffic; Minimize interference with adjoining roads, streets, walks, and other adjacent occupied of used facilities during earth-moving operations.
1. Do not close or obstruct streets, walks or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
1. Do not proceed with work on adjoining property until directed by the Owner.
- C. Utility locator Service: Notify "Missouri One Call" for area where Project is located before beginning earth-moving operations.
- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation- control measures indicated in civil plans are in place.
- E. Do not commence earth- moving operations until tree protection measures indicated in civil plans are in place.

## **1.8 SOIL MATERIALS**

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from extensions.

- B. Satisfactory Soils: Soils Classification Groups GW, GM, GC, SW, SP, SM, SC and CL according to ASTM D 2487 or a combination of these groups; free of rock or gravel larger than 8 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Soils that classify as CH should be analyzed and approved by a qualified geotechnical engineer prior to use.
- C. Unsatisfactory Soils: Soil Classification Groups OL, MH, OH, and PT according to ASRM D 2487 or a combination of these groups.
  - a. Unsatisfactory soils also include satisfactory soils not maintained within -2 to +4 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Subbase material shall meet the crushed stone base MoDOT requirements of Section 1007 of the current Missouri Standards for Highway Construction, Type 1.
- E. Engineered Fill: Controlled and compacted soil fill placed in accordance with ASTM D698.
- F. Bedding Course: Per ASTM C33 #67 or approved equal.
- G. Drainage Course: Rock course meeting the graduation requirements for a #67 rock as defined by ASTM C 33.

## **1.9 ACCESSORIES**

- A. Detectable warning tape: Acid and Alkali resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with the description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried 30 inches deep; colored as follows
  - a. Red: Electric
  - b. Yellow: Gas, Oil, steam, and dangerous materials
  - c. Orange: Telephone and other communications
  - d. Blue: Water systems
  - e. Green: Sewer systems

## **PART 2 – EXECUTION**

### **2.1 PREPARATION**

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### **2.2 DEWATERING**

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding project site and surrounding areas.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - a. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavation. Do not sure excavated trenches as temporary drainage ditches.

### **2.3 EXPLOSIVES**

- A. Do not use explosives.

### **2.4 EXCAVATION, GENERAL**

- A. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross-sectioned by the Design Team. The contract sum will be adjusted for rock excavation according to unit prices included in the contract documents. Changes in the contract time may be authorized for rock excavation.
  - a. Earth excavation includes excavating pavements and obstructions visible on the surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders and other materials not classified as rock or unauthorized excavation.
    - i. Intermittent drilling, ram hammering, or ripping of material not classified as rock excavation is earth excavation.
- B. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the dimensions indicated in the unit prices.

### **2.5 EXCAVATION FOR STRUCTURES**

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus one inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  - a. Excavations for footings and foundations; Do not disturb bottom excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
  - b. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

### **2.6 EXCAVATION FOR WALKS AND PAVEMENTS**

- A. Excavate surface under walks and pavements to indicated lines, cross sections, elevations, and subgrades

### **2.7 EXCAVATION FOR UTILITY TRENCHES**

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.



- a. Beyond the building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipes or conduits. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise noted.
  - a. Clearance: 6 inches on each side of pipe or conduit, or as indicated on the drawings.
- C. Trench bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduits. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
  - a. Excavate trenches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

## **2.8 SUBGRADE INSPECTION**

- A. Notify Owner when excavations have reached required subgrade.
- B. If Owner determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrade.
  - a. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
  - b. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Owner, without additional compensation.

## **2.9 UNAUTHORIZED EXCAVATION**

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by the Owner.
  - a. Fill unauthorized excavations under other construction, pipe, or conduit as directed by the Owner.

## **2.10 UNAUTHORIZED EXCAVATION**

- A. Stockpile borrow soil materials and excavated satisfactory soil material without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - a. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

## **2.11 BACKFILL**

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - a. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  - b. Surveying locations of underground utilities for Record Documents.
  - c. Testing and inspecting underground utilities.
  - d. Removing concrete formwork.
  - e. Removing trash and debris.
  - f. Removing temporary shoring, bracing, and sheeting.
  - g. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow or ice.

## **2.12 UTILITY TRENCH BACKFILL**

- A. Place backfill on subgrades free of much, frost, snow or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings with lean concrete fill, with 28-day compressive strength of 2500 psi.
- D. Trenches under Roadways: Place and compact backfill for Engineered Fill material to bottom of the roadway pavement and a minimum of 1 foot beyond edge of pavement in all directions. Place and compact in 8 inch maximum lifts.
- E. Backfill voids with satisfactory soil while removing shoring and bracing.
- F. Place and compact initial backfill of Engineered Fill, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
  - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- G. Final Backfill (if not specifically indicated in civil plans):
  - a. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
- H. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

## **2.13 SOIL FILL**

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical unit to 5 horizontal units so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - a. Under grass and planted areas, use satisfactory soil material.
  - b. Under walks and pavements, use satisfactory soil material.
  - c. Under steps and ramps, use satisfactory soil material.

- d. Under building slabs, use satisfactory soil material.
  - e. Under footings and foundations, use satisfactory soil material.
  - f. Under grass and planted areas, use satisfactory soil material to achieve grades to bottom of topsoil layer. Achieve finished grade by placing a topsoil layer to thickness indicated in the civil plans.
    - i. Topsoil shall be obtained from the on-site topsoil pile created with the initial grading operations.
  - g. Place soil fill on subgrade free of mud, frost, snow, or ice.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

## **2.14 SOIL MOISTURE CONTROL**

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within -2% to +4% of optimum moisture content.
  - a. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - b. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by +4 percent and is too wet to compact to specified dry unit weight.

## **2.15 COMPACTION OF SOIL BACKFILLS AND FILLS**

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers
- B. Place backfill and fill soil materials on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
  - a. Under building slabs, compact each layer of backfill or fill soil material at least 95 percent.
  - b. Under walkways, structures, steps, and pavements, compact each layer of backfill or fill soil material at least 95 percent.
  - c. Under turf or unpaved areas, compact each layer of backfill or fill soil material at least 95 percent to achieve bottom of topsoil layer elevation. Topsoil surface material shall not exceed 80-85 percent compaction. Light compaction only. Do not allow vehicular access within topsoil areas after placement. Excessively hardened, compacted, or tight topsoil will be rejected and is to be replaced by the Contractor at no cost to the Owner.
  - d. For utility trenches, compact each layer of initial and final backfill soil material at least 95 percent.

## **2.16 GRADING**

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - a. Provide a smooth transition between adjacent existing grades and new grades.
  - b. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevation, within the following subgrade tolerances:
  - a. Turf or Unpaved Areas: Plus or minus 1 inch.
  - b. Athletic Field Areas: Plus or minus 1/4 inch.
  - c. Walks: Plus or minus 1/2 inch.
  - d. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.
- D. Within Athletic Fields:
  - a. Final subgrade preparation receiving topsoil shall be done with equipment that does not leave indentations deeper than 1/2 inch. Typical wheeled road grading equipment is prohibited. Equipment with flotation turf tires, or lightweight designs specific for turf preparation/maintenance are acceptable.

## **2.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS**

- A. Place on subbase course on subgrades free of mud, frost, snow or ice.
- B. On prepared subgrade, place subbase course under pavements and walks as follows:
  - a. Shape subbase course to required crown elevations and cross-slope grades.
  - b. Place subbase course 6 inches or less in compacted thickness in a single layer.
  - c. Place subbase course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  - d. Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

## **2.18 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE**

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
  - a. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
  - b. Place drainage course 6 inches or less in compacted thickness in a single layer.
  - c. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  - d. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

## **2.19 FIELD QUALITY CONTROL**

- A. Testing Agency: Contractor will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work will comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by the Design Team.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
  - a. Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2,500 square feet or less of paved area or building pad, but in no case fewer than three tests.
  - b. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 150 feet or less of wall length, but no fewer than two tests.
  - c. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.
  - d. Paved areas, sidewalks, Athletic fields, and other potential structural areas: At each compacted backfill layer, at least one test for every 10,000 square feet, but in no case fewer than three tests per lift.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

## **2.20 PROTECTION**

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  - a. Scarify or remove and replace soil material to depth as directed by the Owner; reshape and recompact.
- C. Where settling occurs before project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - a. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

## **2.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS**

- A. Remove waste material, trash, and debris, and legally dispose of them off the Owner's property.

**END OF SECTION 31 2000**

## **SECTION 31 2500 EROSION CONTROL**

### **PART 1 - GENERAL**

#### **1. SECTION INCLUDES**

- a. Installation of temporary water pollution control measures to prevent discharge of pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage, or other harmful material from the project.
- B. Other related documents.

#### **2. GENERAL**

- a. The Contractor shall manage his operations to control water pollution in accordance with this specification and applicable State regulations. Construction of permanent drainage facilities and other contract work, contributing to control of erosion, shall be scheduled at the earliest practicable time.
- b. The Contractor shall furnish, install, maintain, and remove temporary erosion control measures. The Contractor shall prevent silt or polluted storm water discharge from the site.
- c. The Owner's Representative may require installation of additional erosion control facilities, by the Contractor, if in the sole opinion of the Owner's Representative, the Contractor's efforts are inadequate.

#### **3. DEFINITIONS**

- a. General Permit: The General Permit for storm water discharges associated with construction activity (Land Disturbance General Permit No. MO-R100038) issued to FMDC as a blanket permit by the Missouri Department of Natural Resources, Water Pollution Program.
- b. Storm Water Pollution Prevention Plan (SWPPP): A plan required by the General Permit that includes site map(s), an identification of construction/contractor activities that could cause pollutants in the storm water, and a description of measures or practices to control these pollutants.
- c. Best Management Practice (BMP): Any program, technology, process, siting criteria, operating method, measure, or device that controls, prevents, removes, or reduces pollution.
- d. Temporary Berm: A temporary ridge of compacted soil, with or without a shallow ditch, constructed at the top of slopes or transverse to the centerline of a slope. The berm diverts storm runoff to temporary outlets to discharge water with minimal erosion.
- e. Temporary Slope Drain: A temporary facility used to carry water down a slope.
- f. Ditch Check: An obstruction placed at frequent intervals across ditches, creating small ponds to cause sediment to settle and be contained.
- g. Sediment Basin: An excavated or dammed storage area to trap and store sediment and prevent the discharge of silt.

- h. Temporary Seeding and Mulching: Placement of a quick ground cover to reduce erosion in areas expected to be re-disturbed.
- i. Straw Bales: Standard agricultural bales used to filter the flow of water, trap, deposit sediment, and/or divert water.
- j. Silt Fence: A geotextile barrier fence to contain sediment by removing suspended particles from water passing through the fence.
- k. Temporary Pipe: Conduit utilized to carry water under haul roads, silt fences, etc., and prevent equipment from direct contact with water when crossing an active or intermittent stream.
- l. Sediment Removal: Removal of accumulated sediment to restore the efficiency of sediment control features.

**4. SUBMITTALS**

- a. The Contractor shall submit his proposed “Erosion Control Plan” for review and approval by the Owner’s Representative. Approval of the plan does not relieve the Contractor of his contractual responsibility to prevent the discharge of pollutants into the receiving drainage ways.
- b. The Contractor shall review the Storm Water Pollution Prevention Plan (SWPPP) provided by the Designer, make appropriate field corrections to the document, and submit final corrected copies of the SWPPP to the Owner and facility.

**PART 2 - PRODUCTS**

**1. MATERIALS**

- a. Temporary slope drains: Stone, concrete or asphalt gutters, half-round pipe, metal pipe, plastic pipe or flexible rubber pipe.
- b. Ditch Checks:
  - Rock ditch checks: 2" to 3" clean gravel or limestone.
  - Straw bale ditch checks: Rectangular wheat straw bales in good condition. Other foliage may be substituted for straw in accordance with MoDOT 802.2.1.
  - Silt fence ditch checks: Geotextile meeting the requirements of this specification.
- c. Riprap for Temporary Erosion Control: Type 1 Rock Blanket conforming to MoDOT 611.32.
- d. Pipe: Corrugated metal (16 Ga.) or ADS N12 Corrugated Plastic.
- e. Temporary Seeding:
  - December 1 to March 1: 50 lbs oats/acre.
  - March 1 to December 1: 50 lbs cereal rye or wheat.
  - Mulch shall be wheat straw.
- f. Wire Supported and Self Supporting Silt Fence:
  - Geotextile Fabric

- a) Fibers used in geotextiles shall consist of longchain synthetic polymers, composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages.
- b) The geotextile shall be free of any treatment or coating which might adversely alter its physical properties after installation.
- c) Geotextile shall be furnished in 36" width rolls.
- d) Geotextile rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure.
- e) Each roll shall be labeled or tagged to provide product identification sufficient for inventory.
- f) Rolls shall be stored in a manner, which protects them from the elements.
- g) Geotextile shall conform to the following:

**TABLE 1**  
**PHYSICAL REQUIREMENTS<sup>1</sup> FOR**  
**TEMPORARY SILT FENCE GEOTEXTILES**

<u>Property</u>	<u>Test Method</u>	Wire Fence Supported <u>Requirements</u>	Self Supported <u>Requirements</u>
Tensile Strength, Lbs.	ASTM D4632	90 Minimum <sup>2</sup>	90 Minimum <sup>2</sup>
Elongation at 50% Minimum			
Tensile Strength (45 Lbs.)	ASTM D4632	N/A	50 Maximum
Filtering Efficiency, %	VTM-51 <sup>3</sup>	75	75
Flow Rate gal/ft/min	VTM-51 <sup>3</sup>	0.3	0.3
Ultraviolet Degradation at 500 hrs.	ASTM D4355	Minimum 70% Strength Retained	Minimum 70% Strength Retained

- Notes: 1. All numerical values represent minimum average roll value.
- A. When tested in any principal direction.
  - B. Virginia DOT test method.

Posts: Wood, steel or synthetic posts may be used. Posts shall have a minimum length of 36" plus embedment depth (24" min.). Posts shall have sufficient strength to resist damage during installation and to support applied loads.

Support Fence: Wire or other support fence shall be at least 24" high and strong enough to support applied loads.



Prefabricated Fence: Prefabricated fence systems may be used provided they meet all of the above material requirements.

**2. CERTIFICATION AND SAMPLING:**

- a. The Contractor shall furnish a manufacturer's certification, stating the material conforms to the requirements of these specifications.
- b. The certification shall include, or have attached, typical results of tests for the specified properties, representative of the materials supplied.
- c. The Owner's Representative reserves the right to sample and test any material offered for use.

**PART 3 - EXECUTION**

**1. GENERAL REQUIREMENTS**

- a. The Owner's Representative may limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, or fill operations.
- b. The Owner's Representative may direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams, other watercourses, lakes, ponds, or other areas of water impoundment. Work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, use of temporary mulches, seeding or other control devices or methods to control erosion.
- c. The Contractor shall incorporate permanent erosion control features at the earliest practicable time.
- d. The Contractor at no additional cost shall provide temporary pollution control measures needed to control erosion during normal construction practices to the Owner.
- e. Contractor shall designate trained and knowledgeable personnel to coordinate all SWPPP activities, and identify these personnel to the Owner's Representative during construction. Missouri Department of Natural Resources offers training classes in Erosion Control free of charge in Jefferson City. Contact for training: David Goggins at (573) 751-2556.
- f. The SWPPP is a living document. As the conditions of the site changes, the SWPPP should be updated by the Contractor.
- g. The SWPPP is subject to random inspection by the Owner. The SWPPP should be kept up to date by the Contractor and available for inspection at any time.
- h. If Contractor determines that any BMP should need modification, the changes shall be dated and documented, and all necessary field changes performed.

**2. LIMITATION OF AREA DISTURBED:**

- a. The Contractor's operations shall be scheduled to install permanent erosion control features immediately after clearing and grubbing, and grading.

- b. The surface area of erodible earth material exposed at one time by clearing and grubbing, excavating, fill, or borrow shall not exceed 200,000 square feet without written approval of the Owner's Representative.
- c. The Owner's Representative may limit the area of clearing and grubbing, excavation, borrow, and embankment operations commensurate with the Contractor's capability and progress in completing the finish grading, mulching, seeding, and other such permanent pollution control measures current.
- d. The Contractor shall respond to seasonal variations. If required by weather, temporary erosion control measures shall be taken immediately.

**3. RIVERS, STREAMS, AND IMPOUNDMENTS:**

- a. Construction operations in rivers, streams, and impoundments shall be restricted to areas, which must be entered for the construction of temporary or permanent structures.
- b. Rivers, streams, and impoundments shall be promptly cleared of falsework, piling, debris, or other obstructions as soon as practical.
- c. Frequent fording of live streams with construction equipment will not be permitted.
- d. Temporary bridges or other structures shall be used when the Contractor's operations include cycling of equipment across streams, rivers, or impoundments.
- e. Mechanized equipment shall not be operated in flowing streams except as required to construct channel changes and temporary or permanent structures.

**4. BORROW AND WASTE AREAS**

- a. Material pits other than commercially operated sources and material spoil areas shall be subject to pollution control measures of this specification. An offsite location does not relieve the Contractor of his contractual obligation to prevent the introduction of silt or other pollutants into receiving waterways.

**5. CONFLICT WITH FEDERAL, STATE OR LOCAL LAWS, RULES OR REGULATIONS**

- a. In case of conflict between these requirements and pollution control laws, rules, or regulations or other Federal, State or local agencies, the more restrictive laws, rules, or regulations shall apply.

**6. TEMPORARY BERMS**

- a. Temporary berms shall be constructed at the top of newly constructed slopes and / or transverse to grade to divert runoff and prevent erosion until permanent controls are installed and / or slopes are stabilized. Two types of temporary berms will be utilized under conditions listed below:

Type "A" Berm: At the end of each day's operations on embankments.

Type "B" Berm: At shut down of embankment operations for the winter season or discontinuation of work at the direction of, or with concurrence of the Owner's Representative.

- b. Interceptor berms transverse to centerline may be used when temporary berms are installed on grades in excess of 1 percent and at locations where water is to be carried down the fill slope by temporary or permanent slope drains.

- c. Construction Requirements:

Type A Berms shall be constructed to the approximate dimensions indicated on the drawings. Berms shall be machine compacted with a minimum of one pass over the entire width with a bulldozer tread, grader wheel, or other approved method.

Type "B" Berms shall be constructed to the approximate dimensions indicated on the drawings. These berms shall be machine compacted with a minimum of three passes over the entire width with a bulldozer tread, grader wheel, or other approved method.

Type "A" and Type "B" Berms must drain to a compacted outlet at a slope drain. The top width of these berms may be wider and the side slopes flatter on transverse berms to allow equipment to pass over these berms with a minimal disruption.

## **7. TEMPORARY SLOPE DRAINS**

- a. General:

Temporary slope drains are required to concentrate water flowing down a slope prior to installation of permanent facilities. Slope drains shall be placed at approximately 500-foot intervals or as directed by the Owner's Representative.

- b. General Requirements

The Contractor shall install a temporary silt fence in locations shown on the drawings, around inlets that accept flow carrying silt, and other locations necessary to prevent the discharge of silt from the site.

Installation shall conform to the drawing detail.

Fence construction shall be adequate to handle the stress from hydraulic and sediment loading.

- c. Construction Requirements:

Temporary slope drains shall be anchored to prevent disruption by the force of the water flowing in the drain.

The inlet end shall be constructed to channel water into the drain.

The outlet ends of these temporary slope drains shall have some means of dissipating the energy of this water to reduce erosion downstream.

Unless otherwise directed by the Owner's Representative, temporary slope drains shall be removed when no longer necessary and the site restored to match the surroundings.

## **8. DITCH CHECKS**

- a. General:

Rock ditch checks may be used on ditches with grades of 4 percent or less.

Straw bale ditch checks may be used on all ditches.

- a) The silt fence fabric may be eliminated for grades of 2 percent or less.

Silt fence ditch check may be used on all ditches.

A straw bale ditch check or a silt fence ditch check may be used in lieu of a sediment basin for drainage areas less than two acres. The basin shall have a volume of 1,815 CF per acre of contributing drainage area.

b. Construction Requirements:

Construct rock ditch checks in accordance with the drawing detail.

- a) Achieve complete coverage of the ditch or swale and insure the center of the check is lower than the edges.

Construct straw bale ditch checks in accordance with the drawing detail.

Construct silt fence ditch checks in accordance with the drawing detail.

c. Maintenance:

Inspect ditch checks for sediment accumulation after each rainfall.

Sediment shall be removed when it reaches one-half of the original height.

- a) Regular inspections shall insure that the center of a rock check is lower than the edges. Correct erosion caused by high flows around the edges of the check immediately.

**9. SEDIMENT BASIN**

a. General

Sediment basins are used for drainage areas of two (2) to five (5) acres or for a roadway ditch exceeding 1,000 consecutive feet in length. Break larger drainage areas or longer ditches into smaller areas.

b. Construction Requirements:

The area where a sediment basin is to be constructed shall be cleared of vegetation.

Construct the inlets of sediment basins with a wide cross-section and a minimum grade to prevent turbulence and allow deposition of soil particles.

- a) The minimum depth is 2'; the maximum depth is 6'.
- b) The minimum width is 5'; the maximum width is 20'.
- c) The minimum length is 25'; the maximum length is 200'.
- d) The minimum volume shall be 1,815 CF per acre of drainage area.

Sediment basins shall remain in service until all disturbed areas draining into the structure have been stabilized.

When use of sediment basin is discontinued, backfill all excavations and compact fill. Fill material shall be removed and the existing ground restored to the original or plan grade.

Maintenance

When the depth of sediment reaches 1/3 of the depth of structure in any part of the pool, all accumulation shall be removed.

Removed sediment shall be disposed of in locations that the sediment will not erode into the construction areas or into natural waterways. The same holds true for excavated material removed during construction of the sediment basin.

## **10. TEMPORARY SEEDING AND MULCHING**

### a. General

This item is applicable to all projects.

Seeding and/or mulching shall be a continuous operation on all cut slopes, fill slopes, and borrow pits during the construction process. All disturbed areas shall be seeded and mulched within five (5) working days after the last construction activity in all locations where necessary to eliminate erosion.

### b. Construction Requirements:

Permanent seeding and mulching following temporary seeding will be performed during the favorable seeding seasons only.

Temporary seeding mixtures and planting season:

- a) December 1 to March 1: 50 lbs. oat grain per acre
- b) March 1 to December 1: 50 lbs. (cereal rye or wheat) per acre

Temporary mulch, fertilizer, and lime for seeding:

- c) Fertilizer and mulch for temporary seed mixtures shall be applied in accordance with Section 02921.
- d) Fertilizer shall be applied at the rate specified for permanent seeding.
- e) Lime will not be required for temporary seeding.

## **11. STRAW BALES**

### a. General

Install at the bottom of embankment slopes less than 10' high to divert runoff from sheet flow and intercept some of the sediment in the sheet flow.

Install as ditch checks in small ditches and drainage areas.

Install on the lower side of cleared areas to catch sediment from sheet flow.

### b. Construction Requirements:

Bales of straw shall be utilized to control erosion, trap sediment, and divert runoff. Bales must be adequately braced from behind.

## **12. SILT FENCE**

### a. General

Install along the toe of fills over 10' in height, along the right-of-way line, parallel to streams or around an inlet to prevent sediment from entering the pipe system.

### b. General Requirements:

The Contractor shall install a temporary silt fence in locations shown on the drawings, around inlets that accept flows containing silt, and other locations necessary to prevent the discharge of silt from the site.

Installation shall conform to the detail at the end of this section.

Fence construction shall be adequate to handle the stress from hydraulic and sediment loading.

c. Installation

Geotextile at the bottom of the fence shall be buried as indicated on the detail.

The trench shall be backfilled and the soil compacted over the geotextile. The geotextile shall be spliced together as indicated on the detail.

Post Installation

- a) Post spacing shall not exceed 8' for wire support fence installation or 5' for self supported installations.
- b) Posts shall be driven a minimum of 24" into the ground. Where rock is encountered, posts shall be installed in a manner approved by the Owner's Representative.
- c) Closer spacing, greater embedment depth and/or wider posts shall be used in low areas, soft, or swampy ground to ensure adequate resistance to applied loads.

When support fence is used, the mesh shall be fastened securely to the upstream side of the post.

- d) The mesh shall extend into the trench a minimum of 2" and extend a maximum of 36" above the original ground surface.

When self-supported fence is used, the geotextile shall be securely fastened to fence posts.

Maintenance

- e) The Contractor shall maintain the integrity of silt fences as long as they are necessary to contain sediment runoff.
- f) The Contractor shall inspect all temporary silt fences immediately after each rainfall and at least daily, during prolonged rainfall.
- g) The Contractor shall immediately correct deficiencies.
- h) The Contractor shall make a daily review of the location of silt fences in areas where construction activities have changed the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness.
- i) Where a single fence is not adequate to handle the volume of silt or flows are not completely intercepted, additional silt fences shall be installed.

The Contractor shall remove and dispose of sediment deposits when the deposit approaches one-half the height of the fence.

The silt fence shall remain in place until the upstream surface is stabilized. Upon removal, the Contractor shall remove the silt fence, dispose of excess silt, and restore the disturbed area in accordance with Section 02921.

### 13. TEMPORARY PIPE

a. General:

The Contractor shall install temporary pipes and fill at locations, to be crossed by the Contractor's equipment, which carry a concentrated flow during rain events.

b. Construction Requirements:

All temporary pipes shall be installed in the same manner as permanent pipe is installed on the project to assure that the water does not cause erosion around the pipe.  
Material to backfill the pipe should be placed in 6" lifts and mechanically compacted.  
Compaction testing will not be required.

**14. SEDIMENT REMOVAL**

a. General

Sediment deposits shall be removed when:

- a) The deposits reach approximately one-half the height of a ditch check, straw bale barrier or silt fence.
- b) The sediments have reduced the ponded volume of sediment basins to one-third of the original volume.
- c) Requested by the Owner's Representative.

b. Sediment removed from erosion control features shall be deposited in a location where it will not erode into construction areas or watercourses.

**END OF SECTION 31 2500**

## SECTION 32 1216 ASPHALT PAVING

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Hot-mix asphalt paving.
  - 2. Asphalt surface treatments.

#### 1.3 DEFINITION

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASDM D 8 for definition of terms.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
  - 1. Job-Mix Designs: For each job mix proposed for the work.
- B. Qualification Data: For qualified manufacturer and Installer.
- C. Material Certificates: For each paving material, from manufacturer.
- D. Material Test Reports: For each paving material.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the current MoDOT Standard Specifications for Highway Construction for asphalt paving work.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.



- B. Store pavement-marking materials in a clean, dry, protected location within temperature range requirements by manufacturer. Protect stored materials from direct sunlight.

## **1.7 PROJECT CONDITIONS**

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
  - a. Prime Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
  - b. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
  - c. Slurry Coat: Comply with weather limitations of ASTM D 3910.
  - d. Asphalt Base Course: Minimum surface temperature of 40 deg F (4.4 deg C) and rising at the time of placement.
  - e. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.6 deg C) at time of placement

## **PART 2 – PRODUCTS**

### **2.1 AGGREGATES**

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Type 1 Aggregate: Per the MoDOT Standard Specifications for Highway Construction.

### **2.2 ASPHALT MATERIALS**

- A. All asphalt material shall conform to the MoDOT Standard Specifications for Highway Construction.
- B. Water: Potable.

### **2.3 AUXILIARY MATERIALS**

- A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.
- B. Sand: ASTM D 1073 or AASHTO M29, Grade Nos. 2 or 3.

### **2.4 MIXES**

- A. Hot-Mix Asphalt: Per the current MoDOT Standard Specifications for Highway Construction.

## **PART 3 – EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excessive yielding. Do not proof-roll wet or saturated subgrades.
  - a. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph (5 km/h).
  - b. Proof roll with a pneumatic tired loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
  - c. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.
- D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that the asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of asphalt surface.

### **3.2 SURFACE PREPARATION**

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

### **3.3 HOT-MIX ASPHALT PLACING**

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
  - a. Place hot-mix asphalt base course per current MoDOT Standard Specifications for Highway Construction.
- B. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### **3.4 JOINTS**

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
  - a. Clean contact surfaces and apply tack coat to joints.
  - b. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
  - c. Offset transverse joints, in successive courses, a minimum of 24 inches.

- d. Construct transverse joints at each point where the paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
- e. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
- f. Compact asphalt at joints to a density within 2 percent of specified course density.

### **3.5 COMPACTION**

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-place compactors in areas inaccessible to rollers.
  - a. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
  - a. Minimum Asphaltic Course Density: At least 98 percent of reference laboratory density according to ASTM D 6927.
  - b. Minimum Bituminous Course Density: At least 95 percent of reference lab density according to ASTM D 6927.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### **3.6 INSTALLATION TOLERANCES**

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - a. Base Course: Plus or minus 1/2 inch.
  - b. Surface Course: Plus or minus 1/4 inch.

- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straight edge applied transversely or longitudinally to paved areas:
  - a. Base Course: 1/4 inch
  - b. Surface Course: 1/8 inch
  - c. Crowned Surface: Test with crowned template centered and at right angles to the crown. Maximum allowable variance from template is 1/4”.
- C. The paving tolerances noted above do not control in regards to site accessibility, and providing accessible routes in accordance with the American with Disabilities Act of 1990 and the 2010 ADA Standards for Accessible Design. Accessible routes shall meet the following:
  - a. Sidewalks shall not exceed 5 percent slope with a 2 percent cross-slope and shall be 5 feet wide except as noted on the civil plans.
  - b. Parking areas for accessible spaces and access isles shall not exceed 2% slope in any direction.
  - c. Ramps shall not exceed 8.33 percent with a 2 percent cross-slope and shall be 5’ wide except as noted on site layout plan.
  - d. All sidewalk intersections shall have a 5 feet by 5 feet landing at 1/4” per one foot max slope in all direction.

### **3.7 FIELD QUALITY CONTROL**

- A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.
- B. Field testing, frequency, and methods may vary as determined by and between the Owner and the Owner’s Testing Agency.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. Asphaltic surface and base courses shall be randomly cored at a minimum rate of 1 core per 20,000 square feet of paving, but not less than 3 cores in light duty areas and 3 cores in heavy-duty areas shall be obtained. Asphaltic concrete pavement samples shall be tested for conformance with mix design.
- E. Immediately replace and compact hot-mix asphalt where core tests were taken.
- F. Thickness Test: Measure thickness of each core sample taken. The thickness of the course or the combined courses shall meet or exceed the indicated thickness. Where the deficiency exists, remove the affected pavement area and replace it with new pavement or, at discretion of the Owner, correct deficient paving thickness with tack coat and a minimum of a one inch overlay.
- G. Field Density test for in-place materials:
  - a. Density test shall be conducted on each core sample taken in accordance with ASTM D1188 or D2726 as applicable.

- b. In-place density tests by nuclear method in accordance with ASTM D2950 shall also be taken as necessary to assure the specified density is obtained. Nuclear density shall be correlated with ASTM D1188 or D2726.
- H. Check all pavement for ponding areas and replace pavement as necessary to eliminate.
- I. Remove and replace unacceptable areas as directed by the Owner.
- J. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

### **3.8 DISPOSAL**

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
  - a. Do not allow milled materials to accumulate on-site.

**END OF SECTION 32 1216**

**SECTION 32 1313**  
**CONCRETE PAVING**

**PART 1 – GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Driveways.
  - 2. Roadways.
  - 3. Parking lots.
  - 4. Walks.

**1.3 DEFINITION**

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

**1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Other Action Submittals:
  - a. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.
- D. Material Certificates: For the following, from manufacturer:
  - a. Cementitious materials.
  - b. Steel reinforcement and reinforcement accessories.
  - c. Welded wire fabric.
  - d. Admixtures.
  - e. Curing compounds.
  - f. Applied finish materials
  - g. Joint fillers
- E. Material Test Reports: For each of the following:
  - a. Aggregates

- F. Field quality-control reports.
- G. Submit certification that joint sealant has been installed in accordance with the manufacturer's instructions. Include a copy of written instructions.

## **1.5 QUALITY ASSURANCE**

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
  - a. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual –Section 3, "Plant Certification Checklist").
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
  - a. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. ACI Publications: Comply with ACI 301 unless otherwise indicated.

## **1.6 PROJECT CONDITIONS**

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities

## **PART 2 – PRODUCTS**

### **2.1 FORMS**

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
  - a. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

### **2.2 STEEL REINFORCEMENT**

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from galvanized steel wire into flat sheets.
- B. Joint Dowel Bars: ASTM A 615/ A 615M, Grade 60 (Grade 420) plain-steel bars. Cut bars true to length with ends square and free of burrs.

### **2.3 CONCRETE MATERIALS**

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout the Project:
  - a. Portland Cement: ASTM C150, Type 1 or 2 Portland Cement.
- B. Normal Weight Aggregates: ASTM C33, uniformly graded. Provide aggregates from a single source.
  - a. Maximum Course Aggregate Size: 3/4 inch nominal.
  - b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Potable and complying with ASTM C 94 / C 94M
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
  - a. Water-Reducing Admixture: ASTM C494 / C494M, Type A.
  - b. Retarding Admixture: ASTM C494 / C494M, Type B.
  - c. Water-Reducing and Retarding Admixture: ASTM C494 / C494M, Type D.
  - d. High-Range, Water-Reducing Admixture: ASTM C494 / C494M, Type F.
  - e. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494 / C494M, Type G.
  - f. Plasticizing and Retarding Admixture: ASTM C 1017 / C1017M, Type 2.

## 2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sqyd. (305 g/sqm) dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterbourne, monomolecular, film forming, manufactured for application to fresh concrete.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - i. Axim Italcementi Group, Inc: Caltexol CIMFILM.
    - ii. BASF Construction Chemicals, LLC; Confilm.
    - iii. ChemMassters: Spray-Film.
    - iv. Conspec by Dayton Superior: Aquafilm.
    - v. Dayton Superior Corporation: Sure Film (J-74).
    - vi. Edoco by Dayton Superior; BurkeFilm.
    - vii. Euclid Chemical Company (The), an RPM company, Eucobar.
    - viii. Kaufman Products, Inc.: VaporAid,
    - ix. Lambert Corporation: LAMBCO Skin.
    - x. L&M Construction Chemicals, Inc.; E-CON.
    - xi. Meadows, W. R., Inc.; EVAPRE.
    - xii. Metalcrete Industries: Waterhold.
    - xiii. Nox-Crete Products Group; MONOFILM.
    - xiv. Sika Corporation, Inc.; SikaFilm.
    - xv. SpecChem, LLC.; SpecFilm.
    - xvi. Symons by Dayton Superior; Finishing Aid.
    - xvii. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.



- xviii. Unitex; PRO-FILM.
  - xix. Vexcon Chemicals Inc.: Certi-Vex EnviroAssist.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.
- a. Available Products: Subject to compliance with requirements, available products that may be incorporated into the Work Include, but are not limited to, the following:
    - i. Anti-Hydro International, Inc.; A-H Curing Compound #2 DR WB.
    - ii. ChemMasters: Safe-Cure Clear.
    - iii. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
    - iv. Euclid Chemical Company (The), an RPM company; Kurez W VOX.
    - v. Kaufman Products, Inc.: Thinfilm 420.
    - vi. Lambert Corporation; AQUA KURE – CLEAR.
    - vii. L&M Construction Chemicals, Inc.; L&M CURE R.
    - viii. Meadows, R. W., Inc.; 1100-CLEAR SERIES.
    - ix. Nox-Crete Products Group; Resin Cure E.
    - x. SpecChem, LLC; PaveCure Rez.
    - xi. Symons by Dayton Superior; Resi-Chem Clear.
    - xii. Tamms Industries, Inc.; TAMMSCURE WB 30C.
    - xiii. Vexcon Chemicals Inc.; Certi-Vex Envirocure 100.

## 2.5 RELATED MATERIAL

- A. Joint Fillers: Resilient premolded bituminous impregnated fiberboard units complying with ASTM D994, D1751, D2628; FS HH-F-341, Type 2 Class A.
- B. Joint Sealants; ASTM C920, non-priming, pourable, self-leveling polyurethane.
- C. Water repellent and chloride screen; Prosoco Saltguard WB.

## 2.6 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
  - a. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
  - b. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
  - a. Compressive Strength (28 Days): 4000 psi.
  - b. Maximum Water-Cementitious Materials Ratio at point of placement: 0.45.
  - c. Slump Limit: 4 inches, plus or minus 1 inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having and air content as follows:
  - a. Air Content: 6 percent plus or minus 1.5 percent for ¾ inch nominal maximum aggregate size.
- D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

- a. Use plasticizing and retarding admixture in concrete as required for placement and workability.
  - b. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- E. Cementitious Materials: Limit percentage by weight of cementitious materials other than Portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.

## **2.7 CONCRETE MIXING**

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94. Furnish batch certificates for each batch discharged and used in the Work.
- a. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1.5 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## **PART 3 – EXECUTION**

### **3.1 EXAMINATION**

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excessive yielding.
- a. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
  - b. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
  - c. Correct subbase with soft spots and areas of pumping or rutting exceeding depths of 1/2 inch according to requirements in Division 31 Section “Earth Moving.”
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

### **3.3 EDGE FORMS AND SCREED CONSTRUCTION**

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

### **3.4 STEEL REINFORCEMENT**

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

### 3.5 JOINTS

- A. General: Form expansion, sawed or premolded strip, and keyed construction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
  - a. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Keyed Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
  - a. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
  - b. Construct joints in accordance with details as shown in Plans.
- C. Expansion Joints: Locate expansion joints as shown and detailed in the Plans and as follows:
  - a. Locate expansion joints at intervals of 150 feet maximum each way unless otherwise indicated.
  - b. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed caps. Remove protective cap after concrete has been placed on both sides of joint.
- D. Sawed or Premolded Strip Joints: Provide a joint plan for approval by Owner. Joint spacing shall not exceed 15 feet maximum. Panels shall be cut such that panels are nearly square and do not exceed 1.4 length to width ratio.
  - a. Construct joints for depths equal to at least 1/3 of the concrete thickness.
  - b. Sawed Joints: Form joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8 inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/8 inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.
- F. Joint Fillers: Extend joint filler full-width and depth of joint, and not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. Furnish joint filler in 1 piece lengths for full width being placed, wherever possible. Where more than 1 length is required, lace or clip joint filler sections together.

- G. Joint Sealants: Joints shall be sealed with approved exterior pavement joint sealants and shall be installed in accordance with manufacturer's recommendations.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation and items to be embedded or cast in.
- B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- F. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - a. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating dowels and joint devices.
- G. Screed paving surface with a straight edge and strike off.
- H. Commence initial floating using bull floats or darbies to impart and open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- I. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- J. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
  - a. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.
- K. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
  - a. When the air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
  - b. Do not use frozen materials or materials containing snow and ice.
  - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- L. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

- a. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
- b. Fog-spray forms and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### **3.7 FLOAT FINISHING**

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
  - a. Medium-to-Fine textured Broom Finish: Draw a soft-bristle broom across, float-finished concrete surface perpendicular to the line of traffic to provide a uniform, fine-line texture.

### **3.8 CONCRETE PROTECTION AND CURING**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sqft per hour before and during finishing operations. Apply according to manufacturer's written instructions and after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by curing compound as follows:
  - a. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.
- F. Apply water repellent and chloride screen Prosoco Saltguard WB as directed by manufacturer and indicated in 321313 Appendix A to the following locations:
  - a. New sidewalks and accessible ramps.
  - b. New concrete landings, stairs, and patios at exterior doors.

### **3.9 PAVING TOLERANCES**

- A. Comply with tolerances in ACI 117 and as follows:
  - a. Elevation: 3/4 inch.
  - b. Thickness: Plus 3/8 inch, minus 1/4 inch.

- c. Surface: Gap below 10-foot long, unlevelled straightedge not to exceed 1/2 inch.
  - d. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
  - e. Lateral alignment and spacing of dowels: 1 inch
  - f. Vertical alignment of dowels: 1/4 inch
  - g. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
  - h. Joint Spacing: 3 inches
  - i. Contraction Joint Depth: Plus 1/4 inch, no minus.
  - j. Joint Width: Plus 1/8", no minus.
- B. The paving tolerances noted above do not control in regards to site accessibility, and providing accessible routes in accordance with the American Disabilities Act of 1990 and the 2010 ADA Standards for Accessible Design. Accessible routes shall meet the following:
- a. Sidewalks shall not exceed 5 percent slope with 2 percent cross-slope and shall be 5 feet wide except as noted on the civil plans.
  - b. Parking areas for accessible spaces and access isles shall not exceed 2 percent slope in any direction.
  - c. Ramps shall not exceed 8.33 percent slope with a 2 percent cross-slope and shall be 5 feet wide except as noted on the civil plans.
  - d. All sidewalk intersections shall have a 5'x5' landing with no more than 2 percent maximum slope in any direction.

### 3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements:
- a. Testing Frequency: Obtain at least one composite sample for each 50 cuyd or fraction thereof of each concrete mixture placed each day.
    - i. When frequency of testing will provide fewer than 5 compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  - b. Slump: ASTM C143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  - c. Air Content: ASTM C231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - d. Concrete Temperature: ASTM C1064; one test hourly when air temperatures is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
  - e. Compression Test Specimens: ASTM C31; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
  - f. Compressive Strength Tests: ASTM C; test one specimen at seven days; two specimens at 28 days and hold one specimen in reserve for future testing, if needed.
    - i. A compressive strength test shall be the average compressive strength from two specimens obtained from the same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive strength test value falls below specified compressive strength by more than 500 psi.

- D. Test results shall be reported in writing to the Owner, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project Identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.
- E. Nondestructive Testing: Sonoscope or other nondestructive device may be permitted by Owner but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by the Owner.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work within specified requirements.
- I. Prepare test and inspection reports.

### **3.11 REPAIRS AND PROTECTION**

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by the Owner.
- B. Drill test cores, where directed by the Owner, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from newly paved areas for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

**END OF SECTION 32 1313**

## SECTION 32 1373 CONCRETE PAVING JOINT SEALANTS

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - a. Cold-applied joint sealants.
- B. Related Sections:
  - a. Division 32 1313 Section “Concrete Paving” for constructing joints in concrete pavement.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of joint sealant product indicated.
- B. Pavement-Joint-Sealant Schedule: Include the following information:
  - a. Joint-sealant application, joint location, and designation.
  - b. Joint-sealant manufacturer and product name.
  - c. Joint-sealant formulation.
  - d. Joint-sealant color.
- C. Qualification Data: For qualified installer
- D. Product Certificates: For each type of joint sealant and accessory, from manufacturer.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for joint sealants.
- F. Preconstruction Compatibility and Adhesion Test Reports: From joint-sealant manufacturer, indicating the following:
  - a. Materials forming joint substrates and joint-sealant backings have been tested for compatibility with and adhesion to joint sealants.
  - b. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

#### 1.4 QUALITY ASSURANCE



- A. Installer Qualifications: Manufacturer’s authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each type of joint sealant from a single source from a single manufacturer.

## **1.5 PROJECT CONDITIONS**

- A. Do not proceed with installation of joint sealants under the following conditions:
  - a. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
  - b. When joint substrates are wet.
  - c. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - d. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrate.

## **PART 2 – PRODUCTS**

### **2.1 MATERIALS**

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

### **2.2 COLD-APPLIED JOINT SEALANTS**

- A. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work, include, but are not limited to, the following:
    - i. Crafc0, Inc., and ERGON company, Road Saver Silicone.
    - ii. Dow Corning Corporation; 888.
    - iii. Pecora Corporation; 301 NS.
- B. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work, include, but are not limited to, the following:
    - i. Crafc0, Inc., and ERGON company, Road Saver Silicone SL.
    - ii. Dow Corning Corporation; 890-SL.
    - iii. Pecora Corporation; 301 SL.
- C. Multi-Component, Pourable, Traffic-Grade, Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - i. Pecora Corporation; Urexpan NR-200

## **2.3 JOINT-SEALANT BACKER MATERIALS**

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- B. Round Backer Rods for Cold and Hot Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Round Baker Rods for Cold Applied Joint Sealants; ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- D. Backer Strips for Cold and Hot Applied Joint Sealants: ASTM D 5249, Type 2, of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

## **2.4 PRIMERS**

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

## **PART 3 – EXECUTION**

### **3.1 EXAMINATION**

- A. Examine joints indicated to receive joint sealants, with installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

### **3.3 INSTALLATION OF JOINT SEALANTS**

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - a. Do not leave gaps between ends of joint-sealant backings.
  - b. Do not stretch, twist, puncture, or tear joint-sealant backings.
  - c. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:
  - a. Place joint sealants so they directly contact and fully wet joint substrates.
  - b. Completely fill recesses in each joint configuration.
  - c. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
  - a. Remove excess joint sealant from surfaces adjacent to joints.
  - b. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

### **3.4 CLEANING**

- A. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### **3.5 PROTECTION**

- A. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at the time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

### **3.6 PAVEMENT JOINT SEALANT SCHEDULE**

- A. Joint Sealant Application: Joints within cement concrete pavement.
  - a. Joint Location:
    - i. Expansion and isolation joints in cast-in-place concrete pavement.
    - ii. Contraction joints in cast-in-place concrete.
    - iii. All other joints as indicated
  - b. Silicone Joint Sealant for Concrete: Single component, self-leveling.
  - c. Urethane Joint Sealant for Concrete: Multi-component, pourable, traffic-grade.
  - d. Joint-Sealant Color: Concrete gray, limestone or color that matches adjacent concrete color. Provide color samples to architect for selection.

**END OF SECTION 32 1373**

**SECTION 32 9200**  
**TURF AND GRASSES**

**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:
  - a. Hydroseeding.

**1.3 DEFINITIONS**

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that can cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Existing, on-site topsoil meeting the definition in section 31 1000 Site Clearing, stockpiled during grading operations and not heavily compacted.
- E. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

**1.4 REQUIRED SUBMITTALS:**

- A. Qualification Data: For landscape Installer.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
  - a. Certification of each seed mixture for turf grass sod. Include identification and location of source and name and telephone number of supplier.
- C. Product Certificates: For fertilizers, from manufacturer.
- D. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

- E. Product specifications and certifications for Hydroseed. Include identification and location of source and name and telephone number of supplier.

## **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during calendar year.

## **1.6 QUALITY ASSURANCE**

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf establishment.
  - a. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare network or the American Nursery and Landscape Association.
  - b. Installer's Field Supervisions: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
  - c. Pesticide Applicator: State licensed, commercial.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Seed and Other Packaged Materials: deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. Bulk Materials:
  - a. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
  - b. Provide erosion-control measures to prevent erosion displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
  - c. Accompany each deliver of bulk materials with appropriate certificates.

## **1.8 FIELD CONDITIONS**

- A. Planting Restrictions: Plant during one of the following periods:
  - a. Spring Planting: March 15 to May 15
  - b. Fall Planting: September 1 to October 20.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

## **PART 2 – PRODUCTS**

### **2.1 FERTILIZERS**

- A. Slow-Release Fertilizer: Granular or pelletized fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
  - a. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

## 2.2 HYDROSEEDING

- A. Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysis of North America. Provide seed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.
- B. Hydraulic Mulch: HydraCM matrix by North American Green, or approved equal. See Appendix for product specification.
- C. Permanent Grass Seed Mix: Proportioned by weight as follows:
  - a. 85 percent tall turf type fescue cultivars (*Festuca arundinacea* variety).
  - b. 15 percent perennial ryegrass (*Lolium perenne*).

## 2.3 PESTICIDES

- A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below any mulch layers.
- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
  - a. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plater, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in the soil within the planting area.
  - b. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
  - c. Uniformly moisten excessively dry soil that is not workable or which is dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the Design Team and replace with new planting soil.

### **3.2 PREPARATION**

- A. Protect structures: utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
  - a. Protect adjacent and adjoining areas, structures, pavement pads, etc. from hydroseeding overspray.
  - b. Protect grade stakes set by others until directed to remove them.

### **3.3 TURF AREA PREPARATION**

- A. Placing Planting Soil: To thickness and grades indicated in civil plans. Provide light compaction only per Section 31 2000 Earth Moving.
  - a. Reduce elevation of planting soil to allow for soil thickness of sod.
- B. Kill and remove all existing weeds.
- C. Verify all areas match the grading plan in the civil plans and provide positive drainage as intended in the plans.
- D. Rake all areas smooth with no bumps, depressions, rills, or eroded areas deeper than ½”.
- E. Remove all objects on the surface (typically rocks, roots, trash, broken concrete, etc.) larger than 2” in any dimension. Fill depressions left with topsoil.
- F. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- G. Before planting, obtain Owner’s acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- H. Place fertilizer at a rate of 7 lbs/1000 sqft or as recommended by the manufacturer.

### **3.5 HYDROSEEDING**

- A. Hydroseeding for areas outside of track: Mix specified permanent grass seed mix, temporary grass seed mix, and HydraCM per manufacturer’s written requirements. Continue mixing until uniformly blended into a homogeneous slurry suitable for hydraulic application.
  - a. Permanent grass seed mix shall be mixed so 215 lb/acre is applied.
  - b. Temporary seed mix shall be mixed so 10lb/acre is applied.
  - c. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that HydraCM component is deposited at not less than 3000 lb/acre dry weight.

### **3.6 TURF MAINTENANCE**

- A. Protection: Protect the area against traffic or other use by placing warning signs, fences, and erecting any barricades that may be required before or immediately after sowing is completed.



- B. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
  - a. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
  - b. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
  - c. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and to reduce hazards.
- C. Watering: Install and maintain water trucks, temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.
  - a. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system (or use permanent irrigation system) to avoid walking over muddy or newly planted areas.
  - b. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.
  - c. Onsite water may be used once the water lines are constructed and functional. Coordinate usage with the Owner.
- D. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when the grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
  - a. Mow areas outside the track to a height of 3 to 4 inches.
  - b. Mow areas inside the track to a height of 2 to 3 inches.
- E. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.
  - a. Apply fertilizer at a rate of at least 7 lb/1000 sqft of turf area.

### **3.8 SATISFACTORY TURF**

- A. Turf installations shall meet the following criteria as determined by the Owner:
  - a. Satisfactory seeded turf: A healthy, uniform, recently mowed, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sqft area and bare spots do not exceed 3 by 3 inches.
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.
- C. Obtain approval of satisfactory turf for all areas by Owner.

### **3.9 PESTICIDE APPLICATION**

- A. Apply pesticides and other chemical products and biological control agents according to manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

- B. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

### **3.10 CLEANUP AND PROTECTION**

- A. Promptly remove the soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Remove waste material, trash, and debris, and legally dispose of them off Owner's property.
- C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout maintenance period and remove as approved by Owner.

### **3.11 MAINTENANCE SERVICE**

- A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape installer. Begin maintenance immediately after each area is planted and continue until acceptable turf is established, but not for less than the following periods:
  - a. Seeded Turf: As long as required until satisfactory turf is established and approved by Owner.

**END OF SECTION 32 9200**

STATE OF MISSOURI  
DEPARTMENT OF NATURAL RESOURCES  
MISSOURI CLEAN WATER COMMISSION

Appendix A



## MISSOURI STATE OPERATING PERMIT

### General Operating Permit

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No MOR100038

Owner: OA-Facilities Mgmt, Design, and Construc  
Address: 301 West High Street, Hst Rm 370  
Jefferson City, MO 65101

Continuing Authority: OA Facilities Mgmt Design Construction  
301 West High St.  
HST SOB Rm 730  
Jefferson City, MO 65102

Facility Name: Office of Administration  
Facility Address: OA-FMDC, PO Box 809 301 W High street  
JEFFERSON CITY, MO 65102

Legal Description: Land Grant 02681, Cole County  
UTM Coordinates: 571840.000/4270368.000  
Receiving Stream: Tributary to Wears Creek (U)  
First Classified Stream - ID#: 100K Extent-Remaining Streams (C) 3960.00  
USGS# and Sub Watershed#: 10300102 - 1304

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein.

### **FACILITY DESCRIPTION** All Outfalls SIC #1629

All Outfalls - Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, filling and other activity that results in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution of waters of the state)

Issued to a city, county, state or federal agency, other governmental jurisdiction, or other private area-wide projects as determined by the Department on a case-by-case basis

This permit authorizes only wastewater, including storm water, discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System, it does not apply to other regulated areas. This permit may be appealed in accordance with RSMo Section 644.051.6 and 621.250, 10 CSR 20-6.020, and 10 CSR 20-1.020.

August 01, 2022

Issue Date

Chris Wieberg, Director  
Water Protection Program

July 04, 2027

Expiration Date

## **I. APPLICABILITY**

### **A. Permit Coverage and Authorized Discharges**

1. This Missouri State Operating Permit (permit) authorizes the discharge of stormwater and certain non-stormwater discharges from land disturbance sites that disturb one or more acres, or disturb less than one acre when part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project.

A Missouri State Operating Permit must be issued before any site vegetation is removed or the site disturbed. Any site owner/operator subject to these requirements for stormwater discharges and who disturbs land prior to permit issuance from the Missouri Department of Natural Resources (Department) is in violation of both State regulations per 10 CSR 20-6.200(1)(A) and Federal regulations per 40 CFR 122.26. The owner/operator of this permit is responsible for compliance with this permit [10 CSR 20-6.200 (3)(B)].

2. This general permit is issued to a city, county, state or federal agency, other governmental jurisdiction, or other private area-wide projects as determined by the Department on a case-by-case basis, for land disturbance projects performed by or under contract to the permittee.
3. This permit authorizes stormwater discharges from land disturbance support activities (e.g., equipment staging yards, material storage areas, excavated material disposal areas, borrow areas, concrete, or asphalt batch plants) provided appropriate stormwater controls are designed, installed, and maintained and the following conditions are met and addressed in the Stormwater Pollution Prevention Plan (SWPPP). The permittee is responsible for compliance with this permit for any stormwater discharges from construction support activity.
  - (a) The support activity is directly related to the construction site required to have permit coverage for stormwater discharges;
  - (b) The support activity is not a commercial operation or serve multiple unrelated construction sites;
  - (c) The support activity does not continue to operate beyond the completion of the construction activity at the project it supports;
  - (d) Sediment and erosion controls are implemented in accordance with the conditions of this permit; and
  - (e) The support activity is strictly stormwater discharges or non-stormwater discharges listed in PART I, APPLICABILITY, Condition A.4. Support activities which discharge process water shall apply for separate coverage (e.g., a concrete batch plant discharging process water shall be covered under a MOG49).
4. This permit authorizes non-stormwater discharges associated with your construction activity from the following activities provided that these discharges are treated by appropriate Best Management Practices (BMPs) where applicable and addressed in the permittee's site specific SWPPP required by this general permit:
  - (a) Discharges from emergency fire-fighting activities;
  - (b) Hydrant flushing and water line flushing, provided the discharged water is managed to avoid instream water quality impacts;
  - (c) Landscape watering, including to establish vegetation;
  - (d) Water used to control dust;
  - (e) Waters used to rinse vehicles and equipment, provided there is no discharge of soaps, solvents, or detergents used for such purposes;
  - (f) External building washdown, provided soaps, solvents, and detergents are not used, and external surfaces do not contain hazardous substances (e.g., paint or caulk containing polychlorinated biphenyls (PCBs))
  - (g) Pavement wash waters, provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used. Directing pavement wash waters directly into any water of the state, storm drain inlet, or stormwater conveyance (constructed or natural site drainage features), unless the conveyance is connected to an effective control, is prohibited;
  - (h) Uncontaminated air conditioning or compressor condensate;
  - (i) Uncontaminated, non-turbid discharges of ground water or spring water;
  - (j) Foundation or footing drains where flows are not contaminated with process materials; and
  - (k) Uncontaminated construction dewatering water discharged in accordance with requirements found in this permit for specific dewatering activities.

## **B. Permit Restrictions and Limitations**

1. This permit does not authorize the discharge of process wastewaters, treated or otherwise.
2. For sites operating within the watershed of any Outstanding National Resource Water (which includes the Ozark National Riverways and the National Wild and Scenic Rivers System), sites that discharge to an Outstanding State Resource Water, or facilities located within the watershed of an impaired water as designated in the Clean Water Act (CWA) Section 303(d) list with an impairment for sedimentation/siltation:
  - (a) This permit authorizes stormwater discharge provided no degradation of water quality occurs due to discharges from the permitted facility per 10 CSR 20-7.031(3)(C).
  - (b) A site with a discharge found to be causing degradation or contributing to an impairment by discharging a pollutant of concern, during an inspection or through complaint investigations, may be required to become a no discharge facility or obtain a site-specific permit with more stringent monitoring and SWPPP requirements.
3. This permit does not allow placement of fill material into any stream or wetland, alteration of a stream channel, or obstruction of stream flow unless the appropriate CWA Section 404 permitting authority provides approval for such actions or determines such actions are exempt from Section 404 jurisdiction. Additionally, this permit does not authorize placement of fill in floodplains unless approved or determined exempt by appropriate federal and/or state floodplain development authorities.
4. This operating permit does not affect, remove, or replace any requirement of the National Environmental Policy Act; the Endangered Species Act; the National Historic Preservation Act; the Comprehensive Environmental Response, Compensation and Liability Act; the Resource Conservation and Recovery Act; or any other relevant acts. Determination of applicability to the above mentioned acts is the responsibility of the permittee. Additionally, this permit does not establish terms and conditions for runoff resulting from silvicultural activities listed in Section 402(1)(3)(a) of the Clean Water Act.
5. Compliance with all requirements in this permit does not supersede any requirement for obtaining project approval from an established local authority nor remove liability for compliance with county and other local ordinances.
6. The Department may require any facility or site authorized by a general permit to apply for a site-specific permit [10 CSR 20-6.010(13)(C)].
7. If a facility or site covered under a current general permit desires to apply for a site-specific permit, the facility or site may do so by contacting the Department for application requirements and procedures.
8. Any discharges not expressly authorized in this permit and not clearly disclosed in the permit application cannot become authorized or shielded from liability under CWA section 402(k) or Section 644.051.16, RSMo, by disclosure to EPA, state, or local authorities after issuance of this permit via any means, including any other permit applications, funding applications, the SWPPP, discharge monitoring reporting, or during an inspection. Discharges at the facility not expressly authorized by this permit must be covered by another permit, be exempt from permitting, or be authorized through some other method.

## **II. EXEMPTIONS FROM PERMIT REQUIREMENTS**

1. Sites that discharge all stormwater runoff directly to a combined sewer system (as defined in 40 CFR 122.26 and 40 CFR 35.2005) connecting to a publicly owned treatment works which has consented to receive such a discharge are exempt from Department stormwater permit requirements.
2. Land disturbance activities that disturb less than one (1) acre of total land area which are not part of a common plan or sale where water quality standards are not exceeded are exempt from Department stormwater permit requirements.

3. Oil and gas related activities as listed in 40 CFR 122.26(a)(2)(ii) where water quality standards are not exceeded are exempt from Department stormwater permit requirements.
4. Linear, strip, or ribbon construction or maintenance operations meeting one (1) of the following criteria are exempt from Department stormwater permit requirements:
  - (a) Grading of existing dirt or gravel roads which does not increase the runoff coefficient and the addition of an impermeable surface over an existing dirt or gravel road;
  - (b) Cleaning or routine maintenance of roadside ditches, sewers, waterlines, pipelines, utility lines, or similar facilities;
  - (c) Trenches two (2) feet in width or less; or
  - (d) Emergency repair or replacement of existing facilities as long as BMPs are employed during the emergency repair.

### **III. REQUIREMENTS**

1. The permittee shall post a public notification sign at the main entrance to the site, or a publically visible location, with the specific MOR100 permit number. The public notification sign must be visible from the public road that provides access to the site's main entrance. An alternate location is acceptable provided the public can see it and it is noted in the SWPPP. The public notification sign must remain posted at the site until the site is finalized.
2. The permittee shall be responsible for notifying the land owner and each contractor or entity (including utility crews and city employees or their agents) who will perform work at the site of the existence of the SWPPP and what actions or precautions shall be taken while on site to minimize the potential for erosion and the potential for damaging any BMP. The permittee is responsible for any damage a subcontractor may do to established BMPs and any subsequent water quality violation resulting from the damage.
3. Ensure the design, installation, and maintenance of effective erosion and sediment controls to minimize the discharge of pollutants. At a minimum, such controls must be designed, installed, and maintained to:
  - (a) Control stormwater volume, velocity, and peak flow rates to minimize soil erosion;
  - (b) Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion and scour;
  - (c) Minimize the amount of exposed soil during construction activity;
  - (d) Minimize the disturbance of steep slopes;
  - (e) Minimize sediment discharges from the site. Address factors such as:
    - 1) The amount, frequency, intensity, and duration of precipitation;
    - 2) The nature of resulting stormwater runoff;
    - 3) Expected flow from impervious surfaces, slopes, and drainage features; and
    - 4) Soil characteristics, including the range of soil particle size expected to be present on the site.
  - (f) Provide and maintain natural buffers around surface waters as detailed in Part V. BMP REQUIREMENTS Condition 7, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration and filtering, unless infeasible; and
  - (g) Minimize soil compaction and preserve topsoil where practicable.

A 2-year, 24-hour storm event can be determined for the project location using the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 which can be located at [https://hdsc.nws.noaa.gov/hdsc/pfds/pfds\\_map\\_cont.html](https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html), or the permittee can determine local rainfall distribution for a 2-year, 24 hours storm event using multi-decade local high density rain gauge data, as approved by the Department.

4. BMPs for land disturbance [10 CSR 20-6.200(1)(D)2] are a schedule of activities, practices, or procedures that reduces the amount of soil available for transport or a device that reduces the amount of suspended solids in runoff before discharge to waters of the state. The term BMPs are also used to describe the sediment and erosion controls and other activities used to prevent stormwater pollution. BMPs are divided into two main categories: structural or non-structural; and they are also classified as temporary or permanent. Temporary BMPs may be added and removed as necessary with updates to the SWPPP as specified in the requirements below.

5. Installation of BMPs necessary to prevent soil erosion and sedimentation at the downgradient project boundary (e.g. buffers, perimeter controls, exit point controls, storm drain inlet protection) must be complete prior to the start of all phases of construction. By the time construction activity in any given portion of the site begins, downgradient BMPs must be installed and operational to control discharges from the initial site clearing, grading, excavating, and other earth-disturbing activities. Additional BMPs shall be installed as necessary throughout the life of the project.
6. All BMPs shall be maintained and remain in effective operating condition during the entire duration of the project, with repairs made within the timeframes specified elsewhere in this permit, until final stabilization has been achieved.
  - (a) Ensure BMPs are protected from activities that would reduce their effectiveness.
  - (b) Remove any sediment per the BMP manufacturer's instructions or before it has accumulated to one-half of the above-ground height of any BMP that collects sediment (i.e., silt fences, sediment traps, etc.)
  - (c) The project is considered to achieve final stabilization when Part V. BMP REQUIREMENTS, Condition 13 is met.
7. Minimize sediment trackout from the site and sediment transport onto roadways.
  - (a) Restrict vehicle traffic to designated exit points.
  - (b) Use appropriate stabilization techniques or BMPs at all points that exit onto paved roads or areas outside of the site.
  - (c) Use additional controls or BMPs to remove sediment from vehicle and equipment tires prior to exit from facility where necessary.
  - (d) Any sediment or debris that is tracked out past the exit pad or is deposited on a roadway after a precipitation event shall be removed by the shorter of either the same business day (for business days only), or by the end of the next business day if track-out occurs on a non-business day, and before predicted rain events. Remove the track-out sediment by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. Sediment or debris tracked out on pavement or other impervious surfaces shall not be disposed of into any stormwater conveyance, storm drain inlet, or water of the state.
  - (e) Stormwater inlets susceptible to receiving sediment or other pollutants from the permitted land disturbance site shall have curb inlet protection. This may include inlets off the active area where track out from vehicles and equipment could impact the stormwater runoff to those inlets.
8. Concrete washout facilities shall be used to contain concrete waste from the activities onsite, unless the washout of trucks and equipment is managed properly at an off-site location. The washout facility shall be managed to prevent solid and/or liquid waste from entering waters of the state by the following:
  - (a) Direct the wash water into leak-proof containers or pits designed so that no overflows can occur due to inadequate sizing or precipitation;
  - (b) Locate washout activities away from waters of the state, stormwater inlets, and/or stormwater conveyances where practicable. If not practicable, use BMPs to reduce risk of waste leaving the washout facility;
  - (c) Washout facilities shall be cleaned, or new facilities must be constructed and ready for use, once the washout is 75% full;
  - (d) Designate the washout area(s) and conduct such activities only in these areas.
  - (e) Ensure contractors are aware of the location, such as by marking the area(s) on the map or signage visible to the truck and/or equipment operators.
9. Good housekeeping practices shall be maintained at all times to keep waste from entering waters of the state.
  - (a) Provide solid and hazardous waste management practices, including providing trash containers, regular site cleanup for proper disposal of solid waste such as scrap building material, product/material shipping waste, food/beverage containers, spent structural BMPs;
  - (b) Provide containers and methods for proper disposal of waste paints, solvents, and cleaning compounds.
  - (c) Manage sanitary waste. Portable toilets shall be positioned so that they are secure and will not be tipped or knocked over and so that they are located away from waters of the state and stormwater inlets and stormwater conveyances.
  - (d) Ensure the storage of construction materials be kept away from drainage courses, stormwater conveyances, storm drain inlets, and low areas.

10. All fueling facilities present shall at all times adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers.
11. Any hazardous wastes that are generated onsite shall be managed, stored, and transported according to the provisions of the Missouri Hazardous Waste Laws and Regulations.
12. Store all paints, solvents, petroleum products, petroleum waste products, and storage containers (such as drums, cans, or cartons) so they are not exposed to stormwater or provide other prescribed BMPs (such as plastic lids and/or portable spill pans) to prevent the commingling of stormwater with container contents. Commingled water may not be discharged under this permit. Provide spill prevention, control, and countermeasures to contain the spill. Any containment system used to implement this requirement shall be constructed of materials compatible with the substances contained and shall prevent the contamination of groundwater.
13. Implement measures intended to prevent the spillage or loss of fluids, oil, grease, fuel, etc. from vehicles and equipment to thereby prevent the contamination of stormwater from these substances. This may include prevention measures such as, but not limited to, utilizing drip pans under vehicles and equipment stored outdoors, covering fueling areas, using dry clean-up methods, use of absorbents, and cleaning pavement surfaces to remove oil and grease.
14. Spills, Overflows, and Other Unauthorized Discharges.
  - (a) Any spill, overflow, or other discharge not specifically authorized in the permit above are unauthorized.
  - (b) Should an unauthorized discharge cause or permit any contaminants, other than sediment, or hazardous substance to discharge or enter waters of the state, the unauthorized discharge must be reported to the regional office as soon as practicable but no more than 24 hours after the discovery of the discharge. If the spill or overflow needs to be reported after normal business hours or on the weekend, the facility must call the Department's Environmental Emergency Response hotline at (573) 634-2436. Leaving a message on a Department staff member voice-mail does not satisfy this reporting requirement.
  - (c) A record of all spills shall be retained with the SWPPP and made available to the Department upon request.
  - (d) Other spills not reaching waters of the state must be cleaned up as soon as possible to prevent entrainment in stormwater but are not required to be reported to the Department.
15. The full implementation of this operating permit shall constitute compliance with all applicable federal and state statutes and regulations in accordance with RSMo 644.051.16 and the CWA §402(k); however, this permit may be reopened and modified or alternatively revoked and reissued to comply with any applicable effluent standard or limitation issued or approved under Clean Water Act §§ 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) if the effluent standard or limitation so issued or approved contains different conditions or is otherwise more stringent than any effluent limitation in the permit or controls any pollutant not limited in the permit. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, termination, notice of planned changes, or anticipated non-compliance does not stay any permit condition.

#### **IV. STORMWATER POLLUTION PREVENTION PLAN (SWPPP) MANAGEMENT REQUIREMENTS**

1. The primary requirement of this permit is the development and implementation of a SWPPP which incorporates site specific practices to best minimize the soil exposure, soil erosion, and the discharge of pollutants, including solids for each site covered under this permit.

The purpose of the SWPPP is to ensure the design, implementation, management, and maintenance of BMPs in order to prevent sediment and other pollutants in stormwater discharges associated with the land disturbance activities [40 CFR 122.44 (k)(4)] from entering waters of the state above established general and narrative criteria; compliance with Missouri Water Quality Standards; and compliance with the terms and conditions of this general permit.

- (a) **The SWPPP must be developed and implemented prior to conducting any land disturbance activities and must be specific to the land disturbance activities at the site.**
- (b) The permittee shall fully implement the provisions of the SWPPP required under this permit as a condition of this general permit throughout the term of the land disturbance project. Failure to develop, implement, and maintain a SWPPP may lead to immediate enforcement action.



- (c) The SWPPP shall be updated any time site conditions warrant adjustments to the project or BMPs.
  - (d) Either an electronic copy or a paper copy of the SWPPP, and any required reports, must be accessible to anyone on site at all times when land disturbance operations are in process or other operational activities that may affect the maintenance or integrity of the BMP structures and made available as specified under Part VIII. STANDARD PERMIT CONDITIONS, Condition 1 of this permit. The SWPPP shall be readily available upon request and should not be sent to the Department unless specifically requested
2. Failure to implement and maintain the BMPs chosen, which can be revised and updated, is a permit violation. The chosen BMPs will be the most reasonable and cost effective while also ensuring the highest quality water discharged attainable for the facility. Facilities with established SWPPPs and BMPs shall evaluate BMPs on a regular basis and change the BMPs as needed if there are BMP deficiencies.
  3. The SWPPP must:
    - (a) List and describe the location of all outfalls;
    - (b) List any allowable non-stormwater discharges occurring on site and where these discharges occur;
    - (c) Incorporate required practices identified below;
    - (d) Incorporate sediment and erosion control practices specific to site conditions;
    - (e) Discuss whether or not a 404 Permit is required for the project; and
    - (f) Name the person(s) responsible for inspection, operation, and maintenance of BMPs. The SWPPP shall list the names and describe the role of all owners/primary operators (such as general contractor, project manager) responsible for environmental or sediment and erosion control at the land disturbance site.
  4. The SWPPP briefly must describe the nature of the land disturbance activity, including:
    - (a) The function of the project (e.g., low density residential, shopping mall, highway, etc.);
    - (b) The intended sequence and timing of activities that disturb the soils at the site; and
    - (c) Estimates of the total area expected to be disturbed by excavation, grading, or other land disturbance support activities including off-site borrow and fill areas;
  5. In order to identify the site, the SWPPP shall include site information including size in acres. The SWPPP shall have sufficient information to be of practical use to contractors and site construction workers to guide the installation and maintenance of BMPs.
  6. The function of the SWPPP and the BMPs listed therein is to prevent or minimize pollution to waters of the state. A deficiency of a BMP means it was not effective in preventing or minimizing pollution of waters of the state.

The permittee shall select, install, use, operate and maintain appropriate BMPs for the permitted site. The following manuals are acceptable resources for the selection of appropriate BMPs.

*Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites*, (Document number EPA 833-R-06-004) published by the United States Environmental Protection Agency (USEPA) in May 2007. This manual as well as other information, including examples of construction SWPPPs, is available at the USEPA internet site at [https://www.epa.gov/sites/production/files/2015-10/documents/sw\\_swppp\\_guide.pdf](https://www.epa.gov/sites/production/files/2015-10/documents/sw_swppp_guide.pdf); and <https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp>.

The latest version of *Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri*, published by the Department. This manual is available at: <https://dnr.mo.gov/document-search/protecting-water-quality-field-guide>.

The permittee is not limited to the use of these guidance manuals. Other guidance publications may be used to select appropriate BMPs. However, all BMPs must be described and justified in the SWPPP. Although the use of these manuals or other resources is recommended and may be used for BMP selection, they do not supersede the conditions of this permit. They may be used to inform in the decision making process for BMP selection but they are not themselves part of the permit conditions.

The permittee may retain the SWPPP, inspection reports, and all other associated documents (including a copy of this permit) electronically pursuant to RSMo 432.255. The documents must be made available to all interested persons in either paper or electronic format as required by this permit and the permittee must remit a copy (electronic or otherwise) of the SWPPP and inspection reports to the Department upon request.

7. The SWPPP must contain a legible site map, multiple maps if necessary, identifying:
  - (a) Site boundaries of the property;
  - (b) Locations of all waters of the state (including wetlands) within the site and half a mile downstream of the site's outfalls;
  - (c) Location of all outfalls;
  - (d) Direction(s) of stormwater flow (use arrows) and approximate slopes before and after grading activities;
  - (e) Areas of soil disturbance and areas that will not be disturbed (or a statement that all areas of the site will be disturbed unless otherwise noted);
  - (f) Location of structural and non-structural BMPs, including natural buffer areas, identified in the SWPPP;
  - (g) Locations where stabilization practices are expected to occur;
  - (h) Locations of on-site and off-site material, waste, borrow, or equipment storage areas and stockpiles;
  - (i) Designated points where vehicles will exit the site;
  - (j) Location of stormwater inlets and conveyances including ditches, pipes, man-made conduits, and swales; and
  - (k) Areas where final stabilization has been achieved.
8. An individual shall be designated by the permittee as the environmental lead. This environmental lead shall have knowledge in erosion, sediment, and stormwater control principles, knowledge of the permit, and the site's SWPPP. The environmental lead shall ensure all personnel and contractors understand any requirements of this permit may be affected by the work they are doing. The environmental lead or designated inspector(s) knowledgeable in erosion, sediment, and stormwater control principles shall inspect all structures that function to prevent or minimize pollution of waters of the state.
9. Throughout coverage under this permit, the permittee shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. All SWPPP modifications shall be signed and dated. The permittee shall amend the SWPPP to incorporate any significant site condition changes which impact the nature and condition of stormwater discharges. At a minimum, these changes include whenever the:
  - (a) Location, design, operation, or maintenance of BMPs is changed;
  - (b) Design of the construction project is changed that could significantly affect the quality of the stormwater discharges;
  - (c) The permittee's inspections indicate deficiencies in the SWPPP or any BMP;
  - (d) Department notifies the permittee in writing of deficiencies in the SWPPP;
  - (e) SWPPP is determined to be ineffective in minimizing or controlling erosion and sedimentation (e.g., there is visual evidence of excessive site erosion or sediment deposits in streams, lakes, or downstream waterways, sediment or other wastes off site); and/or
  - (f) Department determines violations of water quality standards may occur or have occurred.
10. Site Inspections: The environmental lead, or a designated inspector, shall conduct regularly scheduled inspections. These inspections shall be conducted by a qualified person, one who is responsible for environmental matters at the site, or a person trained by and directly supervised by the person responsible for environmental matters at the site. Site inspections shall include, at a minimum, the following:
  - (a) For disturbed areas that have not achieved final stabilization, all installed BMPs and other pollution control measures shall be inspected to ensure they are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
  - (b) For areas on site that have achieved either temporary or final stabilization, while at the same time active construction continues on other areas, ensure that all stabilization measures are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
  - (c) Inspect all material, waste, borrow, and equipment storage and maintenance areas that are covered by this permit. Inspect for conditions that could lead to spills, leaks, or other accumulations of pollutants on the site.
  - (d) Inspect all areas where stormwater typically flows within the site, including drainage ways designed to divert, convey, and/or treat stormwater.

- (e) All stormwater outfalls shall be inspected for evidence of erosion, sediment deposition, or impacts to the receiving stream. If a discharge is occurring during an inspection, the inspector must observe and document the visual quality of the discharge and take note of the characteristics of the stormwater discharge, including turbidity, color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants.
  - (f) When practicable the receiving stream shall also be inspected for a minimum of 50 feet downstream of the outfall.
  - (g) The perimeter of the site shall be inspected for evidence of BMP failure to ensure concentrated flow does not develop a new outfall.
  - (h) The SWPPP must explain how the environmental lead will be notified when stormwater runoff occurs.
11. Inspection Frequency: All BMPs must be inspected in accordance to one of the schedules listed below. The inspection frequency shall be documented in the SWPPP, and any changes to the frequency of inspections, including switching between the options listed below, must be documented on the inspection form:
- (a) At least once every seven (7) calendar days and within 48 hours after any storm event equal to or greater than a 2-year, 24-hour storm has ceased during a normal work day or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday; or
  - (b) Once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches of precipitation or greater, or the occurrence of runoff from snowmelt. To determine if a storm event of 0.25 inches or greater has occurred on the site, the permittee shall either keep a properly maintained rain gauge on site, or obtain the storm event information from a weather station near the site location.
    - 1) Inspections are only required during the project's normal working hours.
    - 2) An inspection must be conducted within 24 hours of a storm event which has produced 0.25 inches. The inspection shall be conducted within 24 hours of the event end, or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
    - 3) If it is elected to inspect every 14 calendar days and there is a storm event at the site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, the permittee shall conduct an inspection within 24 hours of the end of the storm or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
  - (c) Areas on site that have achieved stabilization, while at the same time active construction continues on other areas, may reduce inspection frequency to monthly, for those stabilized areas, if the following conditions exist:
    - 1) For areas where disturbed portions have undergone temporary stabilization, inspections shall occur at least once a month while stabilized and when re-disturbed shall follow either frequency outlined in (a),(b), or (c) above.
    - 2) Areas on site that have achieved final stabilization must be inspected at least once per month until the permit is terminated.
  - (d) If construction activities are suspended due to frozen conditions, the permittee may temporarily reduce site inspections to monthly until thawing conditions begin to occur if all of the following are met:
    - 1) Land disturbances have been suspended; and
    - 2) All disturbed areas of the site have been stabilized in accordance with Part V. BMP REQUIREMENTS, Condition 13.
    - 3) The change shall be noted in the SWPPP.
  - (e) Any basin dewatering shall be inspected daily when discharge is occurring. The discharge shall be observed and dewatering activities shall be ceased immediately if the receiving stream is being impacted. These inspections shall be noted on a log or on the inspection report.

If weather conditions or other issues prevent correction of BMPs within seven calendar days, the reasons for the delay must be documented (including pictures), and there must be a narrative explaining why the work cannot be accomplished within the seven day time period. The documentation must be filed with the regular inspection reports. The corrections shall be made as soon as weather conditions or other issues allow.

12. Site Inspection Reports: A log of each inspection and/or copy of the inspection report shall be kept readily accessible and must be made available upon request by the Department. Electronic logs are acceptable as long as reports can be provided within 24 hours. If inspection reports are kept off site, the SWPPP must indicate where they are stored. The inspection report shall be signed by the environmental lead or designated inspector (electronically or otherwise).
- (a) The inspection report is to include the following minimum information:
    - 1) Inspector's name and title.
    - 2) Date and time of inspection.
    - 3) Observations relative to the effectiveness of the BMPs and stabilization measures. The following must be

documented:

- a. Whether BMPs are installed, operational, and working as intended;
  - b. Whether any new or modified stormwater controls are needed;
  - c. Facilities examined for conditions that could lead to spill or leak;
  - d. Outfalls examined for visual signs of erosion or sedimentation at outfalls. Excessive erosion or sedimentation may be due to BMP failure or insufficiency. Response to observations should be addressed in the inspection report.
- 4) Corrective actions taken or necessary to correct the observed problem.
  - 5) Listing of areas where land disturbance operations have permanently or temporarily stopped.
13. Any structural or maintenance deficiencies for BMPs or stabilization measures shall be documented and corrected as soon as possible but no more than seven (7) calendar days after the inspection.
- (a) Corrective action documentation shall be stored with the associated site inspection report.
  - (b) Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events.
  - (c) If weather conditions or other issues prevent correction of BMPs within seven calendar days, the reasons for the delay must be documented (this may include pictures) and there must be a narrative explaining why the work cannot be accomplished within the seven day time period. The permittee shall correct the problem as soon as weather conditions or issues allow.
  - (d) Corrective actions may be required by the Department. The permittee must comply with any corrective actions required by the Department as a result of permit violations found during an inspection.

## **V. BMP REQUIREMENTS**

1. The information, practices, and BMP requirements in this section shall be implemented on site and, where noted, provided for in the SWPPP.
2. Existing vegetation and trees shall be preserved where practicable. The permittee is encouraged to preserve topsoil where practicable.
3. The permittee shall select appropriate BMPs for use at the site and list them in the SWPPP. When selecting effective BMPs, the permittee shall consider stormwater volume and velocity. A BMP that has demonstrated ineffectiveness in preventing or minimizing sediment or other pollutants from leaving a given site shall be replaced with a more effective BMP, or additional and sequential BMPs and treatment devices may be incorporated as site conditions allow. The permittee should consider a schedule for performing erosion control measures when selecting BMPs.
4. The SWPPP shall include a description of both structural and non-structural BMPs that will be used at the site.
  - (a) The SWPPP shall provide the following general information for each BMP which will be used one or more times at the site:
    - 1) Physical description of the BMP;
    - 2) Site conditions that must be met for effective use of the BMP;
    - 3) BMP installation/construction procedures, including typical drawings; and
    - 4) Operation and maintenance procedures and schedules for the BMP.
  - (b) The SWPPP shall provide the following information for each specific instance where a BMP is to be installed:
    - 1) Whether the BMP is temporary or permanent;
    - 2) When the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project; and
    - 3) Site conditions that must be met before removal of the BMP if the BMP is not a permanent BMP.
5. Structural BMP Installation: The permittee shall ensure all BMPs are properly installed and operational at the locations and relative times specified in the SWPPP.
  - (a) Perimeter control BMPs for runoff from disturbed areas shall be installed before general site clearing is started. Note this requirement does not apply to earth disturbances related to initial site clearing and establishing entry, exit, or access of the site, which may require that stormwater controls be installed immediately after the earth

disturbance.

- (b) For phased projects, BMPs shall be properly installed as necessary prior to construction activities.
  - (c) Stormwater discharges which leave the site from disturbed areas shall pass through an appropriate impediment to sediment movement such as a sedimentation basin, sediment traps (including vegetative buffers), or silt fences prior to leaving the land disturbance site.
  - (d) A drainage course change shall be clearly marked on a site map and described in the SWPPP.
  - (e) If vegetative stabilization measures are being implemented, stabilization efforts are considered “installed” when all activities necessary to seed or plant the area are completed. Vegetative stabilization is not considered “operational” until the vegetation is established.
6. Install sediment controls along any perimeter areas of the site that are downgradient from any exposed soil or other disturbed areas. Prevent stormwater from circumventing the edge of the perimeter control. For sites where perimeter controls are infeasible, other practices shall be implemented to minimize discharges to perimeter areas of the site.
7. For surface waters of the state, defined in Section 644.016.1(27) RSMo, located on or adjacent to the site, the permittee must maintain a riparian buffer or structural equivalent in accordance with at least one of the following options. The selection and location must be described in the SWPPP.
- (a) Provide and maintain a 50-foot undisturbed natural buffer; or
  - (b) Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or
  - (c) If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.
  - (d) The permittee is not required to comply with (a), (b), or (c) above if one or more of the following exceptions apply and documentation is provided in the SWPPP:
    - 1) As authorized per CWA Section 404 Department of the Army permit and its associated Section 401 Water Quality Certification from the Department.
    - 2) If there is no discharge of stormwater to waters of the state through the area between the disturbed portions of the site and waters of the state located within 50 feet of the site. This includes situations where the permittee has implemented permanent control measures that will prevent such discharges, such as a berm or other barrier.
    - 3) Where no natural buffer exists due to preexisting development disturbances that occurred prior to the initiation of planning for the current development of the site.
      - a. Where some natural buffer exists but portions of the area within 50 feet of the waters of the state are occupied by preexisting development disturbances the permittee is required to comply with (a), (b), or (c) above.
    - 4) For linear projects where site constraints make it infeasible to implement a buffer or equivalent provided the permittee limit disturbances within 50 feet of any waters of the state and/or the permittee provides supplemental erosion and sediment controls to treat stormwater discharges from earth disturbances within 50 feet of the water of the state. The permittee must also document in the SWPPP the rationale for why it is infeasible for the permittee to implement (a), (b), or (c) and describe any buffer width retained and supplemental BMPs installed.
  - (e) Where the permittee is retaining a buffer of any size, the buffer should be measured perpendicularly from any of the following points, whichever is further landward from the water:
    - 1) The ordinary high water mark of the water body, defined as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris; or
    - 2) The edge of the stream or river bank, bluff, or cliff, whichever is applicable.
8. Slopes for disturbed areas must be identified in the SWPPP. A site map or maps defining the sloped areas for all phases of the project must be included in the SWPPP. The disturbance of steep slopes shall be minimized.
9. Manage stockpiles or land clearing debris piles composed, in whole or in part, of sediment and/or soil.
- (a) Locate the piles outside of any natural buffers zones, established under the condition above, and away from any stormwater conveyances, drain inlets, and areas where stormwater flow is concentrated;
  - (b) Install a sediment barrier along all downgradient perimeter areas;
  - (c) Divert surface flows around stockpiles to reduce and minimize erosion of the stockpile.

- (d) For piles that will be unused for 14 or more days, provide cover with appropriate temporary stabilization in accordance with Part V. BMP REQUIREMENTS, Condition 13.
  - (e) Rinsing, sweeping, or otherwise placing any soil, sediment, debris, or stockpiled product which has accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the state is prohibited.
10. The site shall include BMPs for pollution prevention measures and shall be noted in the SWPPP. At minimum such measures must be designed, installed, implemented, and maintained to:
- (a) Minimize the discharge of pollutants from equipment and vehicle rinsing; no detergents, additives, or soaps of any kind shall be discharged. Rinse waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
  - (b) Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater;
  - (c) Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures, including, but not limited to, the installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers; and
  - (d) Prevent discharges from causing or contributing to an exceedance of water quality standards including general criteria.
11. Sedimentation Basins: The SWPPP shall include a sedimentation basin for each drainage area with ten or more acres disturbed at one time.
- (a) The sedimentation basin shall be sized, at a minimum, to treat a local 2-year, 24-hour storm.
  - (b) Sediment basins shall not be constructed in any waters of the state or natural buffer zones.
  - (c) Discharges from dewatering activities shall be managed by appropriate controls. The SWPPP shall include a description of any anticipated dewatering methods and specific BMPs designed to treat dewatering water.
    - 1) Appropriate controls include, but are not limited to, sediment socks, dewatering tanks, tube settlers, weir tanks, filtration systems (e.g. bag or sand filters), and passive treatment systems that are designed to remove or retain sediment.
    - 2) Erosion controls and velocity dissipation devices (e.g., check dams, riprap, and vegetated buffers) to minimize erosion at inlets, outlets, and discharge points from shall be utilized.
    - 3) Water with an oil sheen shall not be discharged and shall be marked in SWPPP.
    - 4) Visible floating solids and foam shall not be discharged.
  - (d) Until final stabilization has been achieved, sediment basins and impoundments shall utilize outlet structures or floating skimmers that withdraw water from the surface when discharging.
    - 1) Under frozen conditions, it may be considered infeasible to withdraw water from the surface and an exception can be made for that specific period as long as discharges that may contain sediment and other pollutants are managed by appropriate controls. If determined infeasible due to frozen conditions, documentation must be provided in the SWPPP to support the determination, including the specific conditions or time period when this exception applies.
  - (e) Accumulated sediment shall not exceed 50% of total volume or as prescribed in the design, whichever is less. Note in the SWPPP the locations for disposal of the material removed from sediment basins.
  - (f) Prevent discharges to the receiving stream causing excessive visual turbidity. For the purposes of this permit, visual turbidity refers to a sediment plume or other cloudiness in the water caused by sediment that can be identified by an observer.
  - (g) The SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.

Where use of a sediment basin is infeasible, the SWPPP shall evaluate and specify other similarly effective BMPs to be employed to control erosion and sediment. These similarly effective BMPs shall be selected from appropriate BMP guidance documents authorized by this permit. The BMPs must provide equivalent water quality protection to achieve compliance with this permit. The SWPPP shall require both temporary and permanent sedimentation basins to have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.

12. Soil disturbing activities on site that have ceased either temporarily or permanently shall initiate stabilization immediately in accordance with the options below. For soil disturbing activities that have been temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days:
  - (a) The permittee shall construct BMPs to establish interim stabilization; and
  - (b) Stabilization must be initiated immediately and completed within 14 calendar days.
  - (c) For soil disturbing activities that have been permanently ceased on any portion of the site, final stabilization of disturbed areas must be initiated immediately and completed within 14 calendar days.
    - 1) Allowances to the 14-day completion period for temporary and final stabilization may be made due to weather and equipment malfunctions. The use of allowances shall be documented in the SWPPP. Allowances may be determined unnecessary after review by the Department.
  - (d) Until stabilization is complete, interim sediment control shall consist of well-established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time. This may require adding more BMPs to an area than is normally used during daily operations. The types of BMPs used must be suited to the area disturbed, taking into account the number of acres exposed and the steepness of the slopes. If the slope of the area is greater than 3:1 (three feet horizontal to one foot vertical), then the permittee shall establish interim stabilization within seven days of ceasing operations on that part of the site. The following activities would constitute the immediate initiation of stabilization:
    - 1) Prepping the soil for vegetative or non-vegetative stabilization as long as seeding, planting, and/or installation of non-vegetative stabilization products takes place as soon as practicable;
    - 2) Applying mulch or other non-vegetative product to the exposed areas;
    - 3) Seeding or planting the exposed areas;
    - 4) Finalizing arrangements to have stabilization product fully installed in compliance with the deadlines for completing stabilization.
  - (e) If vegetative stabilization measures are being implemented, stabilization is considered “installed” when all activities necessary to seed or plant the area are completed. Installed does not mean established.
  - (f) If non-vegetative stabilization measures are being implemented, stabilization is considered “installed” when all such measures are implemented or applied.
    - 1) Non-vegetative stabilization shall prevent erosion and shall be chosen for site conditions, such as slope and flow of stormwater.
  - (g) Final stabilization is not considered achieved until vegetation has grown and established to meet the requirements below.
13. Prior to removal of BMPs, ceasing site inspections, and removing from the quarterly report, final stabilization must be achieved. Final stabilization shall be achieved as soon as possible once land disturbance activities have ceased. Document in the SWPPP the type of stabilization and the date final stabilization is achieved.
  - (a) The project is considered to have achieved final stabilization when perennial vegetation (excluding volunteer vegetation), pavement, buildings, or structures using permanent materials (e.g., riprap, gravel, etc.) cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetation must be at least 70% coverage of 100% of the vegetated areas on site. Vegetation must be evenly distributed.
  - (b) Disturbed areas on agricultural land are considered to have achieved final stabilization when they are restored to their preconstruction agricultural use. If former agricultural land is changing to non-agricultural use, this is no longer considered agricultural land and shall follow condition (a).
  - (c) If the intended function of a specific area of the site necessitates that it remain disturbed, final stabilization is considered achieved if all of the following are met:
    - 1) Only the minimum area needed remains disturbed (i.e., dirt access roads, motocross tracks, utility pole pads, areas being used for storage of vehicles, equipment, materials). Other areas must meet the criteria above.

- 2) Permanent structural BMPs (e.g., rock checks, berms, grading, etc.) or non-vegetative stabilization measures are implemented and designed to prevent sediment and other pollutants from entering waters of the state.
- 3) Inspection requirements in Part IV. SWPPP MANAGEMENT REQUIREMENT, Condition 11 are met and documented in the SWPPP.
- (d) Winter weather and frozen conditions do not excuse any of the above final stabilization requirements. If vegetation is required for stabilization the permittee must maintain BMPs throughout winter weather and frozen conditions until thawing and vegetation meets final stabilization criteria above. Document stabilization attempts during frozen conditions in the SWPPP. Consider future freezing when removing vegetation and plan with temporary stabilization techniques before the ground becomes frozen.

## **VI. SITE FINALIZATION & PERMIT TERMINATION**

1. Until a site is finalized, the permittee must comply with all conditions in the permit, including continuation of site inspections and reporting quarterly to the Department. To finalize the site and remove from this permit coverage, the site shall meet the following requirements:
  - (a) For any areas that (1) were disturbed during construction, (2) are not covered over by permanent structures, and (3) over which the permittee had control during the construction activities, the requirements for final vegetative or non-vegetative stabilization in Part V. BMP REQUIREMENTS, Condition 13;
  - (b) The permittee has removed and properly disposed of all construction materials, waste, and waste handling devices and has removed all equipment and vehicles that were used during construction, unless intended for long-term beyond construction phase;
  - (c) The permittee has removed all temporary BMPs that were installed and maintained during construction, except those that are intended for long-term use or those that are biodegradable; and
  - (d) The permittee has removed all potential pollutants and pollutant-generating activities associated with construction, unless needed for long-term use following the construction activities.
2. The permit may be terminated if;
  - (a) There has been a transfer of control of all areas of the site for which the current permittee is responsible under this permit to another operator, and that operator has obtained coverage under this permit;
  - (b) Active sites obtain coverage under an individual or alternative general NPDES permit, with land disturbance conditions; or
  - (c) This permit may be terminated when all projects covered under this permit are finalized. In order to terminate the permit, the permittee shall notify the Department by submitting a Request for Termination along with the final quarterly report for the current calendar quarter.

## **VII. REPORTING AND SAMPLING REQUIREMENTS**

1. The permittee is not required to sample stormwater under this permit. The Department may require sampling and reporting as a result of illegal discharges, compliance issues related to water quality concerns, or evidence of off-site impacts from activities at a site. If such an action is needed, the Department will specify in writing the sampling requirements, including such information as location and extent. If the permittee refuses to perform sampling when required, the Department may terminate the general permit and require the facility to obtain a site-specific permit with sampling requirements.
2. Electronic Discharge Monitoring Report (eDMR) Submission System. The NPDES Electronic Reporting Rule, 40 CFR Part 127, reporting of any report required by the permit shall be submitted via an electronic system to ensure timely, complete, accurate, and nationally consistent set of data for the NPDES program. The eDMR system is currently the only Department-approved reporting method for this permit unless specified elsewhere in this permit, or a waiver is granted by the Department. The facility must register in the Department's eDMR system through the Missouri Gateway for Environmental Management (MoGEM) before the first report is due.
3. Permittees shall prepare a quarterly report with a list of active land disturbance sites including any off-site borrow or depositional areas associated with the construction project and submit the following information electronically as an



attachment to the eDMR system until such a time when the current or a new system is available to allow direct input of the data:

- (a) The name of the project;
- (b) The location of the project (including the county);
- (c) The name of the primary receiving water(s) for each project;
- (d) A description of the project;
- (e) The number of acres disturbed;
- (f) The percent of completion of the project; and
- (g) The projected date of completion.

The quarterly report(s) shall be maintained by the permittee and readily available for review by the Department at the address provided on the application as well as submitted quarterly via the Department’s eDMR system. The permittee shall submit quarterly reports according to Table A.

<b>Table A</b>	<b>Schedule for Quarterly Reporting</b>
Activity for the months of:	Report is due:
January, February, March (1st Quarter)	April 28
April, May, June (2nd Quarter)	July 28
July, August, September (3rd Quarter)	October 28
October, November, December (4th Quarter)	January 28

**VIII. STANDARD PERMIT CONDITIONS**

1. Records: The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site named in the State Operating Permit, results of any monitoring and analysis, and all site inspection records required by this general permit.
  - (a) The records shall be accessible during normal business hours and retained for a period of at least three (3) years from the date of termination.
  - (b) The permittee shall provide a copy (electronic or otherwise) of the SWPPP to the Department, USEPA, or any local agency or government representative if they request a copy in the performance of their official duties within 24 hours of the request (or next working day), unless given more time by the representative.
  - (c) The permittee shall provide a copy of the SWPPP to those who are responsible for installation, operation, or maintenance of any BMP. The permittee, their representative, and/or the contractor(s) responsible for installation, operation and maintenance of the BMPs shall have a current copy of the SWPPP with them when on the project site.
  
2. Land Ownership and Change of Ownership: Federal and Missouri stormwater regulations [10 CSR 20-6.200(1) (B)] require a stormwater permit and erosion control measures for all land disturbances of one or more acres. These regulations also require a permit for less than one acre lots if the lot is part of a larger common plan of development or sale where that plan is at least one acre in size.
  - (a) If the permittee sells any portion of a permitted site to a developer for commercial, industrial, or residential use, this land remains a part of the common sale and the new owner must obtain a permit prior to conducting any land disturbance activity. Therefore, the original permittee must amend the SWPPP to show that the property has been sold and, therefore, no longer under the original permit coverage.
  - (b) Property of any size which is part of a larger common plan of development where the property has achieved final stabilization and the original permit terminated will require application of a new land disturbance permit for any future land disturbance activity unless the activity is by an individual residential building lot owner on a site less than one acre.
  - (c) If a portion of a larger common plan of development is sold to an individual for the purpose of building his or her own private residence, a permit is required if the portion of land sold is equal to or greater than one acre. No permit is required, however, for less than one acre of land sold.
  
3. Permit Transfer: This permit may not be transferred to a new owner.

4. Termination: This permit may be terminated when the project has achieved final stabilization, defined in Part VI. **SITE FINALIZATION & PERMIT TERMINATION.**
  - (a) In order to terminate the permit, the permittee shall notify the Department by submitting the form Request for Termination of Operating Permit Form MO 780-2814. The form should be submitted to the appropriate regional office or through an approved electronic system if it should become available.
  - (b) The Cover Page (Certificate Page) of the Master General Permit for Land Disturbance specifies the “effective date” and the “expiration date” of the Master General Permit. The “issued date” along with the “expiration date” will appear on the State Operating Permit issued to the applicant. **This permit does not continue administratively beyond the expiration date.**
5. Duty to Reapply: If the project or development completion date will be after the expiration date of this general permit, then the permittee must reapply to the Department for a new permit. This permit may be applied for and issued electronically in accordance with Section 644.051.10, RSMo.
  - (a) Due to the nature of the electronic permitting system, a period of time may be granted at the discretion of the Department in order to apply for a new permit after the new version is effective. Applicants must maintain appropriate best management practices and inspections during the discretionary period.
6. Duty to Comply: The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.
7. Modification, Revocation, and Reopening:
  - (a) If at any time the Department determines that the quality of waters of the state may be better protected by reopening this permit, or revoking this permit and requiring the owner/operator of the permitted site to apply for a site-specific permit, the Department may revoke a general permit and require any person to obtain such an operating permit as authorized by 10 CSR20-6.010(13) and 10 CSR 20-6.200(1)(B).
  - (b) If this permit is reopened, modified, or revoked pursuant to this Section, the permittee retains all rights under Chapter 536 and 644 Revised Statutes of Missouri upon the Department’s reissuance of the permit as well as all other forms of administrative, judicial, and equitable relief available under law.
8. Other Information: Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.
9. Duty to Provide Information: The permittee shall furnish to the Department, within 24 hours unless explicitly granted more time in writing, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.
10. Inspection and Entry: The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
  - (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of the permit;
  - (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
  - (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
  - (d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.

11. Signatory Requirement:

- (a) All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
- (b) The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit (including monitoring reports or reports of compliance or non-compliance) shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
- (c) The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.

12. Property Rights: This permit does not convey any property rights of any sort or any exclusive privilege.

13. Notice of Right to Appeal: If you were adversely affected by this decision, you may be entitled to pursue an appeal before the administrative hearing commission (AHC) pursuant to Sections 621.250 and 644.051.6 RSMo. To appeal, you must file a petition with the AHC within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal should be directed to:

Administrative Hearing Commission  
U.S. Post Office Building, Third Floor  
131 West High Street, P.O. Box 1557  
Jefferson City, MO 65102-1557  
Phone: 573-751-2422  
Fax: 573-751-5018  
Website: <https://ahc.mo.gov>



**MISSOURI**  
DEPARTMENT OF  
NATURAL RESOURCES

STORMWATER DISCHARGES FROM  
THIS LAND DISTURBANCE SITE ARE  
AUTHORIZED BY THE MISSOURI  
STATE OPERATING PERMIT NUMBER:

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ANYONE WITH QUESTIONS OR  
CONCERNS ABOUT STORMWATER  
DISCHARGES FROM THIS SITE,  
PLEASE CONTACT THE MISSOURI  
DEPARTMENT OF NATURAL  
RESOURCES AT

**1-800-361-4827**

**MISSOURI DEPARTMENT OF NATURAL RESOURCES**  
**FACT SHEET FOR MASTER GENERAL PERMIT**  
**MO-R100xxx**

The Federal Water Pollution Control Act [Clean Water Act (CWA)] Section 402 of Public Law 92-500 (as amended) established the National Pollution Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the CWA). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Missouri Department of Natural Resources (Department) under an approved program operated in accordance with federal and state laws (Federal CWA and Missouri Clean Water Law Section 644 as amended). Permits are issued for a period of five (5) years unless otherwise specified.

Per 40 CFR 124.56, 40 CFR 124.8, and 10 CSR 20-6.020(1)(A)2, a Fact Sheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the permit. A Fact Sheet is not an enforceable part of an MSOP.

**DEFINITIONS FOR THE PURPOSES OF THIS PERMIT:**

Common Promotional Plan: A plan undertaken by one (1) or more persons to offer lots for sale or lease; where land is offered for sale by a person or group of persons acting in concert, and the land is contiguous or is known, designated, or advertised as a common unit or by a common name or similar names, the land is presumed, without regard to the number of lots covered by each individual offering, as being offered for sale or lease as part of a common promotional plan.

Dewatering: The act of draining rainwater and/or groundwater from basins, building foundations, vaults, and trenches.

Effective Operating Condition: For the purposes of this permit, a stormwater control is kept in effective operating condition if it has been implemented and maintained in such a manner that it is working as designed to minimize pollutant discharges.

Emergency-Related Project: A project initiated in response to a public emergency (e.g. earthquakes, extreme flooding conditions, tornado, disruptions in essential public services, pandemic) for which the related work requires immediate authorization to avoid imminent endangerment to human health/safety or the environment or to reestablish essential public services.

Exposed Soils: For the purposes of this permit, soils that as a result of earth-disturbing activities are left open to the elements.

Immediately: For the purposes of this permit, immediately should be defined as within 24 hours.

Impervious Surface: For the purpose of this permit, any land surface with a low or no capacity for soil infiltration including, but not limited to, pavement, sidewalks, parking areas and driveways, packed gravel or soil, or rooftops.

Infeasible: Infeasible means not technologically possible or not economically practicable and achievable in light of best industry practices.

Install or Installation: When used in connection with stormwater controls, to connect or set in position stormwater controls to make them operational.

Land Disturbance Site or Site: The land or water area where land disturbance activities will occur and where stormwater controls will be installed and maintained. The land disturbance site includes construction support activities, which may be located at a different part of the property from where the primary land disturbance activity will take place or on a different piece of property altogether. Off-site borrow areas directly and exclusively related to the land disturbance activity are part of the site and must be permitted.

Larger Common Plan of Development or Sale: A continuous area where multiple separate and distinct construction activities are occurring under one plan, including any off-site borrow areas that are directly and exclusively related to the land disturbance activity. Off-site borrow areas utilized for multiple different land disturbance projects are considered their own entity and are not part of the larger common plan of development or sale. See definition of Common Promotional Plan to understand what a ‘common plan’ is.

Minimize: To reduce and/or eliminate to the extent achievable using stormwater controls that are technologically available and economically practicable and achievable in light of best industry practices.

Non-structural Best Management Practices (BMPs): Institutional, educational, or pollution prevention practices designed to limit the amount of stormwater runoff or pollutants that are generated in the landscape. Examples of non-structural BMPs include picking up trash and debris, sweeping up nearby sidewalks and streets, maintaining equipment, and training site staff on stormwater control practices.

Operational: for the purposes of this permit, stormwater controls are made “operational” when they have been installed and implemented, are functioning as designed, and are properly maintained.

Ordinary High Water Mark: The line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris.

Peripheral: For the purposes of this permit, peripheral should be defined as the outermost boundary of the area that will be disturbed.

Permanently: For the purposes of this permit, permanently is defined as any activity that has been ceased without any intentions of future disturbance.

Pollution Prevention Controls (or Measures): Stormwater controls designed to reduce or eliminate the addition of pollutants to construction site discharges through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Qualified Person (inspections): A person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

Stormwater Control (also referred to as sediment/erosion controls): refers to any temporary or permanent BMP or other method used to prevent or reduce the discharge of pollutants to waters of the state.

Structural BMP: Physical sediment/erosion controls working individually or as a group (treatment train) appropriate to the source, location, and area climate for the pollutant to be controlled. Examples of structural BMPs include silt fences, sedimentation ponds, erosion control blankets, and seeding.

Temporary Stabilization: A condition where exposed soils or disturbed areas are provided temporary vegetation and/or non-vegetative protective cover to prevent erosion and sediment loss. Temporary stabilization may include temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate erosion until either final stabilization can be achieved or until further construction activities take place to re-disturb this area.

Treatment Train: A multi-BMP approach to managing the stormwater volume and velocity and often includes erosion prevention and sediment control practices often applied when the use of a single BMP is inadequate in preventing the erosion and transport of sediment. A good option to utilize as a corrective action.

Volunteer Vegetation: A volunteer plant is a plant that grows on its own, rather than being deliberately planted for stabilization purposes. Volunteers often grow from seeds that float in on the wind, are dropped by birds, or are inadvertently mixed into soils. Commonly, volunteer vegetation is referred to as 'weeds'. This does not meet the requirements for final stabilization.

Waters of the State: Section 644.016.1(27) RSMo. defines waters of the state as, "All waters within the jurisdiction of this state, including all rivers, streams, lakes and other bodies of surface and subsurface water lying within or forming a part of the boundaries of the state which are not entirely confined and located completely upon lands owned, leased or otherwise controlled by a single person or by two or more persons jointly or as tenants in common."

## **PART I – BASIC PERMIT INFORMATION**

Facility Type: Industrial Stormwater; Land Disturbance  
Facility SIC Code(s): 1629  
Facility Description: Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, filling, and other activities that result in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state).

This permit establishes a Stormwater Pollution Prevention Plan (SWPPP) requirement for pollutants of concern from this type of facility or for all facilities and sites covered under this permit. 10 CSR 20-6.200(7) specifies "general permits shall contain BMP requirements and/or monitoring and reporting requirements to keep the stormwater from becoming contaminated".

Land disturbance activities include clearing, grubbing, excavating, grading, filling and other activities that result in the destruction of the root zone and/or other activities that are reasonably certain to cause pollution to waters of the state. A Missouri State Operating Permit for land disturbance permit is required for construction disturbance activities of one or more acres or for construction activities that disturb less than one acre when they are part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project.

The primary requirement of a land disturbance permit is the development of a SWPPP which incorporates site-specific BMPs to minimize soil exposure, soil erosion, and the discharge of pollutants. The SWPPP ensures the design, implementation, management, and maintenance of BMPs in order to prevent sediment and other pollutants from leaving the site.

When it precipitates, stormwater washes over the loose soil on a construction site and various other materials and products being stored outside. As stormwater flows over the site, it can pick up pollutants like sediment, debris, and chemicals from the loose soil and transport them to nearby storm sewer systems or directly into rivers, lakes, or coastal waters.

The Missouri Department of Natural Resources is responsible for ensuring that construction site operators have the proper stormwater controls in place so that construction can proceed in a way that protects your community's clean water and the surrounding environment. One way the department helps protect water quality is by issuing land disturbance permits.

Local conditions are not considered when developing conditions for a general permit. A facility may apply for a site-specific permit if they desire a review of site-specific conditions.

## **PART II – RECEIVING STREAM INFORMATION**

### **APPLICABLE DESIGNATIONS OF WATERS OF THE STATE:**

Per Missouri Effluent Regulations (10 CSR 20-7.015), the waters of the state are divided into seven (7) categories. This permit applies to facilities discharging to the following water body categories:

- ✓ Missouri or Mississippi River [10 CSR 20-7.015(2)]
- ✓ Lakes or Reservoirs [10 CSR 20-7.015(3)]
- ✓ Losing Streams [10 CSR 20-7.015(4)]
- ✓ Metropolitan No-Discharge Streams [10 CSR 20-7.015(5)]
- ✓ Special Streams [10 CSR 20-7.015(6)]
- ✓ Subsurface Waters [10 CSR 20-7.015(7)]
- ✓ All Other Waters [10 CSR 20-7.015(8)]

Missouri Water Quality Standards (10 CSR 20-7.031) defines the Clean Water Commission water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and/or 1<sup>st</sup> classified receiving stream's designated water uses shall be maintained in accordance with 10 CSR 20-7.031(24). A general permit does not take into consideration site-specific conditions.

### **MIXING CONSIDERATIONS:**

This permit applies to receiving streams of varying low flow conditions. Therefore, the effluent limitations must be based on the smallest low flow streams considered, which includes waters without designated uses. As such, no mixing is allowed [10 CSR 20-7.031(5)(A)4.B.(I)(a)]. No Zone of Initial Dilution is allowed. [10 CSR 20-7.031(5)(A)4.B.(I)(b)].

### **RECEIVING STREAM MONITORING REQUIREMENTS:**

There are no receiving water monitoring requirements recommended at this time.

## **PART III – RATIONALE AND DERIVATION OF EFFLUENT LIMITATIONS & PERMIT CONDITIONS**

### **305(B) REPORT, 303(d) LIST, & TOTAL MAXIMUM DAILY LOAD (TMDL):**

Section 305(b) of the Federal CWA requires each state identify waters not meeting Water Quality Standards and for which adequate water pollution controls have not been required. Water Quality Standards protect such beneficial uses of water as whole body contact, maintaining fish and other aquatic life, and providing drinking water for people, livestock, and wildlife. The 303(d) list helps state and federal agencies keep track of waters which are impaired but not addressed by normal water pollution control programs.

A TMDL is a calculation of the maximum amount of a given pollutant a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed which shall include the TMDL calculation. For facilities with an existing general permit before a TMDL is written on their receiving stream, the Department will evaluate the permit and may require any facility authorized by this general permit to apply for and obtain a site-specific operating permit.



**ANTI-BACKSLIDING:**

A provision in the Federal Regulations [CWA Section 303(d)(4); CWA Section 402(c); 40 CFR Part 122.44(I)] requires a reissued permit to be as stringent as the previous permit with some exceptions.

- ✓ Not Applicable: All effluent limitations in this permit are at least as protective as those previously established.

**ANTIDEGRADATION:**

Antidegradation policies ensure protection of water quality for a particular water body on a pollutant by pollutant basis to ensure Water Quality Standards are maintained to support beneficial uses such as fish and wildlife propagation and recreation on and in the water. This also includes special protection of waters designated as an Outstanding National Resource Water or Outstanding State Resource Water [10 CSR 20-7.031(3)(C)]. Antidegradation policies are adopted to minimize adverse effects on water.

The Department has determined the best avenue forward for implementing the Antidegradation requirements into general stormwater permits is by requiring the appropriate development and maintenance of a SWPPP. The SWPPP must identify all reasonable and effective BMPs, taking into account environmental impacts and costs. This analysis must document why no discharge or no exposure options are not feasible at the facility. This selection and documentation of appropriate control measures will then serve as the analysis of alternatives and fulfill the requirements of the Antidegradation Rule and Implementation Procedure 10 CSR 20-7.031(3) and 10 CSR 20-7.015(9)(A)5.

Any facility seeking coverage under this permit which undergoes expansion or discharges a new pollutant of concern must update their SWPPP and select reasonable and cost effective new BMPs. New facilities seeking coverage under this permit are required to develop a SWPPP including this analysis and documentation of appropriate BMPs. Renewal of coverage for a facility requires a review of the SWPPP to ensure the selected BMPs continue to be appropriate.

- ✓ Applicable; the facility must review and maintain stormwater BMPs as appropriate.

**BENCHMARKS:**

When a permitted feature or outfall consists of only stormwater, a benchmark may be implemented at the discretion of the permit writer. Benchmarks require the facility to monitor and, if necessary, replace and update stormwater control measures. Benchmark concentrations are not effluent limitations. A benchmark exceedance, therefore, is not a permit violation; however, failure to take corrective action is a violation of the permit. Benchmark monitoring data is used to determine the overall effectiveness of control measures and to assist the permittee in knowing when additional corrective actions may be necessary to comply with the limitations of the permit.

- ✓ Not applicable; this permit does not contain numeric benchmarks.

**BEST MANAGEMENT PRACTICES (BMPs):**

Minimum site-wide BMPs are established in this permit to ensure all permittees are managing their sites equally to protect waters of the state from certain activities which could cause negative effects in receiving water bodies. While not all sites require a SWPPP because the SIC codes are specifically exempted in 40 CFR 122.26(b)(14), these BMPs are not specifically included for stormwater purposes. These practices are minimum requirements for all industrial sites to protect waters of the state. If the minimum BMPs are not followed, the facility may violate general criteria [10 CSR 20-7.031(4)]. Statutes are applicable to all permitted facilities in the state; therefore, pollutants cannot be released unless in accordance with RSMo 644.011 and 644.016 (17).

**CHANGES IN DISCHARGES OF TOXIC POLLUTANT:**

This special condition reiterates the federal rules found in 40 CFR 122.44(f) and 122.42(a)(1). In these rules, the facility is required to report changes in amounts of toxic substances discharged. Toxic substances are defined in 40 CFR 122.2 as "...any pollutant listed as toxic under section 307(a)(1) or, in the case of "sludge use or disposal practices," any pollutant identified in regulations implementing section 405(d) of the CWA." Section 307 of the CWA then refers to those parameters found in 40 CFR 401.15.

The permittee should also consider any other toxic pollutant in the discharge as reportable under this condition.

**EFFLUENT LIMITATION GUIDELINE:**

Effluent Limitation Guidelines, or ELGs, are found at 40 CFR 400-499. These are limitations established by the EPA based on the SIC code and the type of work a facility is conducting. Most ELGs are for process wastewater and some address stormwater. All are technology based limitations which must be met by the applicable facility at all times.

- ✓ The industries covered under this permit have an associated Effluent Limit Guideline (ELG) which is applicable to the stormwater discharges in this permit and is applied under 40 CFR 125.3(a).

**ELECTRONIC DISCHARGE MONITORING REPORT (EDMR) SUBMISSION SYSTEM:**

The U.S. Environmental Protection Agency (EPA) promulgated a final rule on October 22, 2015, to modernize CWA reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. The final rule requires regulated entities and state and federal regulators to use information technology to electronically report data required by the National Pollutant Discharge Elimination System (NPDES) permit program instead of filing paper reports. To comply with the federal rule, the Department is requiring all permittees to begin submitting discharge monitoring data and reports online.

- ✓ Applicable; this permit requires quarterly reports.

**GENERAL CRITERIA CONSIDERATIONS:**

In accordance with 40 CFR 122.44(d)(1), effluent limitations shall be placed into permits for pollutants determined to cause, have reasonable potential to cause, or to contribute to, an excursion above any water quality standard, including narrative water quality criteria. In order to comply with this regulation, the permit writer has completed a reasonable potential determination on whether discharges have reasonable potential to cause or contribute to an excursion of the general criteria listed in 10 CSR 20-7.031(4). In instances where reasonable potential exists, the permit includes limitations within the permit to address the reasonable potential. In discharges where reasonable potential does not exist, the permit may include monitoring to later determine the discharge's potential to impact the narrative criteria. Additionally, RSMo 644.076.1, as well as Standard Permit Conditions Part VIII of this permit state it shall be unlawful for any person to cause or allow any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law or any standard, rule, or regulation promulgated by the commission.

**LAND APPLICATION:**

Land application, or surficial dispersion of wastewater and/or sludge, is performed by facilities to maintain a basin as no-discharge. Requirements for these types of operations are found in 10 CSR 20-6.015; authority to regulate these activities is from RSMo 644.026.

- ✓ Not applicable; this permit does not authorize operation of a surficial land application system to disperse wastewater or sludge.

**LAND DISTURBANCE:**

Land disturbance, sometimes called construction activities, are actions which cause disturbance of the root layer or soil; these include clearing, grading, and excavating of the land. 40 CFR 122.26(b)(14) and 10 CSR 20-6.200(3) requires permit coverage for these activities. Coverage is not required for facilities when only providing maintenance of original line and grade, hydraulic capacity, or to continue the original purpose of the facility.

- ✓ Applicable; this permit provides coverage for land disturbance activities. These activities have SWPPP requirements and may be combined with the standard site SWPPP. Land disturbance BMPs should be designed to control the expected peak discharges. The University of Missouri has design storm events for the 25 year 24 hour storm; these can be found at: [http://ag3.agebb.missouri.edu/design\\_storm/comparison\\_reports/20191117\\_25yr\\_24hr\\_comparison\\_able.htm](http://ag3.agebb.missouri.edu/design_storm/comparison_reports/20191117_25yr_24hr_comparison_able.htm); to calculate peak discharges, the website <https://www.lmnoeng.com/Hydrology/rational.php> has the rational equation to calculate expected discharge volume from the peak storm events.

**NUTRIENT MONITORING:**

Nutrient monitoring is required for facilities characteristically or expected to discharge nutrients (nitrogenous compounds and/or phosphorus) when the design flow is equal to or greater than 0.1 MGD per 10 CSR 20-7.015(9)(D)8.

- ✓ This is a stormwater only permit; therefore, it is not subject to provisions found in 10 CSR 20-7.015 per 10 CSR 20-7.015(1)(C).

**OIL/WATER SEPARATORS:**

Oil water separator (OWS) tank systems are frequently found at industrial sites where process water and stormwater may contain oils and greases, oily wastewaters, or other immiscible liquids requiring separation. Food industry discharges typically require pretreatment prior to discharge to municipally owned treatment works. Per 10 CSR 26-2.010(2)(B), all oil water separator tanks must be operated according to manufacturer's specifications and authorized in NPDES permits per 10 CSR 26-2.010(2) or may be regulated as a petroleum tank.

- ✓ Not applicable; this permit does not authorize the operation of OWS. The facility must obtain a separate permit to cover operation of and discharge from these devices.

**PERMIT SHIELD:**

The permit shield provision of the CWA (Section 402(k)) and Missouri Clean Water Law (644.051.16 RSMo) provides that when a permit holder is in compliance with its NPDES permit or MSOP, they are effectively in compliance with certain sections of the CWA and equivalent sections of the Missouri Clean Water Law. In general, the permit shield is a legal defense against certain enforcement actions but is only available when the facility is in compliance with its permit and satisfies other specific conditions, including having completely disclosed all discharges and all facility processes and activities to the Department at time of application. It is the facility's responsibility to ensure that all potential pollutants, waste streams, discharges, and activities, as well as wastewater land application, storage, and treatment areas, are all fully disclosed to the Department at the time of application or during the draft permit review process. Subsequent requests for authorization to discharge additional pollutants or expanded or newly disclosed flows, or for authorization for previously unpermitted and undisclosed activities or discharges, will likely require permit modification or may require the facility be covered under a site specific permit.

**PRETREATMENT PROGRAM:**

This permit does not regulate pretreatment requirements for facilities discharging to an accepting permitted wastewater treatment facility. If applicable, the receiving entity (the publicly owned treatment works - POTW) must ensure compliance with any effluent limitation guidelines for pretreatment listed in 40 CFR Subchapter N per 10 CSR 20-6.100. Pretreatment regulations per RSMo 644.016 are limitations on the introduction of pollutants or water contaminants into publicly owned treatment works or facilities.

- ✓ Not Applicable; the facilities covered under this permit are not required to meet pretreatment requirements under an ELG.

**PUBLIC NOTICE OF COVERAGE FOR AN INDIVIDUAL FACILITY:**

Public Notice of reissuance of coverage is not required unless the facility is a specific type of facility as defined in 10 CSR 20-6.200(1). The need for an individual public notification process shall be determined and identified in the permit [10 CSR 20-6.020(1)(C)5.].

- ✓ Not applicable; public notice is not required for coverage under this permit to individual facilities. The MGP is public noticed in lieu of individual permit PN requirements.

**REASONABLE POTENTIAL ANALYSIS (RPA):**

Federal regulation 40 CFR Part 122.44(d)(1)(i) requires effluent limitations for all pollutants which are or may be discharged at a level which will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard. In accordance with 40 CFR Part 122.44(d)(iii) if the permit writer determines any given pollutant has the reasonable potential to cause or contribute to an in-stream excursion above the water quality standard, the permit must contain effluent limits for the pollutant.

- ✓ The permit writer reviewed industry materials, available past inspections, and other documents and research to evaluate general and narrative water quality reasonable potential for this permit. Permit writers also use the Department's permit writer's manual, the EPA's permit writer's manual (<https://www.epa.gov/npdes/npdes-permit-writers-manual>), program policies, and best professional judgment. For each parameter in each permit, the permit writer carefully considers all applicable information regarding technology based effluent limitations, effluent limitation guidelines, and water quality standards. Best professional judgment is based on the experience of the permit writer, cohorts in the Department and resources at the EPA, research, and maintaining continuity of permits if necessary. For stormwater permits, the permit writer is required per 10 CSR 6.200(6)(B)2 to consider: A. application and other information supplied by the permittee; B. effluent guidelines; C. best professional judgment of the permit writer; D. water quality; and E. BMPs.

#### **SCHEDULE OF COMPLIANCE (SOC):**

Per § 644.051, RSMo, a permit may be issued with a Schedule of Compliance (SOC) to provide time for a facility to come into compliance with new state or federal effluent regulations, water quality standards, or other requirements. Such a schedule is not allowed if the facility is already in compliance with the new requirement or if prohibited by other statute or regulation. An SOC includes an enforceable sequence of interim requirements (e.g. actions, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit. *See also* Section 502(17) of the CWA, and 40 CFR 122.2. For new effluent limitations, the permit may include interim monitoring for the specific parameter to demonstrate the facility is not already in compliance with the new requirement. Per 40 CFR 122.47(a)(1) and 10 CSR 20-7.031(11), compliance must occur as soon as possible. If the permit provides a schedule for meeting new water quality based effluent limits, an SOC must include an enforceable, final effluent limitation in the permit even if the SOC extends beyond the life of the permit.

- ✓ Not Applicable: This permit does not contain a SOC.

#### **SETBACKS:**

Setbacks, sometimes called separation distances, are common elements of permits and are established to provide a margin of safety in order to protect the receiving water and other features from accidents, spills, unusual events, etc. Specific separation distances are included in 10 CSR 20-8 for minimum design standards of wastewater structures. While wastewater is considered separately from stormwater under this permit, the guides and Chapter 8 distances may remain relevant to requirements under this permit if deemed appropriate by the permittee.

- ✓ Discharge to the watersheds of a Metropolitan No-Discharge Stream (10 CSR 20-7.031 Table F) is authorized by this permit if the discharges are in compliance with 10 CSR 20-7.015(5) and 10 CSR 20-7.031(7). Discharges to these watersheds are authorized for uncontaminated stormwater discharges only.
- ✓ This permit authorizes stormwater discharges which are located in a way to allow water to be released into sinkholes, caves, fissures, or other openings in the ground which could drain into aquifers (except losing streams) per 10 CSR 20-7.015(7). It is the best professional judgment of the permit writer to allow discharges to losing streams as the effluent is stormwater only.
- ✓ This permit authorizes stormwater discharge in the watersheds of Outstanding state Resource Waters (OSRW); Outstanding National Resources Waters (ONRW), which includes the Ozark National Riverways and the National Wild and Scenic Rivers System; and impaired waters as designated in the 305(b) Report provided no degradation of water quality occurs in the OSRW and ONRW due to discharges from the permitted facility per 10 CSR 20-7.015(6)(B) and 10 CSR 20-7.031(3)(C). Additionally, if the facility is found to be causing degradation or contributing to an impairment by discharging a pollutant of concern during an inspection or through complaint investigations, they will be required to become a no discharge facility or obtain a site specific permit with more stringent monitoring and SWPPP requirements. Missouri's impaired waters can be found at <https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/impaired-waters>. Sites within 1000 feet of a OSRW, ONRW, or water impaired for sediment must operate as a no-discharge facility. These additional protections are borrowed from the USEPA 2021 draft Construction General Permit.

**SLUDGE – DOMESTIC BIOSOLIDS:**

Biosolids are solid materials resulting from domestic wastewater treatment meeting federal and state criteria for beneficial use (i.e. fertilizer). Sewage sludge is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works; including, but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works.

- ✓ This permit does not authorize discharge or land application of biosolids. Sludge/biosolids is not generated by this industry.

**SLUDGE – INDUSTRIAL:**

Industrial sludge is solid, semi-solid, or liquid residue generated during the treatment of industrial process wastewater in a treatment works; including, but not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment process; scum and solids filtered from water supplies and backwashed; and a material derived from industrial sludge.

- ✓ Not applicable; sludge is not generated by this industry.

**SPILL REPORTING:**

Any emergency involving a hazardous substance must be reported to the Department's 24 hour Environmental Emergency Response hotline at (573) 634-2436 at the earliest practicable moment after discovery. The Department may require the submittal of a written report detailing measures taken to clean up a spill. These reporting requirements apply when the spill results in chemicals or materials leaving the permitted property or reaching waters of the state. This requirement is in addition to the noncompliance reporting requirement found in Standard Conditions Part I. <https://dnr.mo.gov/waste-recycling/investigations-cleanups/environmental-emergency-response>.

Underground and above ground storage devices for petroleum products, vegetable oils, and animal fats may be subject to control under federal Spill Prevention, Control, and Countermeasure Regulation and are expected to be managed under those provisions, if applicable. Substances regulated by federal law under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) which are transported, stored, or used for maintenance, cleaning or repair shall be managed according to the provisions of RCRA and CERCLA.

**STORMWATER POLLUTION PREVENTION PLAN (SWPPP):**

In accordance with 40 CFR 122.44(k), BMPs must be used to control or abate the discharge of pollutants when: 1) Authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities; 2) Authorized under section 402(p) of the CWA for the control of stormwater discharges; 3) Numeric effluent limitations are infeasible; or 4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA. In accordance with the EPA's *Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites*, (Document number EPA 833-R-06-004) published by the EPA in 2007 [https://www.epa.gov/sites/production/files/2015-10/documents/sw\\_swppp\\_guide.pdf](https://www.epa.gov/sites/production/files/2015-10/documents/sw_swppp_guide.pdf), BMPs are measures or practices used to reduce the amount of pollution entering waters of the state from a permitted facility. BMPs may take the form of a process, activity, or physical structure. Additionally, in accordance with the Stormwater Management, a SWPPP is a series of steps and activities to 1) identify sources of pollution or contamination, and 2) select and carry out actions which prevent or control the pollution of storm water discharges. Additional information can be found in *Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006; September 1992).

A SWPPP must be prepared if the SIC code for the facility is found in 40 CFR 122.26(b)(14) and/or 10 CSR 20-6.200(2). A SWPPP may be required of other facilities where stormwater has been identified as necessitating better management.

The purpose of a SWPPP is to comply with all applicable stormwater regulations by creating an adaptive management plan to control and mitigate stream pollution from stormwater runoff. Developing a SWPPP provides opportunities to employ appropriate BMPs to minimize the risk of pollutants being discharged during storm events. The following paragraph outlines the general steps the permittee should take to determine which BMPs will work to achieve the benchmark values or limits in the permit. This section is not intended to be all encompassing or restrict the use of any physical BMP or operational and maintenance procedure assisting in pollution control. Additional steps or revisions to the SWPPP may be required to meet the requirements of the permit.

Areas which should be included in the SWPPP are identified in 40 CFR 122.26(b)(14). Once the potential sources of stormwater pollution have been identified, a plan should be formulated to best control the amount of pollutant being released and discharged by each activity or source. This should include, but is not limited to, minimizing exposure to stormwater, good housekeeping measures, proper facility and equipment maintenance, spill prevention and response, vehicle traffic control, and proper materials handling. Once a plan has been developed, the facility will employ the control measures determined to be adequate to prevent pollution from entering waters of the state. The facility will conduct inspections of the BMPs to ensure they are working properly and re-evaluate any BMP not achieving compliance with permitting requirements. For example if the BMP being employed is deficient in controlling stormwater pollution, corrective action should be taken to repair, improve, or replace the failing BMP. If failures do occur, continue this trial and error process until appropriate BMPs have been established.

The EPA has developed factsheets on the pollutants of concern for specific industries along with the BMPs to control and minimize stormwater (<https://www.epa.gov/npdes/stormwater-discharges-industrial-activities>). Along with EPA's factsheets, the International Stormwater BMP database (<https://bmpdatabase.org/>) may provide guidance on BMPs appropriate for specific industries.

For new, altered, or expanded stormwater discharges, the SWPPP shall identify reasonable and effective BMPs while accounting for environmental impacts of varying control methods. The antidegradation analysis must document why no discharge or no exposure options are not feasible. The selection and documentation of appropriate control measures shall serve as an alternative analysis of technology and fulfill the requirements of antidegradation [10 CSR 20-7.031(3)].

Alternative analysis evaluation of the BMPs is a structured evaluation of BMPs which are reasonable and cost effective. The alternative analysis evaluation should include practices designed to be: 1) non-degrading; 2) less degrading; or 3) degrading water quality. The glossary of the *Antidegradation Implementation Procedure* defines these three terms. The chosen BMP will be the most reasonable and effective management strategy while ensuring the highest statutory and regulatory requirements are achieved and the highest quality water attainable for the facility is discharged. The alternative analysis evaluation must demonstrate why "no discharge" or "no exposure" is not a feasible alternative at the facility. This structured analysis of BMPs serves as the antidegradation review, fulfilling the requirements of 10 CSR 20-7.031(3) Water Quality Standards and *Antidegradation Implementation Procedure*, Section II.B.

- ✓ Applicable: A SWPPP shall be developed and implemented for each site and shall incorporate required practices identified by the Department with jurisdiction, incorporate control practices specific to site conditions, and provide for maintenance and adherence to the plan.

#### **UNDERGROUND INJECTION CONTROL (UIC):**

The UIC program for all classes of wells in the State of Missouri is administered by the Missouri Department of Natural Resources and approved by EPA pursuant to section 1422 and 1425 of the Safe Drinking Water Act (SDWA) and 40 CFR 147 Subpart AA. Injection wells are classified based on the liquids which are being injected. Class I wells are hazardous waste wells which are banned by RSMo 577.155; Class II wells are established for oil and natural gas production; Class III wells are used to inject fluids to extract minerals; Class IV wells are also banned by Missouri in RSMo 577.155; Class V wells are shallow injection wells; some examples are heat pump wells and groundwater remediation wells. Domestic wastewater being disposed of sub-surface is also considered a Class V well.

In accordance with 40 CFR 144.82, construction, operation, maintenance, conversion, plugging, or closure of injection wells shall not cause movement of fluids containing any contaminant into Underground Sources of Drinking Water (USDW) if the presence of any contaminant may cause a violation of drinking water standards or groundwater standards under 10 CSR 20-7.031 or other health-based standards or may otherwise adversely affect human health. If the Department finds the injection activity may endanger USDWs, the Department may require closure of the injection wells or other actions listed in 40 CFR 144.12(c), (d), or (e). In accordance with 40 CFR 144.26, the permittee shall submit a Class V Well Inventory Form for each active or new underground injection well drilled, or when the status of a well changes, to the Missouri Department of Natural Resources, Geological Survey Program, P.O. Box 250, Rolla, Missouri 65402. Single family residential septic systems and non-residential septic systems used solely for sanitary waste and having the capacity to serve fewer than 20 persons a day are excluded from the UIC requirements (40 CFR 144.81(9)).

- ✓ Not applicable; this permit does not authorize subsurface wastewater systems or other underground injection. These activities must be assessed under an application for a site specific permit. Certain discharges of stormwater into sinkholes may qualify as UIC. It is important the permittee evaluate all stormwater basins, even those holding water; as sinkholes have varying seepage rates. This permit does not allow stormwater discharges into sinkholes. The facility must ensure sinkholes are avoided in the construction process. The State's online mapping resource <https://modnr.maps.arcgis.com/apps/webappviewer/index.html?id=87ebef4af15d438ca658ce0b2bbc862e> has a sinkhole layer.

**VARIANCE:**

Per the Missouri Clean Water Law Section 644.061.4, variances shall be granted for such period of time and under such terms and conditions as shall be specified by the commission in its order. The variance may be extended by affirmative action of the commission. In no event shall the variance be granted for a period of time greater than is reasonably necessary for complying with the Missouri Clean Water Law Section 644.006 to 644.141 or any standard, rule, or regulation promulgated pursuant to Missouri Clean Water Law Section 644.006 to 644.141.

- ✓ Not Applicable: This permit is not drafted under premises of a petition for variance.

**WASTELOAD ALLOCATIONS (WLA) FOR LIMITATIONS:**

Per 10 CSR 20-2.010(78), the amount of pollutant each discharger is allowed by the Department to release into a given stream after the Department has determined total amount of pollutant which may be discharged into the stream without endangering its water quality. Water quality based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's Technical Support Document For Water Quality-based Toxics Control (TSD) (EPA/505/2-90-001).

- ✓ Not applicable; water quality limitations were not applied in this permit.

**WATER QUALITY STANDARDS:**

Per 10 CSR 20-7.031(4), General Criteria shall be applicable to all waters of the state at all times, including mixing zones. Additionally, 40 CFR 122.44(d)(1) directs the Department to include in each NPDES permit conditions to achieve water quality established under Section 303 of the CWA, including state narrative criteria for water quality.

**WHOLE EFFLUENT TOXICITY (WET) TEST:**

Per 10 CSR 20-7.031(1)(FF), a toxicity test conducted under specified laboratory conditions on specific indicator organism; and per 40 CFR 122.2, the aggregate toxic effect of an effluent measured directly by a toxicity test. A WET test is a quantifiable method of determining if a discharge from a facility may be causing toxicity to aquatic life by itself, in combination with, or through synergistic responses when mixed with receiving water.

- ✓ Not applicable: At this time, permittees are not required to conduct a WET test. This permit is for stormwater only.

## **PART IV – EFFLUENT LIMITATIONS DETERMINATION**

### **EPA Construction General Permit (CGP)**

The CGP was used to research and support best professional judgment decisions made in establishing technology-based conditions for this general permit which are consistent with national standards. The permit writer determined the standards established by the CGP are achievable and consistent with federal regulations. Additionally, the conditions reflecting the best practicable technology currently available are utilized to implement the ELG.

In this general permit, technology-based effluent conditions are established through the SWPPP and BMP requirements. Effective BMPs should be designed on a site-specific basis. The implementation of inspections provides a tool for each facility to evaluate the effectiveness of BMPs to ensure protection of water quality. Any flow through an outfall is considered a discharge. Future permit action due to permit modification may contain new operating permit terms and conditions which supersede the terms and conditions, including effluent limitations, of this operating permit.

## **PART V–REPORTING REQUIREMENTS**

### **SAMPLING:**

The permittee is not required to sample stormwater under this permit. The Department may require sampling and reporting as a result of illegal discharges, compliance issues related to water quality concerns or BMP effectiveness, or evidence of off-site impacts from activities at the facility. If such an action is needed, the Department will specify in writing the sampling requirements, including such information as location and extent. If the permittee refuses to perform sampling when required, the Department may terminate the general permit and require the facility to obtain a site-specific permit with sampling requirements.

### **REPORTING:**

There are quarterly reporting requirements for MO-R100xxx land disturbance permits. Project specific information is required to be report to the Department through the eDMR system.

## **PART VI – RAINFALL VALUES FOR MISSOURI & SURFACE WATER BUFFER ZONES**

Knowledge of the 2-year, 24-hour storm event is used in this permit for two main reasons:

- 1) The design, installation, and maintenance of effective erosion and sediment controls to minimize the discharge of pollutants.
- 2) If the seven-day inspection frequency is utilized, an inspection must occur within 48 hours after any storm event equal to or greater than a 2-year, 24 hour storm has ceased.

For site-specific 2-year, 24-hour storm event information utilize the National Oceanic and Atmospheric Administration’s National Weather Service Atlas 14 (NOAA Atlas 14) which is located at [https://hdsc.nws.noaa.gov/hdsc/pfds/pfds\\_map\\_cont.html](https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html). For more information visit; [https://www.weather.gov/media/owp/oh/hdsc/docs/Atlas14\\_Volume8.pdf](https://www.weather.gov/media/owp/oh/hdsc/docs/Atlas14_Volume8.pdf).

**Surface Water Buffer Zones:** In order to design controls that match the sediment removal efficiency of a 50-foot buffer, you first need to know what this efficiency is for your site. The sediment removal efficiencies of natural buffers vary according to a number of site-specific factors, including precipitation, soil type, land cover, slope length, width, steepness, and the types of erosion and sediment controls used to reduce the discharge of sediment prior to the buffer. For additional information;

[https://www.epa.gov/sites/default/files/2017-02/documents/2017\\_cgp\\_final\\_appendix\\_g\\_-\\_buffer\\_reqs\\_508.pdf](https://www.epa.gov/sites/default/files/2017-02/documents/2017_cgp_final_appendix_g_-_buffer_reqs_508.pdf)



## **PART VII – ADMINISTRATIVE REQUIREMENTS**

On the basis of preliminary staff review and applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the permit. The proposed determinations are tentative pending public comment.

### **PUBLIC MEETING:**

The department hosted three public meetings for this permit. The meetings were held on January 27, February 17, and March 9, 2021.

### **PUBLIC NOTICE:**

The Department shall give public notice when a draft permit has been prepared and its issuance is pending. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest or because of water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and facility must be notified of the denial in writing.

The Department must give public notice of a pending permit or of a new or reissued Missouri State Operating Permit. The public comment period is a length of time not less than thirty (30) days following the date of the public notice, during which interested persons may submit written comments about the proposed permit.

For persons wanting to submit comments regarding this proposed permit, please refer to the Public Notice page located at the front of this draft permit. The Public Notice page gives direction on how and where to submit appropriate comments.

- ✓ The Public Notice period for this permit is started March 25, 2022 and ended April 25, 2022. Two comment letters were received.

**DATE OF FACT SHEET:** 03/2/2022

### **COMPLETED BY:**

**SARAH WRIGHT**

**MS4 & LAND DISTURBANCE PERMITTING COORDINATOR**

**MISSOURI DEPARTMENT OF NATURAL RESOURCES**

**WATER PROTECTION PROGRAM**

**OPERATING PERMITS SECTION - STORMWATER AND CERTIFICATION UNIT**

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