

# PROJECT MANUAL

*Renovate Campground Full Hook-Up Sites  
Roaring River State Park  
Cassville, Missouri*

Designed By: Allgeier Martin & Associates  
7231 East 24th Street  
Joplin, MO 64804

Date Issued: September 22, 2023

Project No.: X2205-01

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:** (X2205-01 )

**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:**

**CIVIL ENGINEER OF RECORD**  
**Allgeier, Martin and Associates, Inc.**  
**Divisions 02, 03, 05, 12, 31, 32, and 33**



**ELECTRICAL ENGINEER OF RECORD**  
**Allgeier, Martin and Associates, Inc.**  
**Division 26**



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### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section provides a comprehensive list of the drawings that comprise the bid documents for this project:

### PART 2 - 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	G-001	09/22/2023	G-001
2.	Site Plan	L-100	09/22/2023	Design
3.	Existing Site & Demolition Plan	C-101	09/22/2023	Design
4.	Proposed Site & Grading Plan	C-102 & C-103	09/22/2023	Design
5.	Roadway Plan & Profile	C-104 & C-105	09/22/2023	Design
6.	Proposed Sewer & Water Plan	C-106 & C-107	09/22/2023	Design
7.	Proposed Sewer Line Profiles	C-108	09/22/2023	Design
8.	Proposed Staking Plan	C-109 & C-110	09/22/2023	Design
9.	Proposed Staking Table	C-111	09/22/2023	Design
10.	Standard Campsite Details	C-500 & C-501	09/22/2023	C-500-E-201
11.	Standard Construction Details	C-502 & C-503	09/22/2023	C-500-E-201
12.	Erosion Control Plan	C-601	09/22/2023	Design
13.	Proposed Electrical Plan	E-101 & E-102	09/22/2023	Design
14.	Electrical Details	E-201	09/22/2023	C-500-E-201

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. Renovate Campground Full Hook-Up Sites  
Roaring River State Park  
Cassville, Missouri  
**Project No.: X2205-01**

### 3.0 BIDS WILL BE RECEIVED:

- A. Until: 1:30 PM, Thursday, December 21, 2023
- 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 includes the renovation of Campground 3 at Roaring River State Park to provide full hook-up campsites consisting of water, sewer, and electric connections.
- B. MBE/WBE/SDVE Goals: MBE 10%, WBE 10%, and SDVE 3%. **NOTE: Only MBE/WBE firms certified by the State of Missouri Office of Equal Opportunity as of the date of bid opening, or SDVE(s) meeting the requirements of Section 34.074, RSMo and 1 CSR 30-5.010, can be used to satisfy the MBE/WBE/SDVE participation goals for this project.**

### 5.0 PRE-BID MEETING:

- A. Place/Time: 10:00 AM, Monday, December 4, 2023, at Roaring River State Park Office, 12716 Farm Road 2239, Cassville, MO.
- B. Access to State of Missouri property requires presentation of a photo ID by all persons.

### 6.0 HOW TO GET PLANS & SPECIFICATIONS:

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

### 7.0 POINT OF CONTACT:

- A. Designer: Allgeier, Martin & Associates, Inc., Michael Keaton, (417) 680-77325, email: [michael.keaton@amce.com](mailto:michael.keaton@amce.com)
- B. Project Manager: Sandra Walther, (573) 751-2283, email: [sandra.walther@oa.mo.gov](mailto:sandra.walther@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.

## 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://missouribuys.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."
  10. Ensure receipt of notifications including current e-mail address are enabled within vendor profile.
- D. Any time a bidder wants to modify the bid, he or she will have to retract, make revisions, and then submit again. Please ensure that "draft" status is not shown. 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 Office of Administration Division of Accounting at 573-751-2971 and ask for the MissouriBUYS vendor team.

## IMPORTANT REMINDER REGARDING REQUIREMENT FOR OEO CERTIFICATION

A. SECTION 002113 – INSTRUCTIONS TO  
BIDDERS: Article 15.0, Section D1:

**As of July 1, 2020**, all MBE, WBE, and MBE/WBE contractors, subcontractors, and suppliers must be certified by the State of Missouri, Office of Equal Opportunity. No certifications from other Missouri certifying agencies will be accepted.



## **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 signator is other than the corporate president or vice president, the bidder must provide satisfactory evidence that the signator 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 an 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://oa.mo.gov/sites/default/files/sdvelisting.pdf>) or the Department of Veterans Affairs' directory (<https://vetbiz.va.gov/basic-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://o eo .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, on behalf of the Department of Natural Resources, Division of State Parks.

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:**                    **Renovate Campground Full Hook-Up Sites  
Roaring River State Park  
Cassville, Missouri**

**Project Number:**            **X2205-01**

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 **130 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: \$

Alternate No. 1: \$

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

**UNIT PRICES:** The Owner accepts the following Unit Prices:

For changing specified quantities of work from those indicated by the contract drawings and specifications, upon written instructions of Owner, the following unit prices shall prevail. The unit prices include all labor, overhead and profit, materials, equipment, appliances, bailing, shoring, shoring removal, etc., to cover the finished work of the several kinds of work called for. Only a single unit price shall be given and it shall apply for either MORE or LESS work than that shown on the drawings and called for in the specifications or included in the Base Bid. In the event of more or less units than so indicated or included, change orders may be issued for the increased or decreased amount.

**ARTICLE 5. PREVAILING WAGE RATE**

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

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

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

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

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

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

Total \$

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

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

## **ARTICLE 7. CONTRACT DOCUMENTS**

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

1. Division 0 – Procurement and Contracting Information, including, but not limited to:
  - a. Invitation for Bid (Section 001116)
  - b. Instructions to Bidders (Section 002113)
  - c. Supplementary Instructions to Bidders (if applicable) (Section 002213)
  - d. The following documents as completed and executed by the Contractor and accepted by the Owner, if applicable:
    - i. Bid Form (Section 004113)
    - ii. Unit Prices (Section 004322)
    - iii. Proposed Contractors Form (Section 004336)
    - iv. MBE, WBE, SDVE Compliance Evaluation Form(s) (Section 004337)
    - v. MBE, WBE, SDVE Eligibility Determination Form for Joint Ventures (Section 004338)
    - vi. MBE, WBE, SDVE Good Faith Effort (GFE) Determination Form (Section 004339)
    - vii. Missouri Service Disabled Veteran Business Form (Section 004340)
    - viii. Affidavit of Work Authorization (Section 004541)
    - 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	STATE OF	COUNTY (OR CITY OF ST. LOUIS)	USE RUBBER STAMP IN CLEAR AREA BELOW
	SUBSCRIBED AND SWORN BEFORE ME, THIS		
	DAY OF	YEAR	
	NOTARY PUBLIC SIGNATURE	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	\$	\$	



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

**USE RUBBER STAMP IN CLEAR AREA BELOW**

NOTARY PUBLIC SIGNATURE

MY COMMISSION EXPIRES

NOTARY PUBLIC NAME (TYPED OR PRINTED)

# GENERAL CONDITIONS

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- 1.5. Anti-Kickback
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## SECTION 007213 - GENERAL CONDITIONS

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

## ARTICLE 1 – GENERAL PROVISIONS

### ARTICLE 1.1 - DEFINITIONS

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

1. **"COMMISSIONER"**: The Commissioner of the Office of Administration.
2. **"CONSTRUCTION DOCUMENTS"**: The "Construction Documents" shall consist of the Project Manual, Drawings and Addenda.
3. **"CONSTRUCTION REPRESENTATIVE"**: Whenever the term "Construction Representative" is used, it shall mean the Owner's Representative at the work site.
4. **"CONTRACTOR"**: Party or parties who have entered into a contract with the Owner to furnish work under these specifications and drawings.
5. **"DESIGNER"**: When the term "Designer" is used herein, it shall refer to the Architect, Engineer, or Consultant of Record specified and defined in Paragraph 2.0 of the Supplemental Conditions, or his duly authorized representative. The Designer may be either a consultant or state employee.
6. **"DIRECTOR"**: Whenever the term "Director" is used, it shall mean the Director of the Division of Facilities Management, Design and Construction or his Designee, representing the Office of Administration, State of Missouri. The Director is the agent of the Owner.
7. **"DIVISION"**: Shall mean the Division of Facilities Management, Design and Construction, State of Missouri.

8. **"INCIDENTAL JOB BURDENS"**: Shall mean those expenses relating to the cost of work, incurred either in the home office or on the job-site, which are necessary in the course of doing business but are incidental to the job. Such costs include office supplies and equipment, postage, courier services, telephone expenses including long distance, water and ice and other similar expenses.
9. **"JOINT VENTURE"**: An association of two (2) or more businesses to carry out a single business enterprise for profit for which purpose they combine their property, capital, efforts, skills and knowledge.
10. **"OWNER"**: Whenever the term "Owner" is used, it shall mean the State of Missouri, acting by and through the Office of Administration, Division of Facilities Management, Design and Construction.
11. **"PROJECT"**: Wherever the term "Project" is used, it shall mean the work required to be completed by the construction contract.
12. **"PROJECT MANUAL"**: The "Project Manual" shall consist of Introductory Information, Invitation for Bid, Instructions to Bidders, Bid Documents, Additional Information, Standard Forms, General Conditions, Supplemental General Conditions, General Requirements and Technical Specifications.
13. **"SUBCONTRACTOR"**: Party or parties who contract under, or for the performance of part or this entire Contract between the Owner and Contractor. The subcontract may or may not be direct with the Contractor.
14. **"WORK"**: All supervision, labor, materials, 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:

Michael Keaton  
Allgeier Martin & Associates  
7231 East 24th Street  
Joplin, MO 64804  
Telephone: 417-680-7200  
Email: [michael.keaton@amce.com](mailto:michael.keaton@amce.com)

Construction Representative:

Don Wagner  
Division of Facilities Management, Design and Construction  
Landers State Office Building  
149 Park Central Square Rm 328B  
Springfield, MO 65806  
Telephone: 417-895-5001  
Email: [don.wagner@oa.mo.gov](mailto:don.wagner@oa.mo.gov)

Project Manager:

Sandra Walther  
Division of Facilities Management, Design and Construction  
301 West High Street, Room 730  
Jefferson City, Missouri 65101  
Telephone: 573-751-2283  
Email: [sandra.walther@oa.mo.gov](mailto:sandra.walther@oa.mo.gov)

Contract Specialist:

Paul Girouard  
Division of Facilities Management, Design and Construction  
301 West High Street, Room 730  
Jefferson City, Missouri 65102  
Telephone: (573) 751-4797  
Email: [Paul.Girouard@oa.mo.gov](mailto:Paul.Girouard@oa.mo.gov)

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

### 4.0 FURNISHING CONSTRUCTION DOCUMENTS:

- A. The Owner will furnish the Contractor with approximately 6 complete sets of drawings and specifications at no charge.
- B. The Owner will furnish the Contractor with approximately 6 sets of explanatory or change drawings at no charge.
- C. The Contractor may make copies of the documents as needed with no additional cost to the Owner.

### 5.0 SAFETY REQUIREMENTS

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

# Missouri

## Division of Labor Standards

### WAGE AND HOUR SECTION



MICHAEL L. PARSON, Governor

# Annual Wage Order No. 30

Section 005  
**BARRY 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 10, 2023**

Last Date Objections May Be Filed: **April 10, 2023**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	\$25.24*
Boilermaker	\$25.24*
Bricklayer	\$25.24*
Carpenter	\$46.73
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	\$25.24*
Plasterer	
Communications Technician	\$25.24*
Electrician (Inside Wireman)	\$51.08
Electrician Outside Lineman	\$25.24*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	\$25.24*
Glazier	\$25.24*
Ironworker	\$59.80
Laborer	\$25.24*
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	\$25.24*
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	\$25.24*
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	\$25.24*
Plumber	\$25.24*
Pipe Fitter	
Roofer	\$41.14
Sheet Metal Worker	\$25.24*
Sprinkler Fitter	\$25.24*
Truck Driver	\$25.24*
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  
BARRY County

Section 005

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	\$25.24*
Millwright	
Pile Driver	
Electrician (Outside Lineman)	\$25.24*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	\$43.14
General Laborer	
Skilled Laborer	
Operating Engineer	\$50.70
Group I	
Group II	
Group III	
Group IV	
Truck Driver	\$25.24*
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 the renovation of Campground 3 at Roaring River State Park to provide full hook-up campsites consisting of water, sewer, and electric connections.
  - 1. Project Location: The project is located at Roaring River State Park, 12716 Farm Rd. 2239, Cassville, MO 65625.
  - 2. Owner: State of Missouri, Office of Administration, Division of Facilities Management, Design and Construction, Harry S Truman State Office Building, Post Office Box 809, 301 West High Street, Jefferson City, Missouri 65102.
- B. Contract Documents, dated September 22, 2023 were prepared for the Project by Allgeier, Martin and Associates, Inc., 7231 East 24<sup>th</sup> St. Joplin, MO 64804.
- C. The Work consists of renovating an existing campground located on approximately 7.5 acres.
  - 1. The Work includes:
    - Clearing and Grubbing
    - Earthwork associated with bringing the site to grade.
    - Temporary Erosion Control
    - Concrete Pavements for Campsites
    - Asphalt Pavement for Roadway
    - Gravity Sewer and Appurtenance Installation
    - Waterline and Appurtenance Installation
    - Electrical Construction
    - Installation of Site Amenities (Campfire Rings, Assembled Picnic Tables, Marker Posts, Lantern Posts)
- D. The Work will be constructed under a single prime contract.

#### 1.3 WORK SEQUENCE

- A. The Work will be conducted in one phase.

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

## 1.5 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.

## 1.6 OWNER-FURNISHED PRODUCTS

- A. The Owner will furnish grass seed, assembled picnic tables, lantern posts, and fire rings. All items are to be contractor installed. The Work includes providing support systems to receive Owner's equipment, and mechanical and electrical connections.
  1. The Owner will arrange for and deliver necessary shop drawings, product data, and samples to the Contractor.
  2. The Owner will arrange and pay for delivery of Owner-furnished items according to the contractor's Construction Schedule.
  3. The Contractor is responsible for receiving, unloading and handling Owner furnished items at the site.
  4. Following delivery, the Contractor will inspect items delivered for damage. The Contractor shall not accept damaged items and shall notify the Owner of rejection of damaged items.
  5. If Owner-furnished items are damaged, defective, or missing, the Owner will arrange for replacement.
  6. The Owner will arrange for manufacturer's field services and for the delivery of manufacturer's warranties to the appropriate Contractor.
  7. The Contractor shall designate delivery dates of Owner-furnished items in the Contractor's Construction Schedule.
  8. The Contractor shall review shop drawings, product data and samples and return them to the Designer noting discrepancies or problems anticipated in use of the project.



9. The Contractor is responsible for protecting Owner-furnished items from damage, including damage from exposure to the elements. The Contractor shall repair or replace items damaged as a result of his operations.

#### 1.7 CONSTRUCTION PROCEDURES

- A. Construction procedures shall be determined by the Contractor. Where the Work is on or adjacent to existing facilities, the Contractor shall exercise caution and schedule operation to ensure that functioning of present facilities will not be endangered.

#### 1.8 UNDERGROUND OBSTRUCTIONS

- A. Underground obstructions known to the Owner are indicated on the Contract Drawings. Contractor shall notify owning utilities of his approach to any of their facilities and conform to their requirements.
- B. Contractor shall perform exploratory operations as necessary to verify the location, elevation, and dimensions of all known or suspected underground obstructions ahead of any work affected thereby, and shall use care to avoid damage to them.

#### 1.9 PERMITS

- A. The Contractor is responsible for obtaining all permits necessary to complete the contracted work, except the National Pollutant Discharge Permit (NPDES). The Contractor is responsible for compliance with the NPDES permit.

#### 1.10 LAYOUT AND STAKING

- A. From the control points and benchmarks contained in the Drawings, Contractor shall complete the layout of the work and shall be responsible for all measurements that may be required for execution of the Work to the location and limit marks indicated.
- B. Contractor shall submit one copy of all construction survey notes and data to the Owner's Representative upon request.
- C. To the extent practicable, Contractor shall maintain all slope and cut stakes in excavation areas until the adjacent excavation has reached final grade or subgrade.
- D. When so requested by the Resident Project Representative, the Contractor shall furnish one laborer to assist the Resident Project Representative in spot checking of the construction layout and grades.
- E. A staking plan has been provided on the plans in addition to the grading plan. In the event of a discrepancy between the two plans, the grading plan shall govern.

#### 1.11 PROTECTION OF EXISTING PROPERTY

- A. Contractor shall provide for the safety and protection of existing property as set forth in the General Conditions. Any damage to existing facilities resulting from construction operations shall be reported immediately to the owners thereof and promptly repaired by the Contractor.
- B. Parties having jurisdiction over operating streets and utilities in the work area shall be contacted a minimum of one week prior to cutting streets or other traffic areas or excavating near underground utilities or pole lines. CALL DIG-RITE BEFORE WORK BEGINS AT 1-800-DIG-RITE.

- C. Where fences are to be breached on private property, the owners thereof shall be contacted and arrangements made to ensure proper protection of any livestock or other property thus exposed.
- D. All gates must be closed and locked after each entry and exit unless approval is obtained from the Owner's Representative to do otherwise.
- E. The applicable requirements specified for protection of the Work shall also apply to the protection of existing property.
- F. Before acceptance of the Work by the Owner, Contractor shall restore all property affected by his operations to the original or better condition.

#### 1.12 PROTECTION OF THE WORK

- A. Contractor shall provide for the safety and protection of the Work as set forth in the General Conditions
- B. Owner's Representative and Resident Project Representative shall be notified immediately at any time operations are stopped due to conditions which make it impossible to continue operations safely or to obtain proper results.

#### 1.13 MAINTENANCE AND USE OF ROADWAYS

- A. Contractor shall make adequate provisions to prevent unnecessary interference with the use of public and private roads, walkways and drives. The Contractor shall provide and maintain suitable detours or other temporary expedients if necessary.
- B. Contractor shall repair roads, walkways and other traffic areas damaged by his operations to an equal or better condition. Traffic areas shall be kept as free as possible of excavated materials and maintained in a manner to eliminate dust.
- C. Contractor shall provide traffic barricades, construction signs, warning lights, guards and all other devices and services necessary to adequately protect the public.
- D. The Contractor shall employ personnel to direct traffic through construction areas, as directed by the Owner's Representative or as required to insure the safety of workers and the public.
- E. Bridging over open trenches shall be provided where necessary to maintain traffic.
- F. All operations shall meet the approval of Owner's Representative or agencies having jurisdiction over walkways and traffic areas. It is the Contractor's responsibility to coordinate with, and obtain all required permits or approval from the agency having jurisdiction over walkways and traffic areas.
- G. The Contractor shall repair and reseed all temporary access routes and disturbed areas at no additional expense to the Owner.

#### 1.14 ACCEPTANCE OF WORK

- A. Upon completion of all operations, the Contractor shall request the Owner's Representative to perform an inspection for acceptance. All work must be completed in strict accordance with the plans and specifications prior to final acceptance. Where, in the opinion of the Owner's Representative, inspected work does not comply with the

requirements of the Plans and Specifications, the Contractor shall replace rejected work at no additional cost to the Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

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 Contract Change.
- 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 Contract Changes 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 Contract Change 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 Contract Changes.
- 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.

#### 1.7 [LUMP-SUM] ALLOWANCES

- A. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials [selected by Designer] under allowance shall be included as part of the Contract Sum and not part of the allowance.

### 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 20 “bad weather” days.

END OF SECTION 012100

## SECTION 012200 – UNIT PRICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.
- B. Quantities of Units to be included in the Base Bid are indicated in Section 004322 – Unit Prices.

#### 1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Unit Prices.
- B. Related Sections include the following:
  - 1. Division 1 Section "Allowances" for procedures for using Unit Prices to adjust quantity allowances.
  - 2. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Contract Changes.

#### 1.3 DEFINITIONS

- A. Unit Price is an amount proposed by bidders, stated on the Bid Form Attachment 004322 a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

#### 1.4 PROCEDURES

- A. Unit Prices include all necessary material plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of Unit Prices. Methods of measurement and payment for Unit Prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of Work in-place that involves use of established Unit Prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A list of Unit Prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each Unit Price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

- A. Unit Price No. 1 – 12-inch Diameter Compost Filter Sock:
  - 1. Description: 12-inch Diameter Compost Filter Sock according to Division 01 Section 015723 "Storm Water Pollution Prevention Plan."
  - 2. Unit of Measurement: Lineal Feet of Compost Filter Sock Installed
  - 3. Base Bid Quantity: 635 lineal feet (including ditch checks)
  
- B. Unit Price No. 2 – 1-inch Diameter Water Service Line:
  - 1. Description: 1-inch Diameter Water Service Line, including trenching, bedding, backfill, and connection to the water main according to Division 33 Section 332622 "Plastic Pipe" and Section 332713 "Water Supply Systems."
  - 2. Unit of Measurement: Lineal Feet of 1-inch Diameter Water Service Line from Water Main Connection to Center of Campsite Valve Box.
  - 3. Base Bid Quantity: 648 lineal feet
  
- C. Unit Price No. 3 – Relocate Existing 4-inch or 6-inch Diameter Water Line:
  - 1. Description: Relocate Existing 4-inch or 6-inch Line, including trenching, bedding, backfill, and connections to the water main according to Division 33 Section 332622 "Plastic Pipe" and Section 332713 "Water Supply Systems."
  - 2. Unit of Measurement: Lineal Feet of 4-inch or 6-inch Water Line, Complete and in Place.
  - 3. Base Bid Quantity: 0 lineal feet
  
- D. Unit Price No. 4 – Relocate Existing 6-inch Pressure Sewer Line:
  - 1. Description: 6-inch Diameter Pressure Line, including trenching, bedding, backfill, and connections to the existing main according to Division 33 Section 332622 "Plastic Pipe" and Section 332722 "Sanitary Sewer Systems."
  - 2. Unit of Measurement: Lineal Feet of 6-inch Diameter Pressure Sewer Line, Complete and in Place.
  - 3. Base Bid Quantity: 0 lineal feet

END OF SECTION 012200



## SECTION 012300 – ALTERNATES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

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

#### 1.3 DEFINITIONS

- A. Definition: An Alternate is an amount proposed by Bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to the Base Bid amount, if the Owner decides to accept a corresponding change in either the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. The cost for each Alternate is the net addition to the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.
- B. No additional time will be allowed for Alternate Work unless the number of work days is so stated on the Bid Form.

#### 1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate the Alternate Work into the Project.
  - 1. Include as part of each Alternate miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.
- B. Notification: The Award of the Contract will indicate whether Alternates have been accepted or rejected.
- C. Execute accepted Alternates under the same conditions as other Work of this Contract.
- D. Schedule: A “Schedule of Alternates” is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each Alternate.

### PART 2 - PRODUCTS (Not Applicable)

### PART 3 - EXECUTION

#### 3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Add campsites 13 and 14. Work will generally include but is not limited to the addition of the following:
  - 1. Construction of Concrete Campsite Pad

2. Construction of Utilities and Appurtenances as described in the Construction Drawings (Water, Sewer, & Electric Extensions and Connection Pedestals)
3. Installation of Site Amenities

END OF SECTION 012300

## SECTION 012600 – CONTRACT MODIFICATION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract Modifications.
- B. Related Sections include the following:
  - 1. Division 1, Section 012100 "Allowances" for procedural requirements for handling and processing Allowances.
  - 2. Division 1, Section 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 013200, Section "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 Contract Changes
    - 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.

#### 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. Certification of Materials and Quality Assurance Submittals.
5. Construction Photographs.
6. Operating and Maintenance Manuals.
7. Shipping and Weight Tickets.
8. 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. Notification, 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 of 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 Resident Project 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 requires 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. Include 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 by 11 inches but no larger than 36 by 48 inches.

#### 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. Include 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. Include 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 3 multiple units that show approximate limits of the variations.

## 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 receipts and weight tickets, 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 color digital photographs.
  - 2. The Contractor shall identify each photograph with project name, location, number, date, time and orientation.
  - 3. The Contractor shall submit progress photographs weekly by email or monthly at the monthly progress meetings on CD unless specified otherwise.
  - 4. The Contractor shall take four site photographs from differing directions at each site at a minimum.

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 and 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.

SPEC SECTION	TITLE	CATEGORY
013200	Schedules	Construction Schedule
013200	Schedules	Schedule of Values
013200	Schedules	List of Subcontractors
013200	Schedules	Major Material Suppliers
015000	Construction Facilities and Temporary Controls	Test Report
015000	Construction Facilities and Temporary Controls (Implementation/Termination Schedule)	Construction Schedule

015723	Stormwater Pollution Prevention Plan (Inspection Reports)	Test Report
015723	Stormwater Pollution Prevention Plan (Record Photos and Video)	As-Builts
015723	Stormwater Pollution Prevention Plan	Product Data
015639	Temporary Tree and Plant Protection	Product Data
015640	Temporary Tree and Plant Protection (Tree Pruning Schedule)	Construction Schedule
015641	Temporary Tree and Plant Protection (Qualification Data)	List of Subcontractors
015642	Temporary Tree and Plant Protection	Certification
015643	Temporary Tree and Plant Protection	Operation / Maintenance Manual
032200	Concrete Reinforcement (Record Photos)	As-Builts
032200	Concrete Reinforcement (Material Certificates)	Certification
032200	Concrete Reinforcement	Product Data
129300	Site Furnishings	Product Data
260503	Common Work Results for Electrical	Product Data
260519	Low Voltage Electrical Power Conductors and Cables	Product Data
260519	Low Voltage Electrical Power Conductors and Cables (Field Quality-Control Test Reports)	Test Report
260519	Low Voltage Electrical Power Conductors and Cables	Shop Drawings
260526	Grounding and Bonding for Electrical Systems	Product Data
260526	Grounding and Bonding for Electrical Systems (Field Quality-Control Test Reports)	Test Report
260529	Hangers and Supports for Electrical Systems	Shop Drawings
260529	Hangers and Supports for Electrical Systems	Product Data
260533	Raceway and Boxes for Electrical Systems	Shop Drawings
260533	Raceway and Boxes for Electrical Systems	Product Data
260533	Raceway and Boxes for Electrical Systems (Qualification Data)	Product Data
262416	Main Distribution Panels	Shop Drawings
262416	Main Distribution Panels	Product Data
262416	Main Distribution Panels	Certification
262416	Main Distribution Panels (Field Quality-Control Test Reports)	Test Report
262416	Main Distribution Panels	Operation / Maintenance Manual
262720	RV Pedestal	Product Data

262720	RV Pedestal	Shop Drawings
262720	RV Pedestal	Operation / Maintenance Manual
262720	RV Pedestal	Warranty
312000	Earthwork (Qualification Data)	Product Data
312000	Earthwork (Material Test Reports)	Test Report
312000	Earthwork (Record Photos and Video)	As-Builts
312200	Structure Excavation, Trenching, and Backfilling (Material Test Reports)	Test Report
312221	Trenching, Backfilling, and Compacting (Material Test Reports)	Test Report
312222	Granular Stone Bedding and Backfill (Qualification Data)	Product Data
312222	Granular Stone Bedding and Backfill	Certification
312222	Granular Stone Bedding and Backfill (Material Test Reports)	Test Report
312232	Granular Stone Base (Qualification Data)	Product Data
312232	Granular Stone Base	Certification
312232	Granular Stone Base (Material Test Reports)	Test Report
312319	Dewatering (Existing Conditions Documentation)	As-Builts
321216	Asphaltic Concrete Paving	Product Data
321216	Asphaltic Concrete Paving (Design Mixtures)	Product Data
321216	Asphaltic Concrete Paving (Qualification Data)	Product Data
321216	Asphaltic Concrete Paving	Certification
321216	Asphaltic Concrete Paving (Material Test Reports)	Test Report
321313	Concrete Paving	Product Data
321313	Concrete Paving (Concrete Pavement Joint Plan)	Product Data
321313	Concrete Paving (Design Mixtures)	Product Data
321313	Concrete Paving (Material Test Reports)	Test Report
321313	Concrete Paving	Certification
321313	Concrete Paving (Minutes of Pre-Installation Conference)	Product Data
321373	Concrete Paving Joint Sealants	Product Data
321373	Concrete Paving Joint Sealants	Certification
321373	Concrete Paving Joint Sealants (Compatibility and Adhesion Test Reports)	Test Report
321373	Concrete Paving Joint Sealants (Material Test Report)	Test Report
322521	Roadway and Parking Marking	Product Data
329219	Seeding	Product Data
329219	Seeding	Certification

329219	Seeding (Qualification Data)	Product Data
332601	Precast Manholes and Manhole Drops	Shop Drawings
332601	Precast Manholes and Manhole Drops	Product Data
332615	Ductile Iron Pipe and Fittings	Product Data
332615	Ductile Iron Pipe and Fittings	Certification
332622	Plastic Pipe	Product Data
332622	Plastic Pipe	Certification
332641	Gate Valve and Box	Shop Drawings
332641	Gate Valve and Box	Product Data
332641	Gate Valve and Box	Certification
332645	Blow-Off Hydrant	Shop Drawings
332645	Blow-Off Hydrant	Product Data
332645	Blow-Off Hydrant	Certification
332647	Tapping Sleeves and Valves/Cutting-In Sleeves	Product Data
332647	Tapping Sleeves and Valves/Cutting-In Sleeves	Certification
332713	Water Supply Systems (Bacteriological and Leakage Testing Reports)	Test Report
332713	Water Supply Systems (Field Quality-Control Test Reports)	Test Report
332713	Water Supply Systems	Operation / Maintenance Manual
332715	Tracer Wire	Product Data
332715	Tracer Wire	Certification
332715	Tracer Wire (Field Quality-Control Test Reports)	Test Report
332722	Sanitary Sewer Systems (Pipe and Manhole Test Reports)	Test Report

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.
- I. Safety Fencing: Provide 4' high, 1.8" x 3.3: mesh heavy duty orange safety fence with painted steel post.

## 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: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.
  - 1. Sterilization: Sterilize temporary water piping prior to use.
- C. 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.
- D. Temporary Electric Power Service (If using services): 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. Contractors using such services shall pay all costs of temporary services, circuits, outlet, extensions, etc.
  - 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.
- E. Temporary Heating: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
  - 1. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP gas or fuel-oil heaters with individual space thermostatic control.
  - 2. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.
- F. Temporary Telephones: Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities.
  - 1. Provide cell phone service throughout the construction period for all personnel engaged in construction activities.
  - 2. At project office and at each construction area, post a list of important and emergency telephone numbers.
- G. 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.



- H. 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.
- I. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper supply.
  - 1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45°F to 55°F (7°C to 13°C).
- J. 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: Limited areas for storage of building materials are available onsite. The Contractor shall provide his own security. Specific locations for storage and craning operations will be discussed at the Pre-Bid Meeting and the Pre-Construction 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. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and materials drying or curing requirements to avoid dangerous conditions and effects.
  2. Install tarpaulins securely with incombustible wood framing and other materials. Close openings of 25SqFt (2.3SqM) or less with plywood or similar materials.
  3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
  4. Where temporary wood or plywood enclosure exceeds 100SqFt (9.2SqM) in area, use UL-labeled, fire-retardant-treated material for framing and main sheathing.
- H. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered “tools and equipment” and not temporary facilities.
- I. 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.
- J. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.

- K. 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.
- L. 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. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Designer.
- B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonable predictable and controllable fire losses. Comply with NFPA 10 “Standard for Portable Fire Extinguishers” and NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations”.
  - 1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one (1) extinguisher on each floor at or near each usable stairwell.
  - 2. Store combustible materials in containers in fire-safe locations.
  - 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
  - 4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- C. Permanent Fire Protection: At the earliest feasible date in each area of the Project complete installation of the permanent fire-protection facility including connected services and place into operation and use. Instruct key personnel on use of facilities.
- D. 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.
- E. 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 temporary orange safety fencing, installed per manufacturer's recommendations.

- F. 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.
- G. 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. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
  - 2. 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 015639 – TEMPORARY TREE AND PLANT PROTECTION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the protection and trimming of existing trees that interfere with, or are affected by, execution of the Work, whether temporary or permanent construction.
- B. Related Sections include the following:
  - 1. Division 01 Section "Summary" for limits placed on Contractor's use of the site.
  - 2. Division 01 Section "Temporary Facilities and Controls" for temporary tree protection.
  - 3. Division 31 Section "Tree Removal, Clearing, and Grubbing" for removal limits of trees, shrubs, and other plantings affected by new construction.
  - 4. Division 31 Section "Earthwork" for building and utility trench excavation, backfilling, compacting and grading requirements, and soil materials.

#### 1.3 DEFINITIONS

- A. Tree Protection Zone: Area surrounding individual trees or groups of trees to remain during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Tree Pruning Schedule: Written schedule from arborist detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
- C. Qualification Data: For tree service firm and arborist.
- D. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- E. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

## 1.5 QUALITY ASSURANCE

- A. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of tree protection and trimming.
- B. Arborist Qualifications: An arborist certified by ISA or licensed in the jurisdiction where Project is located.
- C. Tree Pruning Standard: Comply with ANSI A300 (Part 1), "Tree, Shrub, and Other Woody Plant Maintenance--Standard Practices (Pruning)."
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
  - 1. Before tree protection and trimming operations begin, meet with representatives of authorities having jurisdiction, Owner, Architect, consultants, and other concerned entities to review tree protection and trimming procedures and responsibilities.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Drainage Fill: Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D 448, Size 24, with 90 to 100 percent passing a 2-1/2-inch (63-mm) sieve and not more than 10 percent passing a 3/4-inch (19-mm) sieve.
- B. Topsoil: Topsoil shall be a well-graded soil of good uniform quality. It shall be a natural, friable soil representative of productive soils in the vicinity. Topsoil shall be free of admixture of subsoil, foreign matter, objects larger than one inch in any dimension, toxic substances, weeds and any material or substances that may be harmful to plant growth and shall have a pH value of not less than 5.0 nor more than 7.5. The Contractor shall submit an analysis of soils along with samples for approval by the Landscape Architect.
- C. Filter Fabric: Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Temporary Fencing: Install temporary fencing around tree protection zones to protect remaining trees and vegetation from construction damage. Maintain temporary fence and remove when construction is complete.
  - 1. Install construction fencing according to manufacturer's written instructions.

- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Do not store construction materials, debris, or excavated material inside tree protection zones. Do not permit vehicles or foot traffic within tree protection zones; prevent soil compaction over root systems.
- D. Maintain tree protection zones free of weeds and trash.
- E. Do not allow fires within tree protection zones.

### 3.2 EXCAVATION

- A. Install shoring or other protective support systems to minimize sloping or benching of excavations.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.
  - 1. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction.
  - 2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
- D. Where utility trenches are required within tree protection zones, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.
  - 1. Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; do not break or chop.

### 3.3 REGRADING

- A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade beyond tree protection zones. Maintain existing grades within tree protection zones.
- B. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist, unless otherwise indicated.
  - 1. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.



- C. Minor Fill: Where existing grade is 6 inches (150 mm) or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.
- D. Moderate Fill: Where existing grade is more than 6 inches (150 mm) but less than 12 inches (300 mm) below elevation of finish grade, place drainage fill, filter fabric, and topsoil on existing grade as follows:
  - 1. Carefully place drainage fill against tree trunk approximately 2 inches (50 mm) above elevation of finish grade and extend not less than 18 inches (450 mm) from tree trunk on all sides. For balance of area within drip-line perimeter, place drainage fill up to 6 inches (150 mm) below elevation of grade.
  - 2. Place filter fabric with edges overlapping 6 inches (150 mm) minimum.
  - 3. Place fill layer of topsoil to finish grade. Do not compact drainage fill or topsoil. Hand grade to required finish elevations.

### 3.4 TREE PRUNING

- A. Prune trees to remain that are affected by temporary and permanent construction.
- B. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
- C. Pruning Standards: Prune trees according to ANSI A300 (Part 1) as follows:
  - 1. Type of Pruning: Cleaning.
  - 2. Specialty Pruning: Utility.
- D. Cut branches with sharp pruning instruments; do not break or chop.
- E. Chip removed tree branches and stockpile in areas approved by Owner.

### 3.5 TREE REPAIR AND REPLACEMENT

- A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
- B. Remove and replace trees indicated to remain that die or are damaged during construction operations that Owner determines are incapable of restoring to normal growth pattern.
  - 1. Provide new trees of 2-inch caliper size and of a species selected by Owner when damaged trees are required to be replaced. Plant and maintain new trees.

### 3.6 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted.
- B. Disposal: Remove excess excavated material and displaced trees from Owner's property.

END OF SECTION 015639

SECTION 015723 – STORM WATER POLLUTION PREVENTION PLAN (SWPPP)  
Project Specific

1. GENERAL

- 1.1 The Contractor shall exercise caution to guard against the degradation of the waters of the state due to construction-related pollutants (silt, debris, and petroleum products). Construction shall be performed in accordance with the Missouri State Operating Permit – General Permit Number X and the SWPPP included on the following pages.

## **I. SITE DESCRIPTION**

**Project Location** – Land disturbance activities will take place at Roaring River State Park, Campground No. 3, Cassville, Missouri and include land disturbing activities for renovation and construction of campsites. Construction will take place within Section 35 of Township 22 north, Range 27 west. Drainage from the site will be directed along a swale to the east end of the campground. Generally only one outfall, Outfall 001, will be associated with this project and it is located in the Southwest ¼ of the Northwest ¼ of Section 35, Township 22 north, Range 27 west. Refer to the location map on the Erosion Control Plan.

**Project Owner** – MDNR, Division of State Parks  
PO Box 176  
Jefferson City, Missouri 65102

**Total Anticipated Disturbed Area = 7.5 acres**

## **II. SEQUENCE OF CONSTRUCTION ACTIVITIES**

The project shall be constructed per the plans and specifications. Prior to the initial soil disturbance activities, temporary BMPs shall be installed at the locations shown on the Erosion Control Plan Drawing in order to retain sediment on the site and out of the drainage structures and streams. Additional Temporary BMPs shall be installed as site-specific conditions may require.

The proposed general sequence of construction activities is as follows:

1. Establish the construction entrance/exit drive(s) as needed at any location(s) as determined by the contractor in the field. Stabilize and maintain the construction entrance/exit drive(s) with a minimum 6" thick layer of 3" to 5" clean, washed and graded, crushed stone, placed over a geotextile filter material, for control of vehicle tracking of sediments off-site and onto the public roadways.
2. Remove any trees and/or vegetation as needed for the installation of all temporary BMP's as noted on the drawing between November 1st and March 31st. The Contractor shall get permission from the Owner's Representative to remove any tree between April 1st through October 31st to prevent loss of Bat habitat. The Contractor shall give the Owner's Representative 5 working days' notice of the trees that need to be removed to install any storm water BMP's. Soil disturbance shall be minimized during this process.
3. Placement of filter fabric silt fencing, filter rolls, straw bale barriers/straw wattles, rock check dams, and inlet/outlet protection as required, at the locations shown on the Erosion Control Plan Drawing, and any other additional areas where site conditions may require to prevent erosion and sediment losses with storm water runoff from the site during the earthwork activities. Installation of these items shall be accomplished prior to, and during the turf and soil disruptions caused by the excavation, filling, grading, trenching, and construction activities.
4. Clear and grub all areas as required for the construction of the proposed improvements, as shown on the construction drawings. Existing vegetation shall be preserved wherever practical.
5. Relocation of and/or installation of additional BMPs shall be accomplished as required to accommodate construction and reduce sediment loss.

6. Grade, shape, and prepare seedbed of all disturbed areas, as required by the plans and specifications that have been impacted by the improvements.
7. Following seedbed preparation of disturbed areas, apply seed, fertilizer, mulch, etc. in areas where final construction has been completed, and maintain until permanent vegetation is re-established per this SWPPP, and in compliance with the conditions of the Storm Water Discharge General Permit issued by the Missouri Department of Natural Resources (MDNR).
8. Temporary seeding and mulching of disturbed areas shall be performed, as necessary, to prevent erosion and sediment loss during the construction activities prior to permanent seeding of the disturbed areas.

Best Management Practices (BMPs) including establishment of the rock stabilized construction entrance/exit(s), placement of filter fabric silt fence, filter rolls, any straw bale silt barriers, rock check dams, inlet/outlet protection, temporary seeding and any other measures to prevent erosion of the soils and sediment movement off-site shall be implemented prior to the land disturbance activities. Inspection, maintenance, repair, and upkeep of all BMPs throughout the construction project to achieve compliance with the conditions of the National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge Permit issued by the MDNR, and this SWPPP is, and will be, considered a major concern and part of the project. All conditions of the NPDES permit and this SWPPP shall be strictly adhered to throughout the project, as required. All erosion control measures shall be wildlife friendly.

### **III. POLLUTION CONTROL – BEST MANAGEMENT PRACTICES (BMPs)**

#### **1. Erosion and Sediment Abatement Control**

##### **A. Soil Stabilization Practices**

- 1) Temporary Practices: Topsoil stockpiles and areas of the project where daily construction activities will temporarily cease for longer than 21 days shall be stabilized using silt fencing or covered to prevent erosion within 14 days. The contractor shall cause the location of topsoil stockpile to be noted and indicated on the Erosion Control Plan Drawing.
- 2) Permanent Restoration: Disturbed portions of the site area affected by the construction shall be seeded for permanent vegetative restoration of turf per the contract plans and specifications. All areas disturbed during construction shall be fertilized, seeded, and mulched.

Erosion Control Mat – Biodegradable erosion control mats shall be installed (as needed) along steeper slopes, bottom of ditches, and elsewhere if shown on the Erosion Control Plan drawing and/or as needed, or as directed by the Resident Project Representative in accordance with the manufacturer's instructions. The mats shall be constructed with straw or recycled cellulose products and strengthened with a netting of jute. Mats shall have a recommended life of no more than ten months. Contractor shall apply fresh seed prior to placement of the erosion control mats.

Slopes and seedbed areas shall be properly prepared, fertilized and seeded prior to installation of the mats. Mats shall be anchored with hardwood or biodegradable pins in

accordance with the manufacturer's recommendations. Metal pins are not acceptable and shall not be used.

A soil guard hydro-seed may be used in lieu of erosion control mats, where appropriate.

#### B. Structural Element Practices

- 1) **Silt Sock:** Temporary silt socks shall be installed along and downgradient of the disturbed areas as shown on the SWPPP drawing and in additional areas as needed, prior to and in conjunction with the construction of the improvements. The placement of the sock shall be effective in the prevention of major sediment movement from the site. All socks shall be maintained throughout the construction and until final vegetation is restored.
- 2) **Straw Bale Barrier:** Temporary straw bale barriers shall be strategically placed at the site as shown on the Erosion Control Plan drawing and at additional locations as necessary according to site specific terrain requirements, as a control measure to contain and prevent major sediment runoff from the project site as needed.
- 3) **The construction entrance/exit drive(s)** shall be rock stabilized with a minimum 6" thick, 3" to 5" crushed stone over a geotextile filter material to prevent construction vehicles from transporting, tracking and/or dropping sediment onto public roadways, as needed. All established entrance/exit drive(s) on/site shall be kept clear and clean of any and all sediment to prevent tracking to public roads. This may require daily sweeping.
- 4) **Inlet Protection:** Temporary measures, such as gravel filter bags/rolls, silt fence, sod, etc., shall be installed on the upstream side of all culverts and around all curb or yard inlets, to trap sediment. This mechanism prevents the sediment from entering inlet structures and prevents the silting-in of inlets, storm drains, culverts, and/or receiving channels.
- 5) **Outlet Protection:** Temporary or permanent measures shall be installed at all culvert or storm drain outlets as shown on the plans or as determined by site specific conditions, to reduce the speed of concentrated storm water flows thereby reducing erosion. Types of outlet protection include, but are not limited to, stone rip-rap, concrete aprons, paved sections, and/or settling basins.
- 6) **Rock Check Dams:** Temporary rock check dams shall be installed within defined drainage ditches as shown on the drawings or as site specific conditions dictate, to reduce the speed of concentrated storm water flows thereby reducing erosion. Rock check dams shall not exceed 2 feet and the top of dam shall be at least 1 foot below the top of ditch or channel. The top width of the dam shall be 2 feet wide with 3:1 side slopes.

## 2. **Waste Disposal**

- A. **Construction Waste/Trash/Solid Waste:** Any and all waste materials (except hazardous waste—see paragraph III.2.B.) generated during the project shall be collected as needed and removed from the site daily or placed and stored in a metal dumpster rented from a solid waste management company licensed to operate in Barry County, Missouri or owned by the contractor or the owner. The dumpster(s) shall meet all local and State solid waste management regulations. The contractor shall cause the location of solid waste containers

placed on the site to be noted and indicated on the Erosion Control Plan drawing. All trash and construction debris from the site will be deposited in the dumpster(s) as appropriate. The dumpster(s) shall be emptied approximately once per week, or more often if necessary. No construction waste materials shall be buried on site. All brush, trees and refuse shall be removed. Materials such as tires or waste oil may not be used to start the fires or be burned in the fires. Missouri State Regulations prohibit open burning of any waste generated by a business, trade, industry, or any demolition operation including, but not limited to paper, cardboard boxes, pallets, tires, rubber products, hazardous materials, styrofoam, plastics, petroleum products, treated wood and any asbestos-containing material. Any burning operations shall be in strict compliance with the requirements of all applicable statutes and regulations. Prior to conducting any open burning, the contractor shall contact the appropriate city or county of jurisdiction for any local restrictions or permit requirements. Burning operations shall not constitute a nuisance to persons living nearby, shall be kept away from all property lines and at least 200 yards from the nearest inhabited dwelling, as well as transmission and distribution lines and shall be carefully controlled to prevent any damage to adjacent properties and facilities. Burn pit refuse shall be cleaned out and disposed of off-site. All personnel shall be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted on site, as necessary. The contractor shall cause any and all burning locations to be shown on the Erosion Control Plan drawing.

- B. Hazardous Waste: Any and all hazardous waste materials shall be disposed of in the manner specified by local, State and/or Federal regulations, or according to manufacturer specific instructions. Site personnel shall be instructed in these practices, and the individual who manages day-to-day site operations will be responsible for seeing that these practices are followed.
- C. Sanitary Waste: The General Contractor is responsible for providing sanitary facilities, as needed, should use of any permanent facilities not be available. The contractor shall cause the location of portable toilet facilities to be noted and indicated on the Erosion Control Plan drawing. All sanitary waste will be collected from the portable units (if provided) a minimum of one time per week (or as needed) by a licensed sanitary waste management contractor, or as required by local regulation and disposed of only in locations having a State permit.

### **3. Offsite Vehicle Tracking**

- A. A stabilized construction site entrance/exit drive(s) shall be established and maintained to help reduce tracking of any sediment off-site and onto the adjacent and adjoining roadways. Care shall be taken to ensure that adequate rock aggregate is in place at all times at the entrance to minimize offsite tracking as discussed previously Section III.1.B.3 of this SWPPP. The construction entrance shall be repaired as needed throughout construction if offsite tracking occurs, or as directed by the onsite representative.

#### **IV. MAINTENANCE/INSPECTION PROCEDURES**

##### **1. Inspection Schedule**

- A. All control measures **SHALL** be inspected at least once a week, or as required by the issued storm water discharge permit, prior to a known major storm event, and within a reasonable time, not to exceed 24 hours, following any storm event of 0.5 inches or greater. The contractor is responsible for completing all inspection and maintenance forms, and providing same to the owner.

##### **2. Maintenance of Sediment Control Measures**

- A. All storm water runoff sediment control measures shall be maintained in good working order. Maintenance and repair (if necessary) shall be initiated within 24 hours of being reported.
- B. Sediment built up shall be removed from the filter fabric silt fence barriers or filter rolls when it has reached one-third the height of the barrier or sooner.
- C. All filter fabric silt fences and filter rolls shall be inspected for depth of sediment and for fabric tears and to ensure the fabric is securely attached to the fence posts or stakes, and that the fence posts or stakes are firmly in the ground.
- D. Any and all earthen berms and sedimentation basin dams shall be inspected for damage and erosion and repaired if necessary.
- E. Any and all vegetative buffers or rock check dams shall be replenished or replaced when the void space has become filled with silt and sediment to the point it is no longer functional.
- F. Straw bales shall be inspected for damage and anchor integrity and replaced and/or re-anchored, if necessary. Sediment built up shall be removed from the straw bale barriers when it has reached one-third the height of the barrier or sooner, as required.
- G. All temporary seeding shall be inspected for bare spots, washouts, and healthy growth. Re-seeding will be accomplished as necessary.
- H. A maintenance inspection report shall be completed during each inspection. Copies of the inspection and report forms to be completed by the inspector are included at the end of this section.
- I. The contractor will be responsible for inspections, completion of the inspection and maintenance reports, and all maintenance and repair activities. The contractor shall provide the owner with copies of all required reports in a timely manner.
- J. The contractor shall name an individual as the Environmental Manager for the site for inspection and maintenance responsibilities. The individual shall be trained and knowledgeable in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls (BMPs) used on the site in good working order. The contractor shall cause the name of the Environmental Manager to be noted and indicated in the space provided on the Erosion Control Plan drawing.

### **3. Non-Storm Water Discharges**

- A. It is expected the following non-storm water discharges may occur from the site.
  - 1) Wash waters from construction equipment and finished pavement (where no spills or leaks of toxic or hazardous materials have occurred.)
  - 2) Water sprinkling for dust control.

## **V. SPILL PREVENTION - SITE MANAGEMENT BMPs/MMPs**

The following are the material management practices (MMPs) that will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff.

### **1. Good Housekeeping Practices**

- A. The contractor shall make a concerted effort to store only enough of each product on site required to do the job. The contractor shall cause the location of storage areas on the site to be noted and indicated on the SWPPP drawing.
- B. Any and all materials stored on site shall be stored in a neat, orderly manner in their appropriate containers and, if possible, under a cover or other enclosure for protection from precipitation and located away from drainage courses and low areas.
- C. Any and all materials and products shall be stored and maintained in their original containers with the original manufacturer's label.
- D. Substances shall not be mixed with one another unless recommended by the manufacturer.
- E. Whenever possible, all of a product shall be used up before disposing of the container.
- F. Manufacturers' recommendations for proper use and disposal shall be followed at all times for all materials and products.
- G. The contractors' site superintendent, or his designated appointee, shall visually inspect the job site daily to ensure proper use and/or disposal of all materials on site.

### **2. Hazardous Products - Storage, Handling, Use, & Disposal Practices**

The contractor shall cause the location of any and all hazardous materials/hazardous products placed on the site to be noted and indicated on the SWPPP drawing. These practices are used to reduce the risks associated with hazardous materials:

- A. Any and all products shall be kept in original containers unless they are not re-sealable. Otherwise they should be transferred to re-sealable containers for storage and properly marked, indicating the contents.
- B. Original labels and material safety data sheets (MSDSs) shall be retained on site, as they contain important product information.
- C. If surplus product must be disposed of, manufacturers' and local, State and Federal



recommended methods for proper disposal shall be followed.

- D. Fuels, oils, lubricants, solvents, or other hazardous materials shall NOT be disposed of on site. All hazardous material must be properly stored, used, and disposed of in accordance with State and Federal laws and regulations. Drip pans shall be provided for any valves on storage containers, as appropriate. For further guidance, contact MDNR at 1-800-361-4827.

### **3. Product Specific Practices**

The following product specific practices shall be followed on site:

- A. Petroleum Products: All on-site vehicles and equipment shall be monitored for leaks, and shall receive regular preventive maintenance to reduce the chance of leakage. Any and all petroleum products on site shall be stored in tightly sealed containers that are clearly labeled and provided with drip pans, if appropriate. Any asphalt substances used on site shall be applied according to the manufacturer's recommendations. Any fuel storage tanks located on-site shall be provided with adequate secondary containment. Drip pans shall be provided for all valves. If greater than 1,320 gallons of oil is stored on the site, the contractor is responsible for providing and maintaining a SPCC (Spill Prevention, Control, and Countermeasures) plan on site. The contractor shall cause the location of any petroleum product storage areas on the site to be noted and indicated on the SWPPP drawing.
- B. Fertilizers: Fertilizers shall be applied only in the minimum amounts stated in the project specifications. Once applied, fertilizer shall be worked into the soil to limit exposure to storm water. Storage of fertilizer shall be inside or under cover. The contents of any partially used bags of fertilizer shall be transferred to a properly labeled, sealable plastic bin or container to avoid spills. The contractor shall cause the location of any fertilizer product storage area on the site to be noted and indicated on the SWPPP drawing.
- C. Paints/Solvents/Cleaning Compounds, Etc.: All containers shall be tightly sealed and stored when not required for use. Drip pans shall be provided, if appropriate. Excess materials shall NOT be disposed or dumped on site, but shall be properly disposed of according to manufacturer's instructions and/or Federal, State, and local regulations. The contractor shall cause the location of any storage areas on the site containing paints/solvents/cleaning compounds, etc. to be noted and indicated on the SWPPP drawing.
- D. Concrete Trucks: Concrete trucks shall be allowed to wash out only in locations where the discharge will remain on-site, and in a manner that prevents contact with storm water runoff. It is not permissible to discharge concrete truck washout directly to streams or storm drains.
- E. Mud/Sediment Offsite Tracking: Only the designated entrance(s) shall be used for contractor access to, and exit from, the site. The General Contractor shall be responsible for keeping all mud and off-site tracking cleaned from the adjoining public road, on a daily basis if needed.

### **4. Spill Control Practices**

The contractor is responsible for providing and maintaining a SPCC (Spill Prevention Control and Countermeasures) plan on site, as required by the regulations at 40 CFR 112. In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices shall be followed for spill prevention and cleanup:

- A. Manufacturer's recommended methods for spill cleanup shall be clearly posted, and site personnel shall be made aware of the procedures and the location of the information and cleanup supplies. Refer to manufacturer's MSDSs.
- B. Materials and equipment necessary for spill cleanup shall be kept in a designated material storage area on site. The contractor shall cause the location of the spill cleanup materials and equipment to be noted and indicated on the SWPPP drawing. Spill cleanup equipment and materials shall include, but not be limited to, shovels, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and/or metal trash containers specifically for this purpose, as applicable.
- C. All spills shall be cleaned up immediately after discovery and properly containerized for proper disposal. Burial on site is not acceptable and shall not be allowed.
- D. The spill area shall be kept well ventilated and personnel shall wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- E. Reportable quantities for spills of toxic or hazardous material shall be promptly reported to the appropriate Federal, State and local government agencies, as required, including those listed on the enclosed "Spill/Release Information and Reporting Form". Reportable quantities for oil and hazardous substances are found at 40 CFR 110, 117, and 302, and as stated in the Appendix of this plan. When permits are applicable, the permittee or his/her authorized representative is required to notify the MDNR Environmental Emergency Response in accordance with 40 CFR 117 and 40 CFR 302 as soon as they have knowledge of the discharge of any hazardous substance or petroleum product in excess of the reportable quantity. The MDNR emergency spills hot line is 1-573-634-2436. Copies of any and all reporting forms shall be provided to the owner of the project as soon as is practical.
- F. The spill prevention, control and countermeasures plan and/or practices shall be adjusted to include measures to prevent a spill event of this type from recurring, and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures taken shall also be included.
- G. The Environmental Manager shall also be the spill prevention and cleanup coordinator unless the contractor arranges otherwise. He shall designate other site personnel who shall receive spill prevention and cleanup training, as required. The names of responsible spill personnel shall be posted in the material storage area and in the office trailer on site, if one so exists.

## **VI. AIR EMISSIONS**

1. Burning: Any burning on the site may require a permit from the MDNR. For guidance, contact the MDNR Kansas City Regional Office at (816) 622-7000 or the MDNR Air Pollution Control Program, Jefferson City at (573) 751-4817. County and/or City ordinances may also apply. It is the responsibility of the contractor to contact these governing bodies for guidance. Refer to Section III.2.A of this SWPPP for additional information relative to open burning at the site. An MDNR fact sheet relative to open burning is included at the end of this section.
2. Dust Control: The contractor is required by State law to control fugitive dust blown from the site. Dust can be minimized by stabilizing areas with mulch as soon as possible. Watering should be provided in unstabilized areas as needed for dust control. Contact MDNR for guidance, as needed, at the numbers listed above.

## **VII. AMENDING THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP)**

The permittee, MDNR, Division of State Parks, and the Contractor shall amend and update the SWPPP, as appropriate, during the term of the land disturbance activities. The permittee/contractor shall amend the SWPPP, at a minimum, whenever the:

1. Design, operation, or maintenance of Best Management Practice (BMP) structures and/or controls is changed or is deemed inadequate in controlling sediment;
2. Changes in the design of the project that could significantly affect the quality of the storm water discharges;
3. Inspections indicate deficiencies in the SWPPP or any BMP used at the site;
4. MDNR notifies the permittee of deficiencies in the SWPPP;
5. The SWPPP is determined to be ineffective in significantly minimizing or controlling erosion and off-site sedimentation (e.g., there is visual evidence, such as excessive site erosion or excessive sediment deposits in receiving streams);
6. Non-Filterable Residues (NFR) from a storm water outfall exceeds 45 mg/l;
7. Total Settleable Solids from a storm water outfall exceed 2.5 ml/L/hr, unless the disturbed area is defined under, "Applicability to Valuable Resource Water". Settleable Solids from a storm water outfall in areas near Valuable Resource Water shall not exceed 0.5 ml/L/hr, as indicated in the permit issued by MDNR and/or;
8. MDNR determines violations of Water Quality Standards may occur or have occurred.

Based on the results of an inspection, the SWPPP must be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP must be completed within seven (7) calendar days following the inspection. Implementation of these additional or modified BMPs must be accomplished as soon as possible.

## **VIII. RETENTION OF RECORDS**

The permittee, MDNR, Division of State Parks, shall retain copies of the SWPPP and all reports required by this permit, and records of all data used to comply with this permit, for a period of at least three years from the date that the site is finally stabilized. This period may be extended by request of the Director of MDNR at any time.

The permittee shall retain a copy of the SWPPP from the date of project initiation to the date of final stabilization, as required by the permit (including a copy of the permit), at the construction site (or other local location), and made available upon request by the MDNR Director, or his representative; or other State or local agency approving or inspecting sediment and erosion control plans, grading plans, or storm water management plans to ensure implementation of the SWPPP, or the operator of a municipal separate storm sewer system, if any, receiving discharges from the site; and representatives of the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. The Permittee, or Contractor(s) with day-to-day operational control over SWPPP implementation shall have a copy of the SWPPP on-site or locally available at all times. A copy of the SWPPP, in its entirety, must be made available to the MDNR staff

for review and copying at the time of an on-site inspection. All SWPPPs must be signed and certified, as required.

If an on-site location is unavailable to store the SWPPP when no personnel are present, a sign or other notice of the plan's location must be conspicuously posted near the main entrance of the construction site. If not feasible, the notice can be posted in a local public building, or public library. The sign or other notice must contain the following information:

- 1) A copy of the completed Application, as submitted to the MDNR Water Pollution Control Program; and
- 2) If the location of the SWPPP or the name and telephone number of the contact person for scheduling SWPPP viewing times has changed, the current location of the SWPPP and the name and telephone number of the person for scheduling viewing times must be stated.

**RENOVATE CAMPGROUND FULL HOOK-UP SITES  
ROARING RIVER STATE PARK, CASSVILLE, MO  
PROJECT No. X2205-01**

**OWNER'S CERTIFICATION**

I certify that, being an authorized representative of MDNR, Division of State Parks, owner of the site, the information contained herein is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting (if required) false information, including the possibility of fine and imprisonment for knowing violations.

Printed Name: \_\_\_\_\_

Title: \_\_\_\_\_

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

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

For: MDNR, Division of State Parks  
PO Box 176  
Jefferson City, Missouri 65102

**CONTRACTOR'S CERTIFICATION**

I certify under penalty of law, that I, being an authorized representative of the Contractor for the permittee, understand the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge General Permit issued by the Missouri Department of Natural Resources (MDNR) and this Storm Water Pollution Prevention Plan (SWPPP) and shall comply with all conditions of the SWPPP, and the Permit for authorized Storm Water Discharges Associated with Construction or Land Disturbance Activities as issued by the MDNR Water Pollution Control Program, and that any non-compliance with the general permit constitutes a violation of Chapter 644, Missouri Clean Water Law, and 10 CSR 20-6.200. Non-compliance may result in enforcement action, termination of this authorization, or denial of the permittee's request for renewal.

\_\_\_\_\_  
Printed or Typed Name and Title

\_\_\_\_\_  
Contractor's Representative Signature Date

For: \_\_\_\_\_  
Contractor Name (Print)

\_\_\_\_\_  
Contractor Address

\_\_\_\_\_  
City/State

**RENOVATE CAMPGROUND FULL HOOK-UP SITES  
ROARING RIVER STATE PARK, CASSVILLE, MO  
PROJECT No. X2205-01**

**INSPECTION AND MAINTENANCE REPORT FORM  
TO BE COMPLETED AT LEAST ONCE PER WEEK, PRIOR TO A KNOWN MAJOR STORM  
EVENT, AND WITHIN 24 HOURS OF A 0.5 INCH OR MORE RAINFALL EVENT**

INSPECTOR: \_\_\_\_\_ DATE: \_\_\_\_\_  
DAYS SINCE LAST RAINFALL: \_\_\_\_\_ AMOUNT OF THIS RAINFALL \_\_\_\_\_ INCHES

Storm Water Control (If applicable)	Condition	Repair Req'd		Comments (Attach additional Sheets if Necessary)	Date Repaired	Initials
		Yes	No			
Site Entrance/Exit(s)						
Filter Fabric Fences						
Straw Bales						
Seeded Areas						
Top Soil Stockpile(s)						
Material Storage Areas						
Portable Toilet(s)						
Waste Container(s)						
Fuel Storage						
Outfall #001						
Outfall #002						

**STABILIZED CONSTRUCTION SITE ENTRANCE/EXIT(S)**

Does Sediment Get Tracked on to Road?	Is the Rock Clean or is it Filled with Sediment?	Does All Traffic Use the Stabilized Entrance to Enter and Leave the Site?	Is the Culvert (if installed) Beneath the Entrance Working?

Describe Maintenance Required to the Stabilized Construction Entrance/Exit(s): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Continued on Next Page**

**SEDIMENTATION BASIN(S)**

Depth of Sediment Basin	Condition of Basin Side Slopes	Any Evidence of Overtopping of the Embankment	Condition of Outfall from Sediment Basins
N/A			

Describe Maintenance Required for the Sedimentation Basins: \_\_\_\_\_

If this box is checked, I hereby certify that this inspection did not identify any incidents of non-compliance and that the facility is in compliance with the permit and the SWPPP.

**CERTIFICATION:**

Qualified personnel must conduct all inspections. "Qualified Personnel" means a person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity. I certify under penalty of law that I am qualified to properly gather and evaluate the information submitted and that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

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

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

Printed Name: \_\_\_\_\_

Contractor: \_\_\_\_\_

Address: \_\_\_\_\_

City/State: \_\_\_\_\_

All Maintenance Items Required and Described above are:

To be performed by: \_\_\_\_\_

On or Before: \_\_\_\_\_

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

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

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

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

List of Items Repaired: \_\_\_\_\_

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

Contractor: \_\_\_\_\_

Printed Name: \_\_\_\_\_

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

**RENOVATE CAMPGROUND FULL HOOK-UP SITES  
ROARING RIVER STATE PARK, CASSVILLE, MO  
PROJECT No. X2205-01**

**INSPECTION AND MAINTENANCE REPORT FORM**

**CERTIFICATION:**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage this SWPPP system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

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

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

Printed Name: \_\_\_\_\_

Phone: \_\_\_\_\_

Contractor: \_\_\_\_\_

Address: \_\_\_\_\_

City/State: \_\_\_\_\_

Report Submitted to and Received by Owner (Permittee), MDNR, Division of State Parks.

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

Submitted by: \_\_\_\_\_  
Printed Name – Contractor’s Representative

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

Contractor: \_\_\_\_\_

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

Received by: \_\_\_\_\_  
Printed Name – MDNR, Division of State Parks

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

**NOTE:** All inspection and maintenance report forms shall be retained by the owner for at least three years from the date the site is finally and permanently stabilized, and permit coverage expires or is terminated. This period may be extended by the request of MDNR at any time.

# of additional sheets attached = \_\_\_\_\_







**RENOVATE CAMPGROUND FULL HOOK-UP SITES  
ROARING RIVER STATE PARK, CASSVILLE, MO  
PROJECT No. X2205-01**

**CHANGES REQUIRED TO THE SWPPP**

**CHANGES REQUIRED:** \_\_\_\_\_

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

**REASONS FOR CHANGES:** \_\_\_\_\_

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

**Date Changes Made to SWPPP:** \_\_\_\_\_

**Date Changes Implemented at the Site:** \_\_\_\_\_

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

Number of Additional Pages Attached: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Company: \_\_\_\_\_

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

Date Received by MDNR, Division of State Parks: \_\_\_\_\_

Received by: \_\_\_\_\_ Signature: \_\_\_\_\_  
Printed Name – Owner Representative





**RENOVATE CAMPGROUND FULL HOOK-UP SITES  
ROARING RIVER STATE PARK, CASSVILLE, MO  
PROJECT No. X2205-01**

**SPILL/RELEASE INFORMATION AND REPORTING FORM**

1. Basic description of the spill/release, including causes, if known: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(If additional space is required, attach additional sheets.)

2. Chemical Name of Material Spilled: \_\_\_\_\_

3. Listed CERCLA Hazardous Substance?                      Yes \_\_\_                      No \_\_\_

4. Listed EPCRA Extremely Hazardous Substance?        Yes \_\_\_                      No \_\_\_

5. Oil?    Yes \_\_\_                      No \_\_\_

6. Quantity Spilled (exclude water): \_\_\_\_\_

7. Date and Time of Spill: \_\_\_\_\_

8. Duration of Spill: \_\_\_\_\_

9. Spill Went to: Water: \_\_\_\_\_    Land: \_\_\_\_\_    Air: \_\_\_\_\_

10. Any known or anticipated acute or chronic health risks associated with the spill and, where appropriate, advice regarding medical attention necessary for exposed individuals.

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

11. Proper precautions to take as a result of the release, including evacuation (unless such information is readily available to the community emergency coordinator pursuant to the emergency plan).

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

12. Spill Reported By: \_\_\_\_\_

    Date: \_\_\_\_\_

    Spill Reported to: \_\_\_\_\_

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

**REPORTABLE QUANTITIES FOR OIL  
AND HAZARDOUS SUBSTANCES ARE FOUND AT**  
40 CFR Part 110, 40 CFR Part 117, & 40 CFR Part 302

In accordance with the Missouri Department of Natural Resources (MDNR), Division of Environmental Quality, a Release and a Reportable Release of Petroleum Products are defined as follows:

**Release:** Any loss of petroleum product to the environment is considered a release. This definition includes, but is not limited to, any spilling, leaking, emitting, discharging, escaping, leaching, or disposing from a storage tank into ground water, surface water, surface or subsurface soils.

**Reportable Release:** A petroleum product release greater than fifty (50) gallons, or spills and/or overfills of petroleum product from an underground storage tank that result in a release to the environment that exceeds twenty-five (25) gallons, or any release that causes a sheen on nearby surface water; and a spill or overfill of a hazardous substance that results in a release to the environment that equals or exceeds its reportable quantity under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 is a reportable release and must be reported to the MDNR within twenty-four (24) hours. Soil contamination levels of TPH  $\geq$  50 parts per million (ppm), BTEX  $\geq$  1.0 ppm, benzene  $\geq$  0.5 ppm, or MTBE  $\geq$  60 ppm is also considered to be evidence of a reportable "release" of petroleum products.

Formal reporting of a Reportable Release shall be as follows:

MDNR – Environmental Emergency Response Unit – (573) 634-2436 (Follow MDNR instructions)  
National Response Center – 1-800-424-8802  
MDNR – Jefferson City – (573) 751-3176  
Cassville Fire Protection District - Emergency 911 – Non-Emergency 417-846-4005

All spills reported by telephone shall be reported in writing within 24 hours by the responsible party, and submitted to the MDNR Environmental Emergency Response Unit, or as directed by the Agency, with copies submitted to MDNR, Division of State Parks.

Circumstances (causes) leading to the release:

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Steps taken to prevent recurrence of the release:

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Date SWPPP modified to reflect the release and prevent similar future release: \_\_\_\_\_

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

**Signature/Title:** \_\_\_\_\_

**Organization:** \_\_\_\_\_





**RENOVATE CAMPGROUND FULL HOOK-UP SITES  
ROARING RIVER STATE PARK, CASSVILLE, MO  
PROJECT No. X2205-01**

**SUBCONTRACTORS CERTIFICATION**

I certify under penalty of law, that I, being an authorized representative of the Subcontractor for the permittee, understand the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) Storm Water Discharge General Permit issued by the Missouri Department of Natural Resources (MDNR) and this Storm Water Pollution Prevention Plan (SWPPP) and shall comply with all conditions of the SWPPP, and the Permit for authorized Storm Water Discharges Associated with Construction or Land Disturbance Activities as issued by the MDNR Water Pollution Control Program, and that any non-compliance with the general permit constitutes a violation of Chapter 644, Missouri Clean Water Law, and 10 CSR 20-6.200. Non-compliance may result in enforcement action, termination of this authorization, or denial of the permittee's request for renewal.

\_\_\_\_\_  
Printed or Typed Name and Title

\_\_\_\_\_  
Subcontractor's Representative Signature

\_\_\_\_\_  
Date

For: \_\_\_\_\_  
Subcontractor Name (Print)

\_\_\_\_\_  
Subcontractor Address

\_\_\_\_\_  
City/State

\_\_\_\_\_  
Subcontractor Telephone Number

## SECTION 017400 – CLEANING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

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

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

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

### PART 3 - EXECUTION

#### 3.1 PROGRESS CLEANING

- A. General
  - 1. Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.
  - 2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
  - 3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the jobsite.
  - 4. Provide adequate storage for all items awaiting removal from the jobsite, observing all requirements for fire protection and protection of the ecology.
- B. Site
  - 1. Daily, inspect the site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
  - 2. Weekly, inspect all arrangements of materials stored onsite. Re-stack, tidy, or otherwise service all material arrangements.

3. Maintain the site in a neat and orderly condition at all times.

C. Structures

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

### 3.2 FINAL CLEANING

- A. General: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
- B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for the entire Project or a portion of the Project.
  1. Clean the Project Site, yard and grounds, in areas disturbed by construction activities including landscape development areas, of rubbish, waste material, litter, and foreign substances.
  2. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
  3. Remove petrochemical spills, stains, and other foreign deposits.
  4. Remove tools, construction equipment, machinery, and surplus material from the site.
  5. Remove snow and ice to provide safe access to the building.
  6. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
  7. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
  8. Broom clean concrete floors in unoccupied spaces.
  9. Vacuum clean carpet and similar soft surfaces removing debris and excess nap. Shampoo, if required.
  10. Clean transparent material, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-

obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

11. Remove labels that are not permanent labels.
  12. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
  13. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  14. Clean plumbing fixtures to a sanitary condition free of stains, including stains resulting from water exposure.
  15. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  16. Clean ducts, blowers, and coils if units were operated without filters during construction
  17. Clean food-service equipment to a sanitary condition, ready and acceptable for its intended use.
  18. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.
  19. Leave the Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests. Comply with regulations of local authorities.
- D. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.
- E. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of lawfully.
1. Where extra materials of value remain after Final Acceptance by the Owner, they become the Owner's property.

END OF SECTION 017400

## SECTION 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 024119 - REMOVAL OF EXISTING IMPROVEMENTS

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. This work shall consist of the demolition, removal, hauling and disposal of all existing improvements within the limits of the project, unless specifically noted otherwise, regardless of whether they are called out on the drawings.
- B. Removal of existing improvements shall include, but not be limited to, removing rails, ties, drainage structures, pavements, surfacing, and base courses of all types, curb, curb and gutter, sidewalks, house walks, drive entrances, miscellaneous concrete, steps, pools, pool piping and drains, retaining walls, foundation walls and drain piping, floor slabs, basements, columns, footings, floors and any other types of building appurtenances, cisterns, catch basins, manholes, drainage and sewer pipes, drainage structures, water lines, valves, meter pits and associated piping, hydrants, gas main pipes, utility service lines, power poles, electrical conduit, wiring, cabling, pedestals, underground improvements, other objects or structures including scattered or piled bricks, stones, broken masonry, rubbish, debris, etc. from demolition work, and other existing improvements. This item shall also include the salvaging of materials as designated in the contract, and the backfilling of the resulting trenches, holes, and pits, and any grading work required to shape, smooth, and finish the disturbed areas.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. All structures, old pavements, foundations, wiring, utilities or other improvements within the limits of the right-of-way and not designated or permitted to remain shall be removed, transported and disposed of by the contractor at an approved dump site in accordance with all Federal, State and local requirements for such work. The contractor may make use of existing structures or portions of them during construction, but no material designated for use elsewhere or designated to remain shall be removed from the project, cut, bent, broken, or otherwise damaged. Any existing utilities, pavement or other items designated to remain that are damaged during construction shall be repaired at the contractor's expense to the satisfaction of the Owner.
- B. Material designated in the contract to be salvaged from existing structures shall be removed without damage in sections which may be readily handled or transported, and shall be piled neatly at an accessible point. Material not designated for salvage will be considered the property of the contractor unless owned and claimed by any political subdivision or utility company. Salvaged materials becoming the property of the contractor shall not be stored upon the right-of-way, nor shall any portion of the right-of-way be used by the contractor as a sales

yard. All discarded material or debris shall be disposed of at locations selected by the Contractor.

- C. In removing pavement, curb, curb and gutter, gutters, sidewalk, and other similar improvements, and where a portion of such improvements are to be left in place, they shall be sawcut, removed to an existing joint or to a joint sawed to a minimum depth of one inch with a true line and vertical face. Sufficient removal shall be made to provide for proper grades and connections in the new work regardless of any limits which may be indicated on the plans.
- D. Items to be demolished or removed shall not be used as fill material on the site unless specifically noted on the plans.
- E. All drainage pipes and utilities and their associated service lines or structures located on the site shall be removed from the site unless otherwise directed to remain. The contractor shall coordinate construction activity with all utility companies prior to beginning construction.
- F. All trenches, holes, and pits resulting from the removal of existing improvements shall be filled with earth. The material shall be placed in the same manner and compacted to approximately the same density as that required in adjoining areas. All backfill and compaction shall be per the site Geotechnical report.
- G. The contractor shall be responsible for obtaining all necessary permits and complying with all Federal, State and local regulations governing such demolition, removal, hauling and disposal work that is to be completed. The contractor shall be responsible for payment of all necessary fees or expenses and completion of any work associated with obtaining any required permits for the demolition, removal, hauling and disposal of items necessary to complete the project.
- H. The contractor shall coordinate all work with the utility companies and Roaring River State Park. It shall be verified prior to beginning construction that all utilities to be removed have been shut off or abandoned.

END OF SECTION 024119

## SECTION 031000 – CONCRETE FORMWORK

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section consists of furnishing all materials, labor, tools and equipment necessary to construct all required concrete form work to the lines and grades shown on the plans.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. All forms for exposed surfaces shall be built of sound plywood or other materials approved by the Engineer, closely fitted to provide the best surface possible without special lining.
- B. Forms for surfaces not exposed may be built of sound lumber free from loose knots.
- C. Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be commercially manufactured type. The portion remaining within the concrete shall leave no metal within one inch of any surface that will be exposed to view.

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. Forms: Forms shall conform to the shape, lines and dimensions of the concrete as shown on the Plans. Forms shall be provided for all vertical surfaces. The materials, design, and construction of formwork shall conform to the applicable portions of the American Concrete Institute Standard "Recommended Practice for Concrete Formwork" (ACI 347) and to these specifications.
- B. Design: The design of the formwork shall be the responsibility of the Contractor.
- C. Construction: Forms shall be built true to line and shall be mortar-tight and sufficiently rigid to prevent displacement or bulging between supports. Bends, chamfers and other offsets shall be provided when the forms are built. Joints shall be kept to a minimum and all joints shall be solidly backed by framing.
- D. Preparation of Surfaces: Before forms are placed, material to form exposed surfaces shall be oiled thoroughly, and for unexposed concrete, forms may be oiled at the Contractor's option. All forms not oiled shall be wetted immediately before placing concrete. All formwork shall be cleaned free of dirt and construction debris before placing concrete and points at which water has gathered within the forms due to wetting shall be drained.

- E. Removal of Forms: Formwork for walls, sides of slabs and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.
- F. Embedded Items, Opening, & Recesses:
1. General: All sleeves, inserts, grooves, anchors, recesses, and other items required for adjoining work or for its support shall be placed for formed prior to placing the concrete.
  2. Related Trades: All of the various trades shall be given ample opportunity to furnish for installation all hangers, anchors, inserts, sleeves, frames and other items to be built into the concrete as shown on the Plans or the various manufacturer's drawings or specified herein.
  3. Placing Embedded Items: Expansions joint material, waterstops and all other embedded items shall be positioned accurately and supported securely against displacement before placing concrete.
  4. Formed Holes: Formed holes shall be formed with non-ferrous material that shall be removed after the concrete has hardened.
- G. Formwork for beams, slabs and other parts that support the weight of concrete and construction live loads shall remain in place until the concrete has reached its specified 28-day strength. Formwork that supports the weight of concrete only, and no construction live loads, or other loads, shall remain in place for not less than seven (7) days or until the concrete has reached 75 percent of its specified 28-day strength. The concrete shall be presumed to have reached its strength when either of the following conditions has been met:
1. When test cylinders, field cured under the most unfavorable conditions prevailing for any portion of the concrete represented, have reached the required strength. Except for field curing and age at test, the test cylinders shall be taken and tested as specified herein.
  2. When the concrete has been cured as specified herein for the same length of time as the age at test of laboratory-cured cylinders that reached the required strength. The length of time the concrete has been cured in the field shall be determined by the cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of air in contact with the concrete is above 50°F, and the concrete has been damp or thoroughly sealed from evaporating and loss of moisture.
- H. Contractor's Responsibility: In all cases, the Contractor shall be solely responsible for adequate support of the forms to safely carry the load of concrete without undue deflection. The Contractor shall be liable for injury or damage resulting from inadequate forms, falsework or from premature removal of same.

END OF SECTION 031000

## SECTION 032200 - CONCRETE REINFORCEMENT

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section consists of furnishing, hauling, and placing all reinforcement materials, and all tools, labor, equipment, and incidentals necessary to complete this section.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Steel Reinforcing Bars: Steel reinforcing bars shall conform to ASTM A615, latest revision, "Specification for Deformed Billet-Steel Bars"; ASTM A6157, latest revision, "Specification for Axle-Steel Deformed Bars"; or ASTM A616, latest revision, "Specification for Deformed Rail-Steel Bars", and shall be Grade 60.
- B. Steel Reinforcing Wire: Steel reinforcing wire shall meet ASTM A82 requirements for cold drawn steel.
- C. Welded Wire Fabric: Welded wire fabric shall conform to requirements of ASTM A185, "Specification for Welded Steel Wire Fabric" or ASTM A497, "Specification for Welded Deformed Steel Wire Fabric".
- D. Dowel Bar Inserts: Dowel bar splice assemblies may be utilized at the Contractor's option, where required to eliminate cutting of forms at cantilevered concrete pours, corbels, etc. The inserts shall be of a threaded design, which creates a position-locking splice that exceeds the ACI1318-89 splice strength requirement of 125 percent of specified yield. Insert shall be Lenton Form Saver by ERICO Products, Richmond DB-SAE system or approved equal.

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. General: Unless otherwise indicated on the drawings or specified herein, all cutting and bending of reinforcement bars shall be done at the mill or shop prior to shipment. Cutting and bending in the field will be permitted only where shown on the plans or to correct errors, damage by handling and shipping, and minor omissions in shop bending when authorized by the Resident Project Representative.
- B. Storing and Cleaning: All reinforcement shall be stored above ground on skids, pallets, or other supports and shall be protected from mechanical injury and from deterioration by exposure. When placed in the work, reinforcement shall be free from dirt, detrimental scale, concrete,

paint, oil, or other foreign materials. Tight, thin rust is not considered detrimental, and will not require cleaning.

- C. **Placing:** Except as shown on the drawings or specified herein, all placement of reinforcing bars, welded wire fabric and bar supports shall conform to the latest edition of “Placing Reinforcing Bars, CRSI-WCRSI Recommended Practices”, published by the Concrete Reinforcing Steel Institute. Bars may be removed as necessary to avoid interference with other reinforcing steel, pipes, or other embedded items. If bars are moved more than the specified placing tolerances, the resulting arrangement shall be subject to approval by the Resident Project Representative.
- D. **Splices:** When splices other than those shown on the plans become necessary, they shall be located at areas of low stress and shall be subject to approval by the Resident Project Representative.
- E. **Fabrication Drawings:** The Contractor shall furnish for Engineer’s reference three sets of complete fabrication drawings and details for placing all reinforcing steel. These drawings shall be made in accordance with the accompanying drawings, the applicable portions of the “Building Code Requirements for Reinforced Concrete”, (ACI 318-83), the latest edition of the “Manual of Standard Practice for Detailing Reinforced Concrete Structures”, (ACI 315), and these specifications. Drawings shall show the clearances, size of members, all dimensions, and other details necessary for accurate construction of the concrete work.

END OF SECTION 032200



## 033051 – COLD WEATHER CONCRETE PROCEDURES

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: This section consists of procedures to be followed when mixing, placing, and curing concrete in cold weather. Comply with ACI 306.1 and the following.
- B. Definition: Procedures called out in this section shall be followed when the ambient temperature falls below 40°F. No concrete shall be placed when the temperature falls below 22°F.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 CONCRETE PLACEMENT

- A. Concrete Temperature: When the ambient temperature falls below 40°F, the minimum temperature of concrete as placed shall be 50°F.
- B. Preparation Before Placement: The inside of forms, reinforcing steel, and embedded fixtures shall be free of all snow and ice at the time concrete is placed. Concrete shall not be placed on a frozen subgrade. If the subgrade is frozen, concreting shall be delayed until the ground thaws sufficiently to insure that it will not freeze again during the curing period.

#### 3.2 CONCRETE MIXING

- A. As-Mixed Temperature: To maintain the temperature of the concrete above the minimum placing temperature required in Paragraph 2.1, the as-mixed temperature shall not be less than 55°F when the ambient temperature falls below 40°F.
- B. If the water or aggregate has been heated, the water shall be combined with the aggregate in the mixer before cement is added. Cement shall not be added to mixtures of water and aggregate when the temperature of the mixture is greater than 100°F.

#### 3.3 CURING AND PROTECTION

- A. Concrete Protection: When the ambient temperature of the air falls below 40°F, the concrete shall be protected during the required curing period by one of the methods outlined below. The Contractor shall make arrangements for protecting the concrete, and shall gain approval of the method from the Engineer prior to placement of the concrete.

1. Insulating Blanket: The concrete may be protected by the use of commercial insulating blanket or bat insulation. The effectiveness of insulation shall be monitored by the Resident Project Representative by placing a thermometer under the insulation in contact with the concrete. If the temperature of the concrete is below 50°F, additional insulating material shall be applied. Extra care shall be taken to prevent corners and edges of the concrete from freezing.
  2. Dry Straw: Concrete may be protected by using dry straw, 12 in. to 24 in. thick. Tarpaulins, canvas or waterproof paper shall be used to protect the straw. The temperature of the concrete shall be checked as specified in paragraph 4.1.1 of this Section and additional straw shall be applied if necessary.
  3. Heated Enclosures: The concrete may be protected by an enclosure constructed of wood framework covered with tarpaulins or plastic sheets. The enclosure shall be sturdy and reasonably airtight, with ample space provided between concrete and enclosure to permit free circulation of warm air. The enclosure shall be heated by live steam, steam in pipes, oil-fired blowers or salamanders. If a fuel-burning heater is utilized, care shall be taken to prevent drying of the concrete and to prevent injury due to concentration of heat or carbon dioxide. Arrangements for heating the enclosure shall be made and approved by the Engineer prior to placement of the concrete. Air temperature within the enclosure shall be no lower than 50°F and no higher than 70°F
- B. Required Curing Period: The curing shall continue for a cumulative number of seven days, not necessarily consecutive, during which the temperature of the air in contact with the concrete is 50°F or above. If high-early-strength cement has been used, the curing shall continue for a total of three days.

END OF SECTION 033051

## SECTION 033052 - HOT WEATHER CONCRETE PROCEDURES

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: This section consists of procedures to be followed when mixing, placing, and curing concrete in hot weather. Comply with ACI 301 and as follows.
- B. Definition: Procedures called out in this section shall be followed when the ambient temperature of the air rises above 90°F.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 CONCRETE PLACEMENT

- A. Concrete Temperature: Concrete placed in hot weather shall have a placing temperature which will not cause difficulty from loss of slump, flash set, or cold joints (less than 90°F).
- B. Preparation Before Placement: Forms, reinforcing steel, and subgrade shall be sprinkled with cool water just before concrete is placed. Prior to placing concrete, however, there shall be no standing water on the subgrade.

#### 3.2 CONCRETE MIXING

- A. Ingredients: The ingredients shall be cooled before mixing if necessary to maintain the temperature of the concrete below the maximum placing temperature required in paragraph 2.1.

#### 3.3 CURING AND PROTECTION

- A. Curing Procedures: During hot weather, arrangements for installation of windbreaks, shading, spraying, sprinkling, ponding, or wet covering shall be made and approved from the Owner gained in advance of placement and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.

END OF SECTION 033052

## SECTION 033100 - CONCRETE ADMIXTURES

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section consists of furnishing and using materials and procedures for air-entrainment of and/or addition of chemical admixtures to concrete.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Air-entrainment Admixtures: Air-entrainment shall be accomplished by the use of Type 1 Portland cement with the addition of an approved air-entrainment admixture or by the use of Type 1A Portland cement. Air-entrainment admixtures shall conform to "Standard Specifications for Air-Entraining Admixtures for Concrete", ASTM C260.
- B. Water Reducing, Retarding, and Accelerating Admixtures: Water reducing, retarding, or accelerating admixtures, if permitted by the Engineer, shall conform to "Standard Specifications for Chemical Admixtures for Concrete", ASTM C494.

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. Water Reducing, Retarding, and Accelerating Admixtures: Such admixtures may be used when such use is requested by the Contractor subject to review and approval by the Engineer. For certain uses, the Engineer reserves the right to require the use of a retardant or other admixtures for specific uses such as a retardant in extensive wall pours to assure elimination of cold joints or for other such purposes. No additional compensation will be allowed when such admixtures are used either at the Contractor's request or at the request of the Engineer. However, when certain such admixtures are used, it will be allowable to reduce the cement content of the mix to a minimum of 5½ bags of cement per cubic yard of concrete, subject to the following conditions: A trial batch and test cylinders taken therefrom demonstrate that the mix will meet the strength, workability, slump, and durability requirements of the specified mix previously herein stated. The strength shall be determined from seven-day test cylinders from a trial batch utilizing the admixture and made using the aggregates selected for the job, to establish the correct proportions to give proper workability with the water-cement ratio specified. The combination of fine and coarse aggregates shall be adjusted within limits specified until the mix meets approval of the Engineer. The seven-day test strength shall equal 95 percent of the specified minimum 28-day strength.

- B. Air-entraining and chemical admixtures shall be charged into the mixer as a solution and shall be dispensed by an automatic dispenser or similar metering device. Powdered admixtures shall be weighed or measured by volume as recommended by the manufacturer. The accuracy of measurement by any admixture shall be within  $\pm$  three percent.
- C. Two or more admixtures may be used in the same concrete, provided such admixtures are added separately during the batching sequence and provided further that the admixtures used in that combination retain full efficiency and have no deleterious effect on the concrete or on the properties of each other.
- D. Addition of retarding admixtures shall not be significantly delayed after the addition of the cement.
- E. The addition of calcium chloride to the mix will not be allowed.

END OF SECTION 033100

## SECTION 033110 - NORMALWEIGHT STRUCTURAL CONCRETE

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section shall include the furnishing, hauling, placing, curing, and testing of all portland cement concrete required by the construction drawings and herein specified.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Portland Cement: Portland cement shall conform to "Standard Specifications for Portland Cement" ASTM C150 Type 1 or Type 1A. One sack of cement shall be considered as one cubic foot of volume or 94 pounds by weight.
- B. Aggregates: Fine and coarse aggregates shall conform to "Standard Specification for Concrete Aggregate", ASTM C33. The nominal maximum size of the coarse aggregate shall not be larger than one-fifth of the narrowest dimension between sides of forms, one-third the depth of the slabs, nor three-fourths of the minimum clear distance between reinforcing bars or between bars and forms, whichever is least. Coarse aggregate gradation shall conform to ASTM C33, Size 57.
- C. Admixtures:
  - 1. Air-entrainment Admixtures: Shall be as specified in Section 033100 "Concrete Admixtures."
  - 2. Water Reducing, Retarding, and Accelerating Admixtures: If permitted by the Engineer according to procedures set forth in Section 033100 "Concrete Admixtures," water reducing, retarding, and accelerating admixtures shall conform to requirements of ASTM C494, latest revision.
- D. Mixing Water: Mixing water for concrete shall be fresh, clean, and potable. Non-potable water may be used only if it produces mortar cubes having 7- and 28-day strengths equal to the strength of similar specimens made with distilled water, when tested in accordance with "Method of Test for Compressive Strength of Hydraulic Cement Mortars", ASTM C109.
- E. Curing Compounds: All curing compounds shall conform to specifications for liquid membrane forming compounds for curing concrete ASTM 309, applied in accordance with manufacturer's recommendations.

## 2.2 PROPORTIONING CONCRETE

- A. General: Proportions of aggregate to cement and water shall be such as to provide a concrete mix that will work readily into corners and angles of forms and around reinforcement and other embedded items without causing segregation of materials.
- B. Concrete Strengths:
  - 1. Structural Concrete: Shall be provided to develop a compressive strength of not less than 4000 psi at 28 days for field-cured cylinders. All structural concrete shall contain entrained air from 3½ to 6½ percent by volume. Concrete shall have a maximum water-cement ratio of 0.45 by weight. Moisture in the aggregate shall be measured and the quantity included in the water-cement ratio specified. The minimum cement content of the mix shall be six sack per cubic yard of concrete.
  - 2. Fill Concrete: Shall be provided to develop a compressive strength of not less than 2500 psi at 28 days for field-cured cylinders. All fill concrete shall contain entrained air from 3½ to 6½ percent by volume. Concrete shall have a maximum water-cement ratio of 0.55 by weight. Moisture in the aggregate shall be measured and the quantity included in the water-cement ratio specified.
- C. Concrete Proportions: Portland cement concrete shall be proportioned and so placed as to provide an average compressive strength sufficiently high to minimize the number of compressive strength tests falling below the specified concrete strength. The proportions of the concrete shall produce a mixture that will work readily with the placement method used, into corners and angles of forms and around reinforcement. Segregation of materials in the concrete shall not be permitted nor collection of excess free water on the surface. Slump of concrete shall be the minimum that is practicable, and shall conform with the following:
  - 1. 4" max., 2" min. - footings, heavy walls, piers, buttresses
  - 2. 5" max., 3" min. - light walls, beams, columns, stairs
  - 3. 3" max., 2" min. -concrete floors with monolithic finish
    - a. In no case shall the amount of fine aggregate be more than the amount of coarse aggregate (measured by weight) nor shall the amount of coarse aggregate be such as to produce honeycombing.
- D. Trial Batches: Proportions of concrete ingredients shall be established on the basis of laboratory trial batches, using the aggregates selected for the job, to provide conformance with strength, workability, and consistency requirements at the water-cement ratio specified. When different materials are used on different portions of the project, each combination shall be evaluated separately. Test specimens shall be made in accordance with ASTM C192, latest revision, and shall be tested in accordance with ASTM C39, latest revision. The combination of fine and coarse aggregates shall be adjusted within limits specified in ASTM C33, latest revision, until the mix meets the approval of the engineer. The mix design and certified test results shall be provided to the Engineer prior to placement of the concrete on the job site.

## PART 3 - EXECUTION

### 3.1 MIXING CONCRETE

- A. Ready-Mixed Concrete: Ready-mixed concrete shall be used and shall conform to the "Standard Specification for Ready-Mixed Concrete" ASTM C94 and to the applicable portions of these Specifications.
- B. Admixtures: Shall be as specified in Section 033100 "Concrete Admixtures."
- C. Retempering: Concrete shall be mixed only in quantities for immediate use. Concrete which has set shall not be retempered, but shall be discarded.
- D. Indiscriminate addition of water to increase slump or workability shall be prohibited. When concrete arrives at the project with slump below that suitable for placing, water may be added only by authorized representatives of the concrete supplier, and then only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. The water must be incorporated by additional mixing equal to at least half of the total mixing required. Any addition of water above that permitted by the limitation on water-cement ratio must be accompanied by a quantity of cement sufficient to maintain the proper water-cement ratio. Such addition must be approved by the Resident Project Representative.
- E. Weather Conditions:
  - 1. Cold Weather: Shall be as specified in Section 033051 "Cold Weather Concreting Procedures."
  - 2. Hot Weather: Shall be as specified in Section 033052 "Hot Weather Concreting Procedures."

### 3.2 CONCRETE PLACEMENT

- A. Preparation Before Placing: Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.
- B. Formwork shall be completed; reinforcement shall be secured in place; expansion joint material, waterstops, anchors, pipe sleeves, and other embedded items shall be positioned; and the entire preparation shall be approved by the Resident Project Representative before any concrete is placed. Subgrades shall be sprinkled sufficiently to eliminate absorption of water from the concrete before any concrete is placed.
- C. Before placing concrete slabs on grade, where required, a polyethylene vapor barrier of 4 mil. thickness, or approved equal, shall be installed in accordance with the manufacturer's recommendations. A layer of sand shall be placed on the granular fill to protect the vapor barrier during placement of concrete.
- D. Conveying: Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent separation or loss of ingredients and in a manner which will assure that the required quality of the concrete is obtained. Conveying equipment shall be of size and design to ensure a continuous flow of concrete at the delivery end and shall be



approved by the Engineer. Conveying equipment and operations shall conform to the following requirements.

1. Unless noted otherwise, truck mixers, agitators, and non-agitating units and their manner of operation shall conform to the applicable requirements of "Specifications for Ready-Mixed Concrete", ASTM C94. All conveying equipment shall be adequately sized to ensure that discharge of the concrete from each truck to the point of its final placement shall be accomplished within 45 minutes after the truck arrives at the site. Any truckload of concrete not discharged within the 45 minute time limit may be rejected by the Resident Project Representative and shall not be placed on the project.
  2. Belt conveyors shall be horizontal or at a slope which will not cause segregation or loss. An approved arrangement shall be used at the discharge end to prevent separation. Long runs shall be discharged without separation into a hopper.
  3. Chutes shall be metal or metal-lined and shall have a slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.
  4. Pumping or pneumatic conveying equipment shall be without "Y" sections, and with adequate pumping capacity. The equipment shall be cleaned at the end of each operation. Pneumatic placement shall be controlled so that separation is not apparent in the discharged concrete. The maximum loss of slump in pumping or pneumatic conveying equipment shall be 1½ inches.
- E. Depositing: Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints and waterstops shall be located at points as provided for in the drawings or as approved by the Engineer. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. They may remain embedded in the concrete only if made of metal or concrete and if prior approval has been obtained.
1. Concrete shall be deposited as nearly as practicable to its final position to avoid segregation due to flowing or rehandling and shall drop vertically into the center of the forms. In no case shall concrete be allowed to fall more than five feet or at other times when required by the Resident Project Representative, drop chutes or other approved devices shall be used.
- F. Where surface mortar is to be the basis of the finish, the coarse aggregate shall be worked back from the forms with a suitable tool so as to bring a full surface of mortar against the form, without the formation of excessive surface voids. All concrete shall be consolidated by vibration, spading, rodding, or forking, so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets, which may cause honeycombing, pitting, or planes of weakness. Mechanical vibrators shall have a minimum frequency of 7,000 revolutions per minute and shall be operated by competent workmen. Overvibrating and use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at many points, from 18 to 30 inches apart. At each insertion, the duration shall be sufficient to consolidate the concrete, but not sufficient to

cause segregation, generally from 5 to 15 seconds duration. A spare vibrator shall be kept on the job site during all concrete placing operations.

G. Weather Conditions:

1. Unless adequate protection is provided and approved by the Resident Project Representative, concrete shall not be placed in rain, sleet, or snow. Rainwater shall not be allowed to increase the mixing water nor to damage the surface finish.
2. Cold Weather: Shall be as specified in Section 033051 "Cold Weather Concreting Procedures."
3. Hot Weather: Shall be as specified in Section 033052 "Hot Weather Concreting Procedures."

H. Concreting Under Water: No concrete shall be placed under water without the written approval of the Engineer.

### 3.3 PATCHING

- A. General: All tie holes and all repairable defective areas shall be patched immediately after form removal. After being cleaned and thoroughly dampened, the holes shall be filled with patching mortar and finished.
- B. Defective Areas: All honeycombed and other defective concrete shall be removed down to sound concrete. The area to be patched and an area at least six inches wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. A bonding grout shall be prepared using a mix of approximately one part cement to one part fine sand passing a No. 30 mesh sieve, shall be mixed to the consistency of thick cream, and shall then be well brushed into the surface.
- C. The patching mixture shall be made of the same material and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than 1 part cement to 1½ parts sand by damp loose volume. White portland cement shall be substituted for a part of the gray portland cement on exposed concrete in order to produce a color matching the color of the surrounding concrete, as determined by a trial patch.
- D. The quantity of mixing water shall be no more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.
- E. After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least one hour before being finally finished. The patched area shall be kept damp for seven days. Metal tools shall not be used in finishing a patch in a formed wall which will be exposed.

- F. Proprietary Materials: If desired by the Contractor, proprietary compounds for adhesion or as patching ingredients may be used in lieu of or in addition to the foregoing patching procedures. Such compounds shall be used in accordance with the manufacturer's recommendations and shall be Standard Dry Wall Products or approved equal.

### 3.4 CURING AND PROTECTION

- A. General: Exposed surfaces of concrete shall be protected from premature drying and excessively hot or cold temperatures for the period of time necessary for the hydration of the cement and proper hardening of the concrete.
- B. Curing: Initial curing shall immediately follow the finishing operation. Concrete shall be kept continuously moist for at least 24 hours by either ponding or continuously sprinkling, absorptive mat, or fabric kept continuously wet, or sand or other covering kept continuously wet. Whichever material or method is chosen shall be approved by the Resident Project Representative.
- C. Immediately following the initial curing and before the concrete has dried, final curing shall be accomplished by either continuation of the method used for initial curing, waterproof paper conforming to "Specifications for Waterproof Paper for Curing Concrete", ASTM C171, or other moisture retaining coverings as approved by the Engineer.
- D. The final curing shall continue for a cumulative number of seven days, not necessarily consecutive, during which the temperature of air in contact with the concrete is above 50°F. If high-early-strength cement has been used, the final curing shall continue for a total of three days. Changes in the temperature of the concrete shall be as uniform as possible and shall not exceed 5°F in any one hour, nor 50°F in any 24-hour period.
- E. Cold Weather: Shall be as specified in Section 033051 "Cold Weather Concreting Procedures."
- F. Hot Weather: Shall be as specified in Section 033052 "Hot Weather Concreting Procedures."
- G. Protection from Mechanical Injury: During curing, the concrete shall be protected from damaging mechanical disturbances, heavy shock, or excessive vibration. All finished surfaces shall be protected from damage caused by construction equipment, materials, or methods and rain or running water.
- H. Temperature and Shrinkage Cracks: Any temperature and shrinkage cracks which develop prior to the final acceptance of the project by the Owner shall be repaired and waterproofed to the satisfaction of the Engineer and as called for in other applicable parts of the specifications.

### 3.5 TESTING

- A. General: Contractor shall provide access to the Engineer and his representatives for any and all inspection of concrete placement. The Contractor shall pay and arrange for all testing of concrete by a third party as required by these specifications.
- B. All strength tests shall be performed by a reputable testing laboratory hired by the Contractor.

- C. Slump Tests: Slump tests shall be conducted at not less than the frequency of compressive strength samples and shall conform to "Standard Method of Test for Slump of Portland Cement Concrete", ASTM C143. The Contractor shall provide all necessary equipment, materials, sampling, and testing.
- D. Strength Tests: Test cylinders shall be taken by the Contractor and shall be cured and tested in accordance with the "Standard Method of Making and Curing Concrete Compressive and Flexural Strength Test Specimens in the Field", ASTM C31. Not less than three specimens shall be made for each 50 cubic yards of concrete or fraction thereof in each day's pour, except that in no case shall a given mix design be represented by less than five tests. In the event that three test cylinders are not considered sufficient to represent the work done, the Resident Project Representative may direct that extra cylinders be made. The standard age of test shall be 28 days, but seven-day tests and 14-day tests may be used provided the relation between the seven-day, 14-day, and 28-day strengths of the concrete is established in advance by test for the materials and proportions used and approved by the Engineer. If the Contractor desires, extra cylinders may be made and tested at his expense for the purpose of indicating sufficient concrete strength for form removal or other purposes. If the average of the strengths of the test cylinders fails to attain the specified strength so as to justify doubt as to the quality of the concrete, further tests shall be made, at the Contractor's expense, of the concrete in place to determine its fitness to remain in the structure. These tests shall be performed in accordance with the "Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete", ASTM C42.
  - 1. The strength level of the concrete will be considered acceptable if the average of three 28-day test strength results equal or exceed the specified compressive strength, and no individual tests fall below the specified compressive strength by more than 500 psi.
- E. Air Content Tests: Air content tests shall be conducted at not less than the frequency of compressive strength samples and shall conform to the "Standard Method of Test for Air Content of Fresh Mixed Concrete by the Volumetric Method", ASTM C173, or the "Standard Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method", ASTM C231. The Contractor shall provide all necessary equipment, materials, sampling, and testing.

### 3.6 GROUT

- A. General: This item includes furnishing, placing, and finishing the grout as required by the drawings or specified herein.
- B. Materials: Material requirements for grout shall be as set forth in Part 2 of this specification.
- C. Proportioning and Mixing: Grout shall consist of a mixture of one part portland cement and two parts fine aggregate with a slump of three inches to five inches. The water-cement ratio shall be maintained at not more than 4½ gallons per bag of cement. The ingredients shall be mixed in accordance with the applicable portions of Paragraph 4 of this specification, so as to produce a uniform mass of material.
- D. Placing: Before placing grout, the concrete shall be thoroughly cleaned of all dust, dirt, or other deleterious material and then shall be thoroughly wetted. Grout shall be placed in one continuous operation to the thickness shown on the plans with no construction joints allowed.
- E. After the grout is placed, it shall be given a floated finish and shall be cured.

- F. Non-Shrink, Non-Metallic Grout: Where called for on the drawings or by these specifications, or where, for a specific application, its use is otherwise required, non-shrink, non-metallic grout shall be utilized. Manufacturer's instructions for application shall be strictly followed.

END OF SECTION 033110

## SECTION 050523- METAL FASTENING

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section consists of furnishing and installing steel bolts, or performing welding operations, for all shop or field connections of structural steel.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Stainless Steel Bolts and Anchor Rods: All steel bolts, nuts, and washers, unless noted otherwise on the drawings or herein, shall be stainless steel conforming to ASTM F593, latest revision. Nuts shall conform to ASTM F594. High strength stainless steel bolts shall be Type 316 for typical applications and Type 316L for weldable applications.
- B. High Strength Bolts: Where fasteners are noted on the drawings as "high-strength" or "A325", the bolts, nuts, and washers so noted shall conform to ASTM F3125, latest revision. Bolts shall have 1/8-inch thick washers under nuts and heads.
- C. Standard Fasteners: Where fasteners are noted on the drawings as "standard" or "A307", they shall be carbon steel, externally threaded standard fasteners conforming to ASTM A307, latest revision, Grade A. Nut for standard fasteners shall be of the grade and style specified in ASTM A307, and shall meet the requirements of ASTM A563, latest revision.
- D. Anchor Rods: All anchor rods shall conform to ASTM F1554 grade 55 unless otherwise specified.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Bolting: Field connections, unless otherwise noted on the drawings or directed by the Engineer, shall be made with stainless steel bolts. Field connections that are to be made with A325 high strength bolts shall be made in accordance with "Specification for Structural Joints Using ASTM A325 or A490 Bolts" as endorsed by the American Institute of Steel Construction.
- B. Welding: If field welding is used, the Contractor's welding procedures, welders, and welding operators shall be qualified and certified in accordance with the requirements of AWS D1.0 "Welding in Building Construction" of the American Welding Society. Proof of certification shall be provided to the Engineer upon request. All welds shall be such as to conform to the requirements of the design loads.

C. Finishes:

1. Hot-Dip Galvanized: The finish of individual steel members and/or assembled steel fabrications which are required by the drawings to be hot-dip galvanized shall be applied in conformance with ASTM specifications A123, A384, and A385, latest revisions. Hardware used in galvanized member connections shall conform to ASTM A153 unless otherwise specified.

END OF SECTION 050523

## SECTION 129300 – SITE FURNISHINGS

### 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. Campfire Grill and Fire Ring.
  - 2. Concrete Wheel Stops.
  - 3. Parking and Directional Signs.
  - 4. Picnic Table.
  - 5. Single Lantern Post.
- B. Related Sections include the following:
  - 1. Division 05 Section “Metal Fastenings”
- C. Products furnished, but not installed under this Section, include anchor bolts to be cast in concrete.

#### 1.3 SUBMITTALS

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

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of site furnishing(s) through one source from a single manufacturer.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes.
- B. Steel and Iron: Free of surface blemishes.



- C. Stainless Steel: Free of surface blemishes.
- D. Wood: Surfaced smooth on four sides with eased edges; kiln dried, free of knots, solid stock of species indicated.
  - 1. Wood Species: Manufacturer's Standard.
- E. Anchors, Fasteners, Fittings, and Hardware: Stainless steel, commercial quality, vandal and theft resistant.
- F. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107; recommended in writing by manufacturer, for exterior applications.
- G. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.
- H. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
  - 1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil thick.
  - 2. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

## 2.2 CAMPFIRE GRILL AND FIRE RING (Standard and Accessible)

- A. Subject to compliance with requirements, Owner will provide the product indicated below or a comparable product approved by Engineer prior to delivery and installation.
- B. Standard Campsite
  - 1. T-155- Heavy Duty Tip-Back Campfire Ring by Missouri Vocational Enterprises
- C. Accessible Campsite
  - 1. T-156- Heavy Duty Tip-Back Campfire Ring by Missouri Vocational Enterprises
- D. The campfire rings will be provided by the Owner and installed by the Contractor.

### 2.3 CONCRETE WHEEL STOPS

- A. Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product approved by Engineer prior to delivery and installation.

### 2.4 PARKING AND DIRECTIONAL SIGNS

- A. Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product approved by Engineer prior to delivery and installation.

### 2.5 PICNINC TABLE (ADA Style, for all sites)

- A. Subject to compliance with requirements, Owner will provide GM-101- Galvanized Picnic Table 6ft long for standard sites and GM-102- Galvanized Picnic Table 8ft long, by Missouri Vocational Enterprises or a comparable product approved by Engineer prior to delivery and installation
- B. The assembled picnic tables will be provided by the Owner and installed by the Contractor.

### 2.6 SINGLE LANTERN POST (Standard and Accessible)

- A. Subject to compliance with requirements, Owner will provide a lantern post, by Missouri Vocational Enterprises or a comparable product approved by Engineer prior to delivery and installation
- B. The lantern posts will be provided by the Owner and installed by the Contractor.

### 2.7 FUTURE BATH HOUSE/SHOWER HOUSE

- A. General Contractor Responsibilities include the following:
  - 1. Prepare the hole/site of the FUTURE restroom/shower unit including:
    - a. Earthwork. The site shall be excavated as required and in accordance with the Geotechnical Report for installation. The excavation shall be a minimum of 24” larger in each direction than the outside vault dimensions. The subgrade soils shall be compacted to provide a minimum bearing capacity of the sub-grade of 1,500 pounds per square feet.
    - b. Utility stubs. Any required utility stubs shall be located horizontally within 2-inches of the coordinated locations and extended to an elevation a minimum of 6 inches above the indicated floor elevations.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.
- D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
- E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and  $\frac{3}{4}$  inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.
- F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

### 3.2 CLEANING

- A. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION 129300

SECTION 260120 – OPERATION AND MAINTENANCE OF LOW-VOLTAGE ELECTRICAL DISTRIBUTION

PART 1 - GENERAL

- 1.1 The Contractor shall undertake all electrical work in a manner that assures that the operation of the existing wastewater lift stations remain unaffected by construction of the electrical systems. Some temporary conduit, conductor runs, and connections may need to be installed to maintain operation of the existing lift stations during construction. All such temporary work, including equipment, materials, labor, incidentals, and appurtenances shall be considered a part of these specifications. Contractor shall not be allowed additional compensation, nor additional time beyond that reflected in the Contractor's bid for such temporary electrical installations.
- 1.2 All electrical equipment removed from the existing RV Park during all phases of renovation shall be the sole property of the Roaring River State Park. All salvaged materials shall be removed by the Contractor to a place of storage designated by the Park, or, at the Parks option, shall be disposed of by the Contractor at no additional cost to the Owner.
- 1.3 All temporary installation of electrical equipment shall be made in accordance to requirements of the 2023 N.E.C.

END OF SECTION 260120

## SECTION 260503 – COMMON WORK RESULTS FOR ELECTRICAL

### PART 1 - CODES AND STANDARDS

- 1.1 Codes: All work shall be done in accordance with the latest rules and regulations of the National Electrical Code, the National Electrical Safety Code, and the local authorities having jurisdiction over this class of work. The provisions of these codes constitute minimum standards for wiring methods, materials, equipment, and construction. Strict compliance therewith will be required for all electrical work, except where the drawings and specifications require better materials, equipment, and construction than these minimum standards, in which case, the drawings and specifications shall precede the Code requirement.
- 1.2 Standards: Contractor shall complete and make operable the electrical systems of all equipment and devices shown on the drawings. This consideration shall include all electrical interconnections, home runs, and services. Contractor shall provide an operational and functional check of the electrical systems involved.
  - A. Contractor shall install, connect, and complete all equipment and devices as per manufacturer's certified drawings approved by Engineer.
  - B. All work, selection of materials, ratings, capacities and methods of construction shall be approved by the Engineer in writing before work is started.
  - C. The Bidder may request to furnish equivalent items ONLY by submitting his request in writing to the Engineer no later than 14 days prior to bid opening. The Engineer will review the request, and if the items are deemed equivalent, approval will be made in writing.
  - D. All control circuits shall operate at a nominal voltage not to exceed 120 volts to ground and shall be obtained from a fused 120 volt circuit or a transformer with an isolated secondary winding, with primary power taken from a source on the load side of the main disconnect device. One side of the control circuit shall be grounded, and the ungrounded side shall be properly fused at the point of transformation or supply.
  - E. Materials, and equipment shall meet the applicable requirements of NEMA, ANSI, IEEE, and the latest edition of IPCEA Publication #S-19-81, as specified.
  - F. Materials and equipment of the types for which there are Underwriters' Laboratories Standard requirements, listings, and labels shall have listing of Underwriters' Laboratories and be so labeled, or shall conform to the requirements, in which case, certified statements to the effect shall be furnished, if requested. Use new materials and equipment.
  - G. Materials other than those listed shall be the size, type, and capacity indicated by the drawings and the specifications. Insofar as possible, use one type and quality.

### PART 2 - DEFECTIVE MATERIALS AND WORKMANSHIP

- 2.1. The acceptance of any materials, equipment, or any workmanship by the Engineer shall not preclude the subsequent rejection thereof if such materials, equipment, or workmanship shall be found to be defective after delivery or installation, and any such materials, equipment, or workmanship found defective before final acceptance of the construction shall be replaced or remedied, as the case may be, by and at the expense of the Contractor. Any such condemned material or equipment shall be immediately removed from the site of the project by the Contractor at the Contractor's expense.

The Contractor shall not be entitled to any payment hereunder as long as any defective materials, equipment, or workmanship in respect to the project, of which the Contractor shall have had notice, shall not have been replaced or remedied, as the case may be.

- 2.2 Notwithstanding any certificate which may have been given by the Engineer, if any materials, equipment, or any workmanship which does not comply with the requirements of this contract shall be discovered within one (1) year after completion of construction of the project, the Contractor shall replace such defective materials or equipment, or remedy any such defective workmanship within thirty (30) days after notice in writing of the existence thereof shall have been given by the Owner. If the Contractor shall be called upon to replace any defective materials or equipment, or to remedy defective workmanship as herein provided, the Owner, if so requested by the Contractor, shall de-energize that section of the project involved in such work. In the event of failure by the Contractor to do so, the Owner may replace such defective materials or equipment, or remedy such defective workmanship, as the case may be, and in such event, the Contractor shall pay to the Owner the cost and expense thereof.

### PART 3 - TEST AND INSPECTION

- 3.1 Contractor shall provide labor, material, and test equipment, except as noted to the contrary herein, to test all wiring and equipment for continuity, proper polarity, proper phase relation, dielectric strength, operation and alignment after installation. Test equipment and methods shall meet the Engineer's approval. The Engineer shall be notified at least two working days prior to tests and reserves the right to witness any and all such tests. The Engineer shall interpret test results and pass on the acceptability. Electrical test data reports shall be filled out by contractor's field representative and engineer. Contractor-supplied work which does not test out to the Engineer's satisfaction shall be corrected and re-tested as required without added cost to the Owner. The Engineer reserves the right to perform any test on any phase of the installation utilizing Contractor's personnel and test equipment.

### PART 4 - SCOPE OF WORK

- 4.1 The work covered by the specification shall include furnishing all labor, material, equipment, and services to construct the complete electrical system as shown on the accompanying plans and as specified herein. The work, in general, includes the following principle items:
- A. The service to main distribution panelboards MDP-1, MDP-2, MDP-3 and MDP-4, via Pad Mount Transformers.
  - B. The complete conduit and wiring system for RV pedestals and conduit for restroom/showers.
  - C. The equipment racks, concrete embedment posts and accessories.
  - D. RV pedestals as specified.
  - E. The complete underground wiring including pvc conduit as shown on drawings.
  - F. Removal and/or relocation of existing electrical equipment as noted on plans
  - G. Temporary conduit and conductor runs and connections as required to maintain operation of existing lift stations during construction.

## PART 5 - DRAWINGS

- 5.1 The design drawings, which constitute an integral part of this contract, shall serve as the working drawings. They indicate the general arrangement and are generally diagrammatic; and locations of outlets and equipment shall be governed by structural conditions and obstruction. This is not to be construed to permit redesigning systems. All outlets shall be interconnected as shown on the drawings.
- 5.2 The Contractor shall review the plans of all phases of this project and shall adjust his work to conform to all conditions indicated thereon.
- 5.3. All modifications or relocations shall be approved by the Engineer prior to actual work.
- 5.4 The Contractor shall submit complete connection and schematic wiring diagrams, including a complete list of materials and components used in the electrical system for approval.
- 5.5 Six copies of data on all material and equipment to be incorporated into the project shall be submitted to Engineer for approval as specified in the General Conditions. This includes all conduit, conductor, fitting, fixture, etc. The Engineer will subsequently review all data presented and will make the necessary approval in writing.
- 5.6 After approval is granted on material and equipment, the Contractor may then install the equipment in the project.

END OF SECTION 260503

## SECTION 260519 – LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

### PART 1 - GENERAL

- 1.1 All wire and cables shall be of copper, and shall comply with the standardization rules of the IEEE as to conductivity and shall be free from kinks and defects when installed. Conductors shall be in accordance with the requirements of IPCEA Publications S-19-81, latest edition. Conductor sizes as shown on drawings or scheduled herein, are for copper conductors. No aluminum wire or conduit for aluminum wire shall be installed without approval in writing from the Engineer.
- 1.2 All wire used in this project shall be new and shall be identified by type and manufacturer.
- 1.3 All wire and cable shall be approved by the Engineer, as hereinbefore outlined.

### PART 2 - MATERIALS

- 2.1 Minimum wire size shall be No. 12 AWG and shall have six hundred (600) volt insulation unless otherwise specified.
- 2.2 Insulated wire and cable shall have size, type of insulation, voltage, and manufacturer's name permanently marked on outer covering at regular intervals not exceeding four feet. Wire and cable shall be delivered in complete coils or reels with identifying tags, stating size, type of insulation, voltage, and manufacturer's name.
- 2.3 Wire and cable shall be suitably protected from weather and other damage during storage and handling, and shall be in first class condition after installation.
- 2.4 Conductors shall be soft drawn copper ASTM B3 for solid wire, ASTM B8 for stranded conductors. Conductor wire sizes shall be American Wire Gauge (AWG); all wire of #8 and larger shall be stranded for "Conduit" work.
- 2.5 All conductors shall be rated 600 volts unless otherwise specified or shown in the drawings.
- 2.6 Power wiring shall be THWN, THHN, unless otherwise specified.
- 2.7 Conductors in hazardous areas shall be Type RHW or XHHW.
- 2.8 All control wiring shall be Type THW or THWN unless otherwise specified. Control cable shall be made up of 7 strand copper conductors with 20 mils of polyethylene insulation of 10 mils of color coded PC covering on each conductor, enclosed in a flamenol jacket overall.
- 2.9 All direct buried cable shall be Underwriters' Type USE, TC-ER 90°C, 600 volt, with thermosetting polyethylene insulation.

### PART 3 - INSTALLATION

- 3.1 All conductors shall be continuous from box to box and no splices shall be made in the conduit or earth. All splices, taps, or connections shall be soldered or joined by mechanical means, 3M, or equal. All contact surfaces shall be cleaned to assure maximum conductivity. All equipment that is not furnished with connectors shall be provided with approved AL-CU lug-Type terminal



connectors.

- A. Each 120 volt branch circuit must be provided with a neutral wire, and in no case may the neutral wire be interrupted or fused. Common neutrals may be used as permitted by the 2023 NEC.
  - B. Branch circuits shall be installed in conduit, and shall meet all applicable provisions of 2023 NEC.
  - C. When 20 ampere branch circuits exceed sixty-five (65) feet of conductor length one way, the wire size shall be increased to #10 AWG. For lengths in excess of one hundred (100) feet, the wire shall be increased to #8.
  - D. Branch circuits shall be wired so that the neutral and the ground conductors are continuous, and will not be interrupted by removal of any fixture, receptacle, or other device.
- 3.2 All splices and joints at the free ends of conductors shall be covered with an insulation composed of materials of thickness and insulation resistance equal to that on the conductors, as recommended by the wire manufacturer. A pulling compound used in pulling in any conductor shall not contain any oils or grease and shall be approved by the Engineer.
- 3.3 Unless otherwise noted, equipment shall, in all cases, be wired so that on facing the front of the equipment, Phase "A" appears at the front, top or left, Phase "B" in the center and Phase "C" at the bottom, back, or right hand side.
- 3.4 Conductors for all power and lighting circuits shall be identified by the following color code:

	<u>480Y/277V,3Ø</u>	<u>240/120V,3Ø</u>	<u>120/240,1Ø</u>	<u>208/120,3Ø</u>
Phase A	Brown	Black	Black	Black
Phase B	Orange	Orange-Red	Red	Red
Phase C	Yellow	Blue		Blue
Neutral	Gray	White	White	White
Equipment Ground	Green	Green	Green	Green

Identification of conductors, #8AWG and smaller shall be made by use of colored conductors only. Identifications of conductors of #6AWG and larger shall be made by use of colored conductors or colored plastic tape. If colored plastic tape is used for conductor identification, it shall be installed on conductors at every junction box and equipment enclosure. Control cable conductors shall be identified at the terminal designations in equipment to which it connects. Underground cables shall be properly identified as to phase by use of a non-corrosive metal tag at each end of the cable run. The metal tag shall be stamped with letters not less than one-half (1/2) inch in height.

- 3.5 Direct buried conductors shall be installed so that the top conductor is at least two feet (2'-0") below finish grade. The trench for cables shall be excavated three inches (3") below the bottom cable line and the trench shall then be backfilled to the first cable line with sand. Cables shall then be installed, maintaining at least two inches (2") separation between cables. Subsequent backfilling and cable installation shall then be made. After the top layer of cables is installed, a three-inch (3") layer of sand shall be installed. The trench shall then be backfilled to within twelve (12") inches of the surface. At this point, lay continuous underground magnetic utility marking tape with appropriate imprinting repeated every twenty-four inches (24") as

manufactured by SETON 85508, or approved equal. After the marking tape has been laid, the trench shall be backfilled and tamped.

END OF SECTION 260519

## SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

### PART 1 - GROUNDING

#### 1.1 Equipment Grounding:

A. All exposed non-current carrying metal parts of all equipment, receptacles, enclosures, conduits, motors and other devices and accessories, shall be bonded to a separate equipment grounding conductor. The equipment grounding conductor and/or raceway shall be insulated from the grounded service conductor (neutral) except at the point of service entrance or supply.

B. The equipment grounding conductor shall be sized in accordance with NEC Table 250.66, unless otherwise indicated. Equipment grounding conductors shall be insulated, and shall be protected from mechanical damage by means equivalent to those provided for live conductors, and shall be green colored.

C. Flexible metallic conduits in excess of six and one-half (6-1/2') feet in length shall have an equipment grounding conductor installed unless conduit and connectors are UL approved as a grounding assembly.

D. Electrical systems on secondary side of dry-transformers shall be grounded in accordance with NEC Article 250.30.

#### 1.2 Bonding:

1.2.1 The grounding terminal of each receptacle shall be bonded to the metallic outlet box with a bonding jumper or through the supporting screws where they are UL approved for this purpose.

1.2.2 The grounded service conductor (neutral) shall be bonded to the equipment grounding conductor, but only within the main switchboard. This bonding jumper shall have an area of at least 12-1/2 percent of the area of one of the service entrance phase buses.

1.2.3 All grounding conductors installed in conduit shall be bonded to both ends of the conduit except where phase conductors are installed in the same conduit.

#### 1.3. Grounding Electrode System:

1.3.1 The ground shall be connected to the main ground bus in the main panelboard center by means of a bare, unspliced, stranded, copper conductor sized as shown on the Riser Diagram.

1.4 Tests: The Contractor shall check the ground resistance path in the presence of the Engineer or his representative, who shall pass on the acceptability of both the test instrument and the method of carrying out this test.

END OF SECTION 260526

## SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 - MATERIALS

- 1.1 Supports for conduit shall consist of conduit clamps of an approved type, conduit hangers, pipe hangers designed for attachment to wood posts, steel beams, galvanized steel strut trapeze with threaded rod hangers, or wall brackets as required to suit special conditions.
- 1.2 Galvanized rigid conduit exposed inside and outside, mounted to wood posts shall utilize mechanically galvanized straps with conduit spacers. Galvanized rigid conduits exposed inside and outside, mounted to steel beams and/or mounted on concrete block or steel surfaces shall utilize Type 14-G malleable iron, mechanically galvanized straps with malleable iron conduit spacers and nest backs fastened to malleable iron beam clamps. All straps and clamps shall be as manufactured by Ozgedney, Crouse Hinds, Appleton, Killark or an approved equal.
- 1.3 All strut rack systems shall be hot dip galvanized after fabrication, and shall comply with ASTM A1 23
- 1.4 Strut systems shall be bolted with approved fittings, stainless steel bolts, locking washers, nuts, spring nuts, and/or twirl nuts. Welded connections for strut are prohibited without prior approval in writing from the Engineer. The use of slotted strut is prohibited.

END OF SECTION 260529

## SECTION 260533 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

### PART 1 - MATERIALS

- 1.1 All conduit shall be low carbon, hot dipped galvanized, heavy wall, rigid steel conduit; or rigid polyvinyl chloride heavy wall conduit, as specified.
- 1.2 All conduit shall bear the Underwriters' Label of approval and shall be manufactured according to American Standards Association Specifications.
- 1.3 Minimum size of conduit shall be three-fourths (3/4) inch, except as specifically noted on the plans.
- 1.4 Flexible conduit and fittings shall be used to complete the final twenty-four (24) inches of connection to rotating machinery, transformers, and other equipment subjected to movement or vibration. Flexible conduit shall be Type UA liquid-tight.
- 1.5 Special conduit fittings shall be appropriate for each application. Conduit systems shall be installed in accordance with the 2023 NEC Edition, and shall be installed in a neat and workmanlike manner.

### PART 2 – INSTALLATION

- 2.1 Conduit must be installed at least twelve (12) inches from hot water piping in parallel runs, at least six (6) inches in cross runs, and at least three (3) inches from cold water piping. Conduit shall in no case be secured to other piping, and where practical, shall be installed above other piping.
- 2.2 Exposed conduit runs, where allowed, shall be parallel or perpendicular to building walls. Conduit shall be installed in an approved manner, and rigidly supported with approved conduit clamps. Drilling of, or welding to main structure members for supporting means is not permissible.
- 2.3 The opening of all conduit fittings shall be readily accessible.
- 2.4 All metallic conduit shall be cut square and threads for rigid conduit shall be cut and cleaned before reaming. All joints in rigid galvanized conduit shall be threaded fully and pulled tight with a wrench. Each underground joint shall be sealed with spray plastic for waterproofing and corrosion protection. Conduit must be securely fastened to all outlet boxes with double locknuts to provide continuity of ground. Bushings of approved make must be used, care being exercised to see that the full number of threads project through to allow the bushings to butt up tight against the end of the conduit. Conduit shall be joined by approved couplings and shall have ends butted in all cases. The use of running threads will not be permitted. Where building construction or other conditions make it impossible to use standard threaded couplings, approved watertight conduit unions shall be installed as to make a continuous bond between the conduits connected.
- 2.5 All ends of conduit shall be properly reamed to remove rough edges and whenever a conduit enters a box or other fittings, it shall be securely fastened by the use of a locknut inside and outside of the box or fitting. An approved bushing shall be installed on the ends of all conduits

in such a manner as to protect the wire from abrasion. The contractor shall so lay out and install the conduit systems as to avoid all other services or systems, the proximity of which may prove injurious to the conduit or the wires or conductors which it confines. All conduit systems except those otherwise specifically shown to the contrary, shall be concealed in the building construction.

- 2.6 All conduits with conductors exiting into areas without the use of boxes, shall be supplied and installed with bell type connectors as approved for this purpose, to protect the conductors from physical damage.
- 2.7 All polyvinylchloride conduit shall be cut square and joints made with an approved solvent cement. A grounding conductor shall be installed in conduit to insure continuity of ground.
- 2.8 All conduit and fittings installed outdoors shall be rain-tight and shall be pitched and drained as required by the 2023 National Electrical Code.
- 2.9 Whenever a conduit or duct enters an area from an exterior or underground distribution system, the end within the building shall be sealed with a suitable compound so as to prevent the entrance of moisture or gases. Spare or unused conduit shall also be sealed.
- 2.10 All conduit or duct required to be encased in a concrete envelope shall have three (3) inches of concrete coverage all around. Conduits and ducts shall be racked on spacers with a minimum of one spacer every five (5) feet. Conduits and ducts shall be so placed that the joints are staggered.
- 2.11 All underground conduit or ducts, where not located below the frost line, shall be arranged to drain in accordance with the NEC.
- 2.12 All conduit installed below grade or encased in concrete shall be rigid galvanized steel or polyvinyl chloride. Conduit fittings shall be rigid galvanized steel or malleable.
- 2.13 All conduit installed above grade outdoors shall be galvanized rigid, unless otherwise indicated
- 2.14 All conduit installed above grade or exposed in buildings shall be galvanized rigid.
- 2.15 All underground conduit not encased in concrete shall be buried a minimum twenty-four (24) inches deep. PVC conduit shall further be laid in a bed of sand or limestone screenings with a minimum of two (2") inch coverage top and bottom, with plastic utility marking tape above conduit at 12" below finished grade.
- 2.16 Right angle turns shall consist of symmetrical bends of rigid galvanized steel. PVC right angle turns shall not be utilized. Bends and offsets shall be avoided wherever possible. Field bends shall be made so as to avoid changing the internal diameter of the conduit and so as not to damage its protective coating either outside or inside. Bends shall be free from kinks, indentation, or flattened surfaces and shall be made with approved conduit bending machines or devices, in accordance with recommended radii per the 2023 NEC. No more than four ninety (90) degree bends will be allowed in any one conduit run. Where more bends are necessary, a suitable pull or junction box shall be installed, but not on a building expansion joint. All junction boxes shall be sized in accordance with the 2023 NEC.

END OF SECTION 260533

## SECTION 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

- 1.1 This section includes identification of electrical materials, equipment, and installations. It includes requirements for electrical identification components, including, but not limited to the following: identification labeling for panelboards, disconnects, motor control centers, transformers, and electrical-related signs.

### PART 2 - MATERIALS

- 2.1 Engraved, plastic-laminated labels, signs, and instruction plates: engraving stock melamine plastic laminate, 1-1/16-inch minimum thick for labels and signs up to 20 square inches, or 8 inches in length; 1-1/8-inch thick for larger sizes. Engraved legend in white letters on black face and punched for mechanical fasteners.

### PART 3 - INSTALLATION

- 3.1 Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment. Labels shall be one inch (1") high, three inches (3") wide, 1-1/16 inch thick with 1/4 inch lettering. Text shall match terminology and numbering, as schedules and drawings indicate.

Apply labels for each unit of the following categories of electrical equipment (panelboards, electrical cabinets, enclosures, electrical switchgear, disconnect switches, switchboards, contactors, and motor control centers).

END OF SECTION 260553

## SECTION 262416 – MAIN DISTRIBUTION PANELBOARDS

### PART 1 – GENERAL

- 1.1 This section includes low voltage power service and distribution panelboards and associated auxiliary equipment rated 600V or less.

### PART 2 – MATERIALS

- 2.1 NEMA Type 3R Boxes shall be galvanized steel construction in accordance with UL50 requirements.
- 2.2 Boxes shall have removable blank end walls and interior mounting walls.
- 2.3 Maximum enclosure dimensions shall be 42 inches wide and 9.5 inches deep.
- 2.4 NEMA Type 3R Trim Front: Shall meet strength and rigidity requirements per UL 50 standards. Trim front shall be manufacturer's standard gray finish over a rust-inhibiting primer on phosphate treated metal surface.
- 2.5 Trim front shall be hinged 1-piece with door surface mount. Trim front door shall have rounded edges free of burrs. A clear plastic directory card holder shall be mounted on the inside of the door.
  - A. Locks shall be cylindrical tumbler type with larger enclosures requiring sliding vault locks with 3-point latching. All lock assemblies shall be keyed alike. Two (2) keys shall be provided with each lock.
- 2.6 Interior shall be continuous main current ratings as indicated on drawings, not to exceed 600 amperes maximum. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67.
  - A. Main lug and main breaker panelboards shall be suitable for use as service equipment when application requirements comply with UL 67 and NEC Articles 230-F and G.
  - B. The bussing shall be fully rated with sequentially phased branch distribution. Bussing rated 200 amperes and above shall be plated copper.
  - C. Interior trim shall be of dead-front construction to shield user from all energized parts. Main circuit breaker and main lug interiors shall be field convertible for top or bottom incoming feed.
  - D. Equipment ground bar shall be isolated. Ground bar shall be copper. Solid neutral shall be equipped with a full capacity grounding strap for service entrance applications.
  - E. Nameplates shall contain system information and catalog number or factory order number, interior wiring diagram, neutral wiring diagram, UL listed label, and short circuit current ratings shall be provided. Leveling provisions shall be provided.



### PART 3 – RATINGS

- 3.1 Provide nominal system voltage, continuous main bus amperage, and short-circuit current ratings as indicated.
  - A. Nominal system voltage: 120/240V, 60 HZ 1Ø.
  - B. Main bus continuous: 400 amperes and 600 amperes.
  - C. Short circuit current ratings: 65,000 symmetrical amperes.

### PART 4 – INSTALLATION

- 4.1 General: Install panel boards and accessory items in accordance with manufacturer's written installation instructions.

### PART 5 – MANUFACTURERS

- 5.1 Distribution panelboards shall be manufactured by Square D, Siemens, General Electric, or an approved equal.

END OF SECTION 262416

## SECTION 262720 RV PEDESTAL

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Integral Receptacles, receptacles with integral GFCI, and associated device plates.
  - 2. Pedestal mounted RV hookup enclosure with in-use flip open cover, NEMA 3R enclosure.
- B. See Division 3-13 for any earthwork, concrete, etc.
- C. See Division 26 Section "Panelboards" for parts within RV pedestal that correspond to bussing, circuit breakers, etc.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

#### 1.3 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.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
  - 1. Eaton/ Cutler Hammer
  - 2. Milbank
  - 3. Midwest Electrical Products
  - 4. General Electric

5. Wiring Devices:

- a. Cooper Wiring Devices
- b. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
- c. Leviton Mfg. Company Inc. (Leviton).
- d. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 RV PEDESTALS

- A. See on-drawing schedule for model/make and accessories.
- B. Installation of pedestal to closely following on-drawing details and manufacturer guidelines
  1. Provide in-grade sleeve for installation per details
  2. Stainless steel stand option with bolt down base.
- C. The amperage of the RV pedestal bussing shall be 200 amps, 22 kAIC, due to configuration of loop feeds. Each set of main lugs shall be loop fed style lugs (in/out).
- D. All enclosures shall be weathertight NEMA 3R.
- E. NO LIGHT TO BE PROVIDED WITH PEDESTAL.
- F. Housing shall be resin / epoxy with guarantee of no rusting.
  1. Lifetime warranty with housing
- G. Provide loop-feed 3/8" mechanical busbars that can accept to (3) 1/0 – 250 MCM AWG wire. (Terminal Panel)
- H. UL listing.
- I. Breakers and wiring outlets per on-drawing details and notes. As basis, include the following:
  1. 1 – 50 amp, 250V outlet with 50 amp circuit breaker (2 pole)
  2. 1 – 30 amp, 125V outlet with 30 amp circuit breaker (2 pole)
  3. 1 – 20 amp, 125V outlet (convenience, custom option) with standard 20 amp, 1-pole GFCI circuit breaker.

2.3 BUSSING AND BREAKERS

- A. See related specification sections for panelboards which shall be similar to bussing, isolation, and bolt-on style of breakers.

2.4 INDUSTRIAL HEAVY DUTY RECEPTACLES

- A. Provide pin and sleeve design receptacles conforming to UL 498. Comply with UL 1010 where installed in hazardous locations. Provide features indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted
- B. Conform to panelboard installation techniques from 262413 section.
- C. Coordination with Other Trades:
  - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
  - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  - 4. Install wiring devices after all wall preparation, including painting, is complete.
- D. Conductors:
  - 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
  - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
  - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails
  - 4. Existing Conductors:
    - a. Cut back and pigtail, or replace all damaged conductors.
    - b. Straighten conductors that remain and remove corrosion and foreign matter.
    - c. Pigtailing existing conductors is permitted provided the outlet box is large enough.
- E. Device Installation:
  - 1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
  - 2. Keep each wiring device in its package or otherwise protected until it is time to connect

conductors.

3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

F. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

G. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

END OF SECTION 262726

## SECTION 311000 - TREE REMOVAL, CLEARING AND GRUBBING

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work in this section consists of furnishing all labor, materials, equipment, and tools necessary for performing all operations for tree removal and for all clearing and grubbing within the construction area as necessary to complete the improvements.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. Clearing & Tree Removal:

1. Clearing and tree removal shall consist of clearing the surface of the ground in the construction areas of all trees, stumps, roots, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, debris, and rubbish of any nature.
2. Trees, stumps, roots, brush, and other vegetation in the areas to be cleared shall be cut below the original ground surface.
3. Trees and vegetation designated to remain standing shall be protected from any demand incidental to the clearing, grubbing, and construction operations.
4. The Contractor is free to remove any trees noted on the drawing between November 1st and March 31st. The Contractor shall get permission from the Owner's Representative to remove any tree noted on the drawing between April 1st through October 31st to prevent loss of Bat habitat. After April 1st and before October 31st the Contractor shall give the Owner's Representative 5 working days' notice of any trees noted on the drawing, or identified for removal. Once the Owner's Representative has determined that the trees are not Bat habitat the Contractor shall remove the tree needed to proceed with the work.

- B. Grubbing:

1. Grubbing shall consist of the removal and disposal of stumps, roots larger than two (2) inches in diameter, and matted roots from the construction areas. This material shall be removed to a depth of no less than twelve (12) inches below the original surface of the ground or twelve (12) inches below finished grade, whichever is the lower elevation.
2. Depressions created by grubbing operations shall be filled with suitable material and compacted.

C. Disposal of Materials:

1. All cleared and grubbed material, including trees, stumps, roots, vegetation, organic material, rubbish, and otherwise, shall be removed from the project site and disposed of in accordance with federal, state, and local laws.
2. Burning of debris on the site will not be permitted. Debris shall be removed from the site and taken to a landfill, or depository areas as selected by the Contractor.

END OF SECTION 311000

## SECTION 312000 - EARTHWORK

### 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. Stripping and Stockpiling Topsoil
2. Preparing subgrades for slabs-on-grade, walks, & pavements
3. Excavating and backfilling for buildings and structures.
4. Subbase course for concrete walks & pavements.
5. Subbase course and base course for asphalt paving.
6. Subsurface drainage backfill for walls and trenches.
7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

##### B. Related Sections:

1. Section 015500 "Construction Facilities and Temporary Controls"
2. Section 312100 "Subgrade Compaction"
3. Section 312200 "Structure Excavation, Trenching, and Backfilling"
4. Section 312221 "Trenching, Backfilling, and Compaction"
5. Section 312222 "Granular Stone Bedding and Backfill"
6. Section 312250 "Compaction Control & Testing"
7. Section 312260 "Finish Grading"
8. Section 312319 "Dewatering"
9. Section 313200 "Site Geotechnical Report"
10. Section 329219 "Seeding"

#### 1.3 MEASUREMENT AND PAYMENT

- A. There are no unit prices or allowances for any Earthwork operations in this project.
- B. The Earthwork lump sum amount shall include all excavation, hauling, placement of earthwork, staging/stockpiling, backfilling, compacting fill, and grading.
- C. Where rubbery conditions exist at the time the aggregate surface is to be placed, the Contractor shall rework or remove such material as directed by the Engineer and replace it with a suitable subgrade material compacted in accordance with these specifications. All rework or removal and replacement shall be SUBSIDIARY to Earthwork.
- D. Compacting in Cut, will not be paid for separately and shall be considered SUBSIDIARY to Earthwork.
- E. Hauling, stockpiling, and transportation costs for earthwork materials are SUBSIDIARY to Earthwork.



- F. Rock removal shall be SUBSIDIARY to Earthwork.
- G. The backfill requirements of the utility pipe and storm pipe (Aggregate and soil) shall be SUBSIDIARY to Earthwork.
- H. No claim for extra work will be considered after excavation operations have commenced on the project.
- I. No field measurement will be made for Earthwork.
- J. No measurement will be made of the amount of excavation, fill, compaction or borrow will be made. It is the responsibility of the Contractor to appraise the site and it's Fill/Backfill to determine the amount of borrow will be required to complete the project.
- K. No material excavated from the project shall be deposited within any "floodway" or "floodplain" as defined by the FEMA Flood Insurance Maps unless a permit to do so has been obtained.

#### 1.4 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an 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. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
  - 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
  - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- F. Fill: Soil materials used to raise existing grades.
- G. Topsoil: Soil suitable for grass growth.
- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
  - 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp (103-kW) flywheel power with bucket-curling force of not less than 28,700 lbf (128 kN) and stick-crowd force of not less than 18,400 lbf (82 kN) with extra-long reach boom; measured according to SAE J-1179.
  - 2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp (172- kW) flywheel power and developing a minimum of 47,992-lbf (213.3-kN) breakout force with a general-

purpose bare bucket; measured according to SAE J-732.

- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. 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 a cement concrete or hot-mix asphalt walk.
- K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill 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 INFORMATIONAL SUBMITTAL

- A. Qualification Data: For qualified testing agency
- B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
  - 1. Classification according to ASTM D 2487
  - 2. Laboratory compaction curve according to ASTM D 698
- C. Blasting plan approved by authorities having jurisdiction (only if blasting is planned for rock removal).
  - 1. Seismic survey report from seismic survey agency (only if blasting is planned for rock removal).
- D. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

#### 1.6 QUALITY ASSURANCE

- A. Blasting: Comply with applicable requirements in NFPA 495, "Explosive Materials Code," and prepare a blasting plan reporting the following:
  - 1. Types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
  - 2. Seismographic monitoring during blasting operations.
- B. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:
  - 1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
  - 2. Seismographic monitoring during blasting operations.
- C. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.
- D. Preexcavation Conference: Conduct conference at Project site.

#### 1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used

facilities during earthwork 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 earthwork 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 Owner.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earthwork operations.
- D. Do not commence earthwork operations until temporary erosion- and sedimentation- control measures, specified in Section 311000 "Site Clearing," are in place.
- E. Do not commence earthwork operations until tree/plant-protection measures are in place.
- F. The following practices are prohibited within protection zones and under tree canopies:
1. Storage of construction materials, debris, or excavated material.
  2. Parking vehicles or equipment.
  3. Foot traffic.
  4. Erection of sheds or structures.
  5. Impoundment of water.
  6. Excavation or other digging unless otherwise indicated.
  7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Do not direct vehicle or equipment exhaust towards protection zones.
- H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
1. Should borrow soils material come from off-site property, the Contractor shall assume all responsibility to obtain certification that the site(s) are in compliance with the National Environmental Policy Act and all related applicable Federal and State Laws and regulations. There will be no modification to the time or the cost of the contract for obtaining required certifications.
- B. Satisfactory Soils: As identified in the Geotechnical Report
- C. Unsuitable Soils: As identified in the Geotechnical Report
1. Unsuitable soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

- D. Subbase Material: See Section 312232 – Granular Stone Base
- E. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2- inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve
- F. Bedding Course: See Section 312222 – Granular Stone Bedding and Backfill
- G. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.
- H. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1- inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.
- I. Sand: ASTM C 33; fine aggregate.
- J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.
- K. Topsoil:
  1. Topsoil Stripped and Stored: Topsoil stripped, stored, and placed shall be fertile, friable, with liberal content of humus, and capable of sustaining vigorous plant growth.
  2. Topsoil to be Furnished: If the stripped topsoil is not adequate to complete the work, sufficient topsoil shall be furnished and shall be a natural, fertile, friable, loamy soil, possessing characteristics representative of productive soils in the vicinity. It shall be obtained from naturally well-drained areas. It shall not be excessively acid or alkaline (except for those plants requiring acid soil) nor contain toxic admixture of subsoil and shall be cleaned and free from subsoil, weeds, sods, stiff clay, clay lumps, stumps, roots, stones larger than 2 inches, toxic substances, litter or similar substances, debris, or other objects which might be a hindrance to placing operations and have a minimum pH of 6.0 and a maximum pH of 8.0. Do not deliver in frozen or muddy condition.

## 2.2 CONTROLLED LOW-STRENGTH MATERIAL

- A. Controlled Low-Strength Material: Self-compacting[, low-density], flowable concrete material produced from the following:
  1. Portland Cement: ASTM C 150, Type I.
  2. Fly Ash: ASTM C 618, Class C or F.
  3. Normal-Weight Aggregate: ASTM C 33, 3/8-inch nominal maximum aggregate size.
  4. Foaming Agent: ASTM C 869.
  4. Water: ASTM C 94/C 94M.
  5. Air-Entraining Admixture: ASTM C 260.

- B. Produce low-density, controlled low-strength material with the following physical properties:
  - 1. As-Cast Unit Weight: 30 to 36 lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.
  - 2. Compressive Strength: 80 psi (550 kPa), when tested according to ASTM C 495.
- C. Produce conventional-weight, controlled low-strength material with 80-psi compressive strength when tested according to ASTM C 495.

### 2.3 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 (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:
  - 1. Red: Electric.
  - 2. Yellow: Gas, oil, steam, and dangerous materials.
  - 3. Orange: Telephone and other communications.
  - 4. Blue: Water systems.
  - 5. Green: Sewer systems.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect and maintain erosion and sedimentation controls during earthwork operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.
- D. Prior to placing fill exposed subgrades shall be scarified to a depth of 12 inches, moisture-conditioned and compacted as identified within this Specification Section.

### 3.2 EXPLOSIVES

- A. Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site.
  - 1. Perform blasting without damaging adjacent structures, property, or site improvements.
  - 2. Perform blasting without weakening the bearing capacity of rock subgrade and with the least-practicable disturbance to rock to remain.

### 3.3 EXCAVATION, GENERAL

- A. All excavation is Unclassified.

### 3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.5 SUBGRADE INSPECTION

- A. Notify Geotechnical Engineer when excavations have reached required subgrade.
- B. If Geotechnical Engineer determines that unsuitable 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 and loaded 10-wheel, tandem-axle dump truck weighing not less than 25 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  - 1. Proof-roll shall be completed within two days of final surfacing. Should
  - 2. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
  - 3. Excavate soft spots, unsuitable soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

### 3.6 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.7 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  - 2. Surveying locations of underground utilities for Record Documents.
  - 3. Testing and inspecting underground utilities.
  - 4. Removing concrete formwork.

5. Removing trash and debris.
  6. Removing temporary shoring and bracing, and sheeting.
  7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

### 3.8 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
1. Under grass and planted areas, use satisfactory soil material.
  2. Under walks and pavements, use satisfactory soil material.
  3. Under steps and ramps, use engineered fill.
  4. Under building slabs, use engineered fill.
  5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

### 3.9 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to in accordance with the Geotechnical Report.
1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

### 3.10 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 (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Refer to Section 312250 Compaction Control & Testing for compaction requirements.

### 3.11 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.

1. Provide a smooth transition between adjacent existing grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
1. Turf or Unpaved Areas: Plus or minus 1 inch.
  2. Walks: Plus or minus 1 inch.
  3. 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 (3-m) straightedge.

### 3.12 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
- C. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.
- D. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
  1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
  2. Do not stockpile topsoil within protection zones.
  3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be reused.

### 3.13 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course under pavements and walks as follows:
  1. Shape subbase course to required crown elevations and cross-slope grades.
  2. Place subbase course 6 inches (150 mm) or less in compacted thickness in a single layer.
  3. Place subbase course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
  4. Compact subbase course in accordance with Section 312250 Compaction Control & Testing.
- C. Pavement Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.



### 3.14 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:
  - 1. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
  - 2. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
  - 3. Compact each layer of drainage course in accordance with Section 312250 Compaction Control & Testing.

### 3.15 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor will engage a qualified special inspector to perform the following special inspections:
  - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
  - 2. Determine that fill material and maximum lift thickness comply with requirements.
  - 3. Determine, at the required frequency, that in-place density of compacted fill complies with requirements.
- B. Testing Agency: Contractor will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.
- E. Testing agency will test compaction of soils in place according to Section 312250 Compaction Control & Testing.
- F. 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.

### 3.16 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.
  - 1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.

- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### 3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Dispose of waste materials, including unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile as directed by Owner.
  - 1. Remove waste materials, including unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

## SECTION 312100 - SUBGRADE COMPACTION

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: This work shall consist of compacting the earth subgrade for roads, parking lots, paved surfacing and other structures. This work shall be performed prior to the placement of granular stone base.
- B. The contractor shall perform this work on the subgrade at all locations beneath the aggregate stone base and at all locations where roads, parking lots, paved surfacing, or other structures are to be constructed.
- C. All work shall be completed in accordance with the Section 003132 "Geotechnical Report." In case of discrepancy with this specification section, the recommendations of the site geotechnical report shall govern.

#### 1.2 CONSTRUCTION REQUIREMENTS

- A. The subgrade for areas within lines five (5) feet outside of the roadbed, parking lot, paved surfacing or other structures shall be scarified to a depth of at least eight (8) inches and the scarified material brought to a uniform moisture content either by drying or by adding water and manipulating with suitable equipment. At the contractor's option, the upper eight (8) inches of soil may be removed and replaced with satisfactory material, or removed and manipulated with suitable equipment before replacing. The material shall be compacted to produce a subgrade having a density not less than the density required and within the moisture contents specified under Range B compaction of Section 312250 "Compaction Control," by the use of approved equipment producing satisfactory results.
- B. If the required subgrade density cannot be obtained by moisture control and compaction of the upper eight (8) inches, the unsuitable material shall be excavated and replaced with satisfactory fill material compacted in layers not to exceed eight (8) inches. Each eight (8) inch layer shall be processed, wetted, or dried, as necessary, and compacted to the required density. No extra compensation will be made for removal of unsuitable material, and the work shall be considered incidental to the contract.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION (NOT USED)

END OF SECTION 312100

## SECTION 312200 - STRUCTURE EXCAVATION, TRENCHING, AND BACKFILLING

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work in this section consists of excavation, trenching, filling, compacting, and satisfactory disposal of all materials within the limits of the work required to prepare the site for construction of miscellaneous structures and all other uses in accordance with these specifications and in conformity with the dimensions, as shown on the drawings and with elevations and contours established by the Engineer. There will be no distinction made between wet or dry materials below the surface of the earth. Structure excavation shall be considered as unclassified, which shall consist of all materials of whatever character encountered in the work, including soil, concrete, asphalt, solid rock, fragmented rock, water, or other.
- B. All work shall be completed in accordance with Section 003132 "Geotechnical Report." In case of discrepancy with this specification section, the recommendations of the Site Geotechnical Report shall govern.

#### 1.2 COMMON EXCAVATION

- A. Excavation: The Contractor shall excavate to the lines, grades, and elevations shown on the drawings all materials within the work area and place and/or dispose of the excavated materials as specified herein, as called for on the drawings or as directed by the Engineer.
  - 1. Foundations: All footings shall be founded on firm, undisturbed soil, previously approved earthen structural fill, or fill concrete.
  - 2. Slabs on grade: Where the drawings show compacted granular backfill under basement slabs or other slabs on grade, the excavation shall be carried deep enough to permit the minimum thickness of compacted granular material to be placed.
  - 3. Over-Excavation: In no case shall any footings be founded above those elevations shown on the drawings. If soft or unsuitable soil is encountered at elevations where footings are to be founded, the excavation shall be taken through unsuitable material and brought back up to grade with fill concrete. Contractor shall notify the Engineer when such conditions are encountered and prior to over-excavation of the unsuitable material, in order to be compensated. Compensation for the extra work shall be negotiated by the Owner and Contractor. Excavations carried below depths shown on the drawings, without prior notification being given the Engineer, shall be brought to grade with fill concrete at the Contractor's expense.
- B. Side Forms: Unless the utilization of earth as a side form for footings is requested by the Contractor in writing and approved by the Engineer, side forms shall be required for all footings, grade beams, walls, and base slabs below grade. The excavation shall be large enough to allow for installation and removal of forms. In the cases where earth side forms are allowed, additional concrete thickness shall be utilized as directed by the Engineer.

- C. Excavation Bottom: Special care shall be taken to prevent disturbance of the bottom of excavations where the soil is to provide bearing for slabs, footings, etc. If surface water or other conditions that may decrease the bearing capacity of the foundation subgrade are present, then soil adequate to protect the foundation subgrade shall not be excavated until just before reinforcing steel and concrete are to be placed. The bottom of all excavations shall be inspected and approved by the Resident Project Representative before the placement of any granular material, reinforcing steel, or concrete.
- D. Waste Material: Earthen material excavated for foundation construction shall be disposed of by contractor, or if suitable, used for fill within the site.
- E. Removal of Water: The Contractor shall at all times during the construction of the work provide and maintain ample equipment to remove and dispose of all water entering the excavations or other parts of the work, and keep said excavations dry until the structures to be built therein are completed. No reinforcing steel shall be placed in water, and no water shall be allowed to rise over any reinforcing steel before the concrete has been placed. No water shall be allowed to come in contact with any concrete within 24 hours after placing unless specifically required by the drawings, authorized by the Engineer, or specified herein. The Contractor shall be held responsible for the conditions of any sewers, drains, or other conduits or pipelines that may be used for drainage purposes, and such pipes or conduits shall be clean and free from all sediment before acceptance by the Engineer.
- F. Sheeting, Shoring, or Bracing: Sheeting, shoring, or bracing shall be placed by the Contractor wherever necessary for the proper preservation of any excavation, embankment, or structure. Where the ground is of such a character or other conditions are such as to render it necessary, the sheeting shall be closely driven and shall be to such depth below the lowest point of the final excavation as may be directed. The Contractor shall be held responsible for the sufficiency of all sheeting and bracing used, and for any and all persons injured or property damaged as the result of improper quality, strength, placement, maintenance, or removal of the same. No extra compensation will be made for sheeting, shoring, or bracing, whether left in place or not. The Contractor shall, at his own expense, shore up, protect, and insure from injury all buildings, retaining walls, piers and footings, storm sewers, sanitary sewers, gas lines, water lines, fences, curbs, trees, or other property liable to be injured during the process of the work, and he will be held responsible for all damage that may occur by reason of prosecution of the work. Sheeting, shoring, and bracing shall be provided, installed, and maintained to protect the excavation and insure the safety of workmen and shall be as required by applicable federal, state, and local laws, rules, and regulations.
- G. All areas to be constructed underneath proposed structures or paved areas shall be excavated to elevations below indicated finish grades to allow for their future construction as indicated on the drawings, Section 312000 "Earthwork" and Section 312100 "Subgrade Compaction."

### 1.3 BACKFILL AND COMPACTION

- A. Cuts: When required on the drawings or directed by the Engineer, the soil below grade in cut sections shall be scarified, broken up, adjusted to a moisture content within the designated moisture range and compacted to 95% maximum density as determined by Section 312250 "Compaction Control." When the depth of compaction in cut sections is shown on the drawings to be more than six inches, all material shall be removed to within six inches of the lower limit of the compaction. The layer of material left in place shall be scarified, broken up, adjusted to a

moisture content within the designated moisture range, and compacted to 95% maximum density, as determined by Section 312250 "Compaction Control." This process shall be repeated until the cut section has been compacted to the grade shown on the drawings. Compaction of low plasticity or non-plastic fine grained materials shall be considered adequate when additional passes of the roller do not bring the tamping feet closer to the surface of the lift, provided the entire weight of the roller is supported on the tamping feet and non by material directly in contact with the drum. Sand and gravel, which cannot be compacted satisfactorily with a sheepsfoot roller, shall be rolled with a pneumatic-tired roller or other approved type. Each lift shall be rolled until no further consolidation is visually evident.

B. Around and Beneath Structures - General:

1. Prior to placing fill material, all topsoil and soft material shall be removed to a depth necessary to establish good bearing of the fill material. The subgrade shall then be evaluated for stability by rolling the ground surface with a minimum 25,000 pound pneumatic tired roller or fully loaded tandem axle dump truck and noting any areas that rut or deflect during rolling. All soft subgrade areas identified during this proof-rolling shall be undercut and replaced with compacted fill. The surface of the ground shall be scarified to a depth of eight inches and the moisture content of the loosened material shall be such that it will readily bond with the first layer of fill material.
2. When the drawings require the placement of fill beneath a proposed structure, the floor or footing subgrade shall be made with finely divided material sufficiently moist to compact readily when tamped. Fine grained material used as backfill shall be placed in eight-inch compacted lifts and compacted to 95% standard proctor density as determined by Section 312250 "Compaction Control." Granular soils used for backfill shall be placed in eight-inch lifts (compacted) and compacted to 100% of the maximum density as determined by Section 312250 "Compaction Control." Classification of the soils as fine grained or granular shall be made by the Site Geotechnical Engineer.
3. Fill around and between structures shall be constructed, to as great an extent as possible, with earth obtained from the excavations for structures. The fill shall be compacted to Range "C" requirements as determined by Section 312250 "Compaction Control."

1.4 EMBANKMENT

- A. Do all cutting, filling, compacting of fills, and rough grading required to bring the entire project area to subgrades for all surfaced and planted areas. Remove topsoil to its entire depth from the areas within lines five (5) feet outside areas to be occupied by structures, roads, parking areas, playing surfaces, walks, and other surfacing. Pile topsoil in approved locations where it will not interfere with building or utility operations. Areas to be stripped as designated by the plans shall first be scraped clean, cleared, and grubbed of all brush, weeds, grass, and roots. All finish grading in areas designated to be fine graded shall be done with satisfactory topsoil and in such a manner as will permit the sowing of grass seed with no further work necessary. All rough grading of areas to be fine graded shall be done to a level of three (3) inches below elevations shown to allow placement of topsoil.
- B. Rough grading of areas beyond limits of fine grading shall be done with machine and shall be as smooth and free of rocks as can be obtained under machine conditions. Grades shall be accurately cut to elevations shown on elevations and site plans.
- C. All ditches, swales, and gutters shall be finished to drain readily.

- D. Material for fill shall be free of roots, wood, or other organic material, and shall be supplied by the contractor. Remove all debris subject to termite attack, rot, or corrosion, and all other deleterious materials from areas to be filled. Prior to placing fill material, the surface of the ground shall be scarified to a depth of eight (8) inches, and the moisture content of the loosened material shall be such that it will readily bond with the first layer of fill material. Place fill in layers not exceeding six (6) inches to eight (8) inches loose material.
- E. Compact each layer of fill by rolling or tamping to ninety-five (95) percent of maximum density at optimum moisture content. The degree of compaction shall be determined and controlled in accordance with the AASHTO "Standard Method of Test for the Compaction and Density of Soil". Compaction shall be accomplished by the use of power rollers, machine tampers, or other mechanical equipment approved by the Engineer. If necessary, soil shall be moistened or allowed to dry to the correct moisture content before compaction. Do not deposit any fill on a subgrade that is muddy, frozen, or that contains frost.

#### 1.5 TESTS

- A. The Contractor shall pay for all necessary compaction testing. Where tests indicate that fill does not conform to the compaction density specified, the fill shall be removed and replaced with conforming material including all necessary re-testing without additional cost to the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 312200

## SECTION 312221 - TRENCHING, BACKFILLING, AND COMPACTING

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section consists of excavation of trenches, pits, and associated incidental elements relating to the construction of underground lines and appurtenances, and the backfilling of these excavations. There will be no distinction made in any definition or classification of excavation covered by this section between wet or dry materials below the surface of the earth. Trench excavation shall be considered as unclassified, which shall consist of all materials of whatever character encountered in the work, including soil, solid rock, fragmented rock, water, or other. Work under this section shall also include:
1. All sheeting, shoring, bracing, protection of adjacent property, preparation of all subgrades, storage of excavated materials, backfilling, tamping, grading, and surfacing.
  2. The cost of diversion of surface water, and all pumping, draining, or otherwise dewatering of excavations.
  3. All subsequent handling and disposal of such material, together with the preparation of all trench subgrade.
- B. Protection of Adjacent Property: The Contractor shall protect all excavations and trenches from settlement or displacement by approved means of bracing and shoring. All existing underground utilities and structures and surface improvements and structures shall be protected and their functional purpose preserved.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Earth Backfill: Earth backfill shall be earth previously excavated from the trench, free from perishable matter, frozen soil, stone over six (6) inches in its largest dimension, and other matter liable to become unstable when saturated with water and compacted.
- B. Stone Backfill: All utility crossings, drainage structures and areas underneath roads/parking areas shall be backfilled with well-graded granular crushed stone.
- C. Select Backfill: Where previously excavated earth is determined by the Engineer to be unsuitable for backfill, the Contractor shall obtain and place earth from an approved source.
- D. All excavation shall be considered unclassified.



## PART 3 - EXCAVATION

### 3.1 CONSTRUCTION

#### A. Trench Excavation (Storm Sewer and Gravity Sewer Lines):

1. All trench excavation shall be made with a sufficient working space to permit the placement, inspection, and completion of all work contemplated in the contract. Excavated material that is unsuitable for backfill, and all boulders exposed by trenching shall be removed from the work area. Trenches shall be excavated in accordance with the drawings for trench width relative to trench depth.
2. Trenches shall be excavated to six (6) inches below the bottom of the pipe when set to establish flowlines to provide clearance for the pipe bell and not less than six (6) inches of granular stone bedding material. Should the trench be excavated more than six (6) inches below the flowline, the Contractor shall use only granular stone bedding material to establish flow line grade.
3. Trench excavation shall, in all cases, be continuous from the ground surface to the established trench depth. Materials excavated shall be stockpiled at the sides of the trench and within established area limits so as to minimize inconvenience to the public, and damage to vegetation and structures in the area.
4. When unstable ground is encountered, the trenching shall be carried out utilizing trench shoring, bracing, and shields to prevent cave-ins.
5. Trench width from six (6) inches below the bottom of the pipe to six (6) inches above the pipe joint shall be held to 1.4 times the pipe O.D., plus 12 inches. Trench width above these levels may be wider to accommodate shoring, bracing, and shields, but shall be kept within practical limits and shall be subject to the Engineer's approval.
6. Lines and Grades for Trench Excavation: The Contractor shall furnish and set all stakes for the lines and grades as shown on the drawings and shall furnish and set up for underground construction all batter boards required therefore, and shall provide all required labor for setting stakes and boards. The Contractor shall be held responsible for verification of lines and grades as established and shown on the plans. The Engineer may check the line and depth at any given point in the trench.

#### B. Trench Excavation (Water Lines):

1. Trench Depth: Trenches shall be cut as deep as necessary on either side of natural depressions, ditches, waterways, etc. to provide for not less than 42-inches of cover over the top of the pipe. Depth of cover shall be measured from the outside top of the pipe vertically to the original ground surface or pavement surface. Mounding over the trench to attain the specified cover shall not be permitted. Trenches shall be cut so as to prevent high spots that could lead to "air binding" of the installed line. Trenches shall be excavated to six (6) inches below the bottom of the pipe to provide clearance for not less than six (6) inches of pipe bedding material. The maximum degree of deflection, either vertical or horizontal, shall not cause a pipe joint's annular clearance in the bell to be less than one-fourth (1/4) inch at its closest point. In case the trench be excavated at any place more than six (6) inches below grade, it shall be filled by the Contractor to the design grade with approved bedding material. The Contractor shall receive no compensation for refilling to grade. Trench excavation shall, in all cases, be continuous from the ground surface to the established trench depth. Materials excavated shall be stockpiled at the sides of the trench and within established area limits so as to minimize

inconvenience to the public and damage to vegetation and structures in the area. Gutters and ditches shall be kept clear, or other satisfactory provisions shall be made to facilitate drainage. Ground adjacent to trench shall be graded so as to prevent water from flowing into the trench. The Contractor shall provide for the continuous flow of all waterways, ditches, drains, or sewers encountered during construction of the project. All ditches and waterways shall be restored to their original conditions as soon as possible.

2. Trench Width: The width of the trench, as dug, from the trench bottom to the top of the pipe, shall not exceed the outside diameter of the pipe bell or socket plus 12 inches, or 24 inches, whichever is greater. Trench width above the top of the pipe shall be as required by field conditions to prevent sliding and caving of the excavation.
- C. Record Drawings: Even though all excavation shall be considered unclassified for pay purposes, the Contractor shall clearly indicate on the Record Drawings (which he submits to the Owner per Supplemental General Conditions) the elevations and extent of all solid rock encountered during construction of the project.
- D. Sheeting, Shoring, or Bracing: Sheeting, shoring, or bracing shall be placed by the Contractor wherever necessary for the proper preserving of any excavation, embankment, or structure. Where the ground is of such a character or other conditions are such as to render it necessary, the sheeting shall be closely driven and to such depth below the lowest point of the final excavation as may be required. The Contractor shall be held responsible for the sufficiency of all sheeting and bracing used, and for property damaged as the result of improper quality, strength, placement, maintenance, or removal of the same. No extra compensation will be made for sheeting and bracing, whether left in place or not. The Contractor shall, at his own expense shore up, protect, and insure from injury all buildings, retaining walls, piers and footings, storm sewers, sanitary sewers, gas lines, water lines, fences, curbs, trees, or other property liable to be injured during the process of the work, and he will be held responsible for all damage which may occur by reason of prosecution of the work. Sheeting, shoring, and bracing shall be provided, installed, and maintained to protect the excavation and insure open trench operations.
- E. Removal of Water: The Contractor shall furnish and operate sufficient pumps and appliances, and shall provide all material, labor, etc. required to prevent interference with any work by water, ice, or snow. Damage of any kind resulting from insufficient pumping facilities or similar lack of proper conduct of the work shall be made good by the Contractor at his own expense. No structure and pipes shall be placed in water and water shall not be allowed to run into or cover any concrete work or pipe, or into or through any pipe, unless by special permission given by the Engineer in writing.
- F. Clean-up and Maintenance of Backfilled Trenches: All excess excavation materials or blasting debris shall be cleaned up by the Contractor as directed. Backfilled trenches or other excavations that exhibit settlement prior to final acceptance of the entire project, wherein the top of backfill is below the original ground surface, shall be refilled, compacted, and smoothed to conform to the contours and elevations of the adjacent ground surface. Sod in lawns removed or damaged by settlement and/or the repair thereof, shall be replaced. Maintenance of backfill as described above shall be the responsibility of the Contractor for a period of one year after final acceptance of the work by the Owner.
- G. Cleaning of Rights-of-Way and Easements: Upon completion of any portion of the work, all the land and rights-of-way shall be cleaned of all surplus material, earth, rubbish, etc. and left in a condition acceptable to the Owner. At all times, adequate clean-up shall be provided to enable normal passage of traffic to occur on all streets, alleys, and private driveways.

H. Backfilling:

1. Material used for backfilling of trenches shall be free from perishable matter and from other material liable to become unstable when saturated with water after having been compacted. No frozen material shall be used in backfill. Care shall be taken to prevent damage to the pipe and structures. Special precautions shall be taken in backfilling over pipes. No backfill shall be placed over any portion of pipes and/or joints not inspected by the Engineer. The granular stone bedding material shall be brought to a depth of at least six (6) inches over the top of the pipe bell, with this material carefully deposited in uniform layers not exceeding six (6) inches in depth, and each layer carefully and solidly tamped with mechanical tampers in such a manner as to avoid damage to pipe or disturbing completed work. Unless noted otherwise on the drawings, backfilling for the remainder of the trench shall be previously excavated gravel, sand, or earth, and shall contain no stone over ten (10) inches in its largest dimensions. Stones smaller than that size may be used in proportion not exceeding one part of stone and three parts of earth in any place. This backfilling shall be deposited and spread in layers and solidly tamped. Except as specified below for roadway crossings, trench backfill shall be compacted to Range C compaction requirements (Section 312250 "Compaction Control"). The method of securing adequate compaction will be approved by the Engineer. As the trenches are backfilled, the Contractor shall remove all surplus material and regrade the surface, leaving it in good order. The trenches shall be filled to the ground surface elevation which previously existed, unless shown otherwise on the drawings or the Engineer directs otherwise.
2. The Contractor may be required to settle certain backfill material with water, in addition to other backfilling procedures. The water will be furnished by the Contractor without cost to the Owner. Methods and procedures in using the water shall be approved by the Engineer prior to carrying out the operation.
3. Whenever, in the opinion of the Engineer, the excavated material is not suitable for backfilling the trench, or there is a deficiency of material, the Contractor shall, at his own expense, provide suitable material.
4. All excess excavation materials shall be cleaned up by the Contractor as directed. All backfilled trenches shall be maintained by the Contractor for a period of one year after Final Acceptance of the work by the Owner.

I. Paved surface Crossings: At all open-cut crossings of proposed or existing roadways, parking areas or other paved surfaces, and for all trenching within or along proposed or existing roadways, parking areas or other paved surfaces, the trench shall be backfilled with crushed stone meeting ASTM C33, Gradation 67, in lieu of previously excavated material, and compacted level with the existing riding surface of the roadway. Backfill material, whether crushed stone or previously excavated earth, shall be compacted to Range A compaction requirements, as defined in Section 312250 "Compaction Control." Final surfacing shall be as called for on the drawings.

J. Private Drives, Field Entrances, etc.: At all open-cut crossings of private drives, field entrances, and the like, the trench backfill shall be deposited and spread in layers and solidly tamped to Range "B" compaction requirements set forth in Section 312250 "Compaction Control." Private drives, etc. shall be backfilled "immediately" upon completion of the pipe lying across the drive. The driving surface shall be restored to its original condition immediately following proper compaction of the backfill.

- K. Inspection: After completion of excavations, the Contractor shall notify the Engineer that the trench or excavation may be inspected; and prior to placement of materials other than shoring, bracing, or sheeting, the excavation shall be observed by the Engineer.

END OF SECTION 312221

## SECTION 312222 - GRANULAR STONE BEDDING AND BACKFILL

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section consists of furnishing, hauling, placing, and compacting granular stone for pipe bedding and beneath and around structures and granular stone backfill at the locations shown on the drawings.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Granular Stone Bedding: Bedding material shall be crushed limestone consisting of aggregate particles meeting the requirements of ASTM C-33, latest revision, gradation 67, 1-inch to No. 8 size as follows:

<u>Sieve Size</u>	<u>Percent Passing</u>
1"	100
3/4"	90 - 100
3/8"	20 - 55
No. 4	0 - 10
No. 8	0 - 5

- B. Granular Stone Backfill: Shall be 3/4" clean crushed stone.

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. Granular Stone Pipe Bedding (Storm Sewer and Gravity Sewer Lines): Granular stone shall be placed in the trench and shaped so as to provide uniform support for the bottom quadrant of the pipe barrel. The bedding shall be not less than six (6) inches in thickness. Following placement of the pipe, the trench shall be filled with granular stone bedding material to a minimum compacted depth of six (6) inches above the pipe barrel.
- B. Granular Stone Pipe Bedding (Water Lines): Granular stone shall be placed in the trench and shaped so as to provide uniform support for the bottom quadrant of the pipe barrel. The bedding shall be not less than six (6) inches in thickness. Following placement of the pipe, the trench shall be filled with granular stone bedding material to a minimum compacted depth of six (6) inches above the pipe barrel.
- C. Granular Stone Backfill: Granular stone of the specified gradation shall be utilized to backfill all excavated areas where called for on the drawings and shall be placed in the excavation in 12-

inch layers and compacted to 95% of maximum density as set forth in Section 312250  
“Compaction Control.”

END OF SECTION 312222

SECTION 312232 - GRANULAR STONE BASE

PART 1 - GENERAL

1.1 GENERAL

- A. The work shall consist of furnishing and placing one or more courses of aggregate on a prepared subgrade in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans.
- B. At the Contractor's option, millings from existing onsite asphalt pavements may be used as a substitute for granular stone base in lieu of disposing of the material offsite. The reclaimed asphalt may be utilized on the bottom half of the total required section thickness of the granular stone base. The top half of the base material shall consist of Type 1 Aggregate for Base.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Granular Stone Base: Crushed stone shall conform to material specified as Type 1 aggregate by the Missouri Highway Department and produced by an approved source. Aggregate shall be mechanically crushed limestone or dolomite, graded to the following gradation ranges:
- B. Percentage by Weight Passing Each Sieve:
  - 1 Inch Sieve-----100%
  - 1/2 Inch Sieve-----60-90%
  - No. 4-----40-60%
  - No. 40-----15-35%
- C. Plasticity Index of the fraction passing the No. 40 sieve shall not exceed 6.
- D. Material shall be delivered with sufficient moisture content to provide specified densities when compacted.
- E. Reclaimed Asphalt as Granular Base: Existing asphalt shall be milled such that the gradation of the material closely conforms to the gradation shown in section 2.1B above and in no case shall contain material larger than 3-inches. The existing asphalt shall be milled full depth and may contain some existing base material if available. Millings shall be kept clean and free of deleterious materials and shall meet the compaction requirements of this specification.

## PART 3 - EXECUTION

### 3.1 METHODS

- A. Subgrade: All work on that portion of the subgrade on which the base is to be constructed shall be completed in accordance with the requirements of these specifications prior to the placing of any base material on that portion. Aggregate base shall not be placed on a frozen subgrade.
- B. Placing: The maximum compacted thickness of any one layer shall not exceed four (4) inches. When the specified compacted depth of the base course exceeds four (4) inches, the base shall be constructed in two or more layers of specified thickness. The compacted depth of a single layer of the base course may be increased to six (6) inches for shoulders and lightly traveled areas. After preliminary compaction has been secured, finish compaction shall be carried to completion by means of self-propelled steel-wheeled rollers weighing not less than ten (10) tons. Shaping and compacting shall be carried on until a true, even, uniform base course of proper grade, cross section and density is obtained. Proper moisture content shall be maintained by wetting the surface or allowing it to dry as required during shaping and compacting operations. The use of excess water, resulting in run-off or in the formation of a slurry on the surface shall be avoided. The stone base shall be compacted to not less than ninety-five (95%) percent of the maximum density at optimum moisture content.
- C. Testing: The compacted base shall be tested for in-place density by ASTM Method 6938, latest revision, at the rate of five (5) determinations for each 1500 square yards of base surface. In addition, all areas of compacted base shall be proof-rolled by a loaded dump truck and witnessed by a qualified testing facility.
- D. Tolerance: The compacted base shall be brought to within a tolerance of 1/2" or less below design grade.
  - 1. The compacted aggregate base thickness shall not be deficient in excess of 1/2 inch from the plan thickness. Thickness measurement shall be taken and determined for each 1500 square yards of base surface or as designated by the Engineer.

END OF SECTION 312232



## SECTION 312250 - COMPACTION CONTROL & TESTING

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section consists of furnishing all equipment, labor, materials, and incidentals to compact the various cut and fill areas. Also, the Contractor shall provide the necessary on-site sampling and testing facilities and equipment.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. Compaction Requirements: Compaction requirements for soils as controlled by methods of testing described herein are as follows:
  - 1. Range A - In place compacted density of soil shall be equal to or greater than one hundred (100) percent of maximum density at optimum moisture content.
  - 2. Range B - In place compacted density shall be equal to or greater than ninety-five (95) percent Standard Proctor Density (ASTM D-698).
  - 3. Range C - In place compacted density shall be equal to or greater than eighty (80) percent of the maximum density at optimum moisture content.
  - 4. Density range for compaction shall be as stated on the drawings or as specified herein. Compaction requirements for granular stone or sand, as controlled by methods of testing described herein shall be to a density of not less than ninety-five (95) percent of the referenced density.
  - 5. Range B Compaction shall be attained for all compacted fill, stone base, concrete pavement, building foundations, and parking lots.
- B. Compaction Operations:
  - 1. Adjacent to Structures: Compaction shall be achieved using manually operated mechanical tampers or towed and self-propelled drum and vibrator tampers.
  - 2. Roadways and Fills: Compaction shall be achieved using rollers, vibrators, compactors, or mechanical tampers.
  - 3. Variances: The use of water jetting or similar techniques of compaction are prohibited as the sole means for compaction.
- C. Moisture Content and Control:
  - 1. Content: The moisture content requirements as determined under the methods of testing described herein are as follows:

- a. Range A Compaction: The moisture content of the soil at the time of compaction shall be uniform and shall be not higher than five (5) percentage points above the optimum nor lower than the optimum of the soil involved.
- b. Range B Compaction: The moisture content of the soil at the time of compaction shall be uniform and shall be  $\pm 2\%$  optimum moisture for CL Soil Types and 0 to 4% above optimum for Shaley CL-CH & CH Soil Types.
- c. Range C Compaction: The moisture content of the soil at the time of compaction shall not be lower than five (5) percentage points below the optimum moisture content of the soil involved.
- d. Compaction of Granular Stone or Sand: The moisture content shall be not less than ten (10) percentage points below the optimum content at the time of compaction.

2. Control:

- a. Water Application: The moisture content of the soil at the time of compaction shall be within the moisture range designated. When the natural moisture content of the embankment soil does not fall within the required moisture range, water shall be added or the material shall be aerated, whichever is needed to adjust the soil to the proper moisture content. Water may be transported or distributed from calibrated tank trucks or the water may be added to the soil in the borrow and cut areas before hauling, as long as the moisture content of the soil at the time of compaction is uniform and within the designated moisture range.
- b. Testing: No water shall be added without the consent of the Resident Project Representative and without providing him adequate opportunity to measure the quantities used. The amount of water to be added shall be only that amount that will, as determined by the field moisture tests, provide a moisture content in the soil to be within the required range plus a reasonable amount to compensate for evaporation and other unavoidable losses. Satisfactory methods and sufficient equipment shall be used for the furnishing and handling of the water so there will be no undue loss due to evaporation. If water is added to cut areas or borrow pits, the surfaces of the areas or pits shall be maintained in such a manner that will prevent undue loss of moisture.
- c. Visual Control: From other than the results of the moisture content test, the moisture content of the soil being compacted shall be considered as being too high to ensure compaction when after repeated rollings with the sheepsfoot roller, the roller continues to pick up excessive amounts of soil and refuses to "build up" so that the tamping feet eventually ride the compacted surface.

D. Compacting Equipment:

1. Sheepsfoot Rollers shall conform to the following requirements: Tamping or sheepsfoot rollers shall consist of metal rollers, drums, or shells, surmounted by metal studs with tamping feet projecting not less than six and one-half (6-1/2) inches from the surface of the rollers, drum or shell. Tamping feet shall be spaced not less than six (6) inches, nor more than twelve (12) inches measured diagonally center to center; and the cross-section area of each tamper foot, measured perpendicularly to the axis of the stud, shall not be less than four (4) nor more than twelve (12) square inches. The weight of tamping rollers shall be such that, when fully loaded, the load on each tamper foot shall not be less than two hundred (200) pounds per square inch of cross-sectional area. The load per tamper foot will be determined by dividing the total weight of the roller (loaded) by the number of tamper feet in one (1) row parallel to the axis of the roller.

2. Pull-Type Steel Rollers: Pull-type steel rollers shall not have less than forty-eight (48) inches effective width of roll and shall be designed and constructed so that the weight per lineal inch of roll can be varied from two hundred (200) to at least three hundred (300) pounds.
3. Trench Rollers, Self-Propelling: The trench roller shall be an approved type and shall weigh not less than three hundred (300) pounds per inch of width.
4. Manually Operated Compactors: Equipment shall be in good mechanical condition and shall be capable of transmitting forceful vibrations or impacts to the various materials placed in construction.

### 3.2 SOIL TESTING

A. Testing Methods: Density tests, as prescribed in these specifications, will be made on the soil to be used in the construction of the project to determine a reference density, an optimum moisture content, and the moisture range applicable to the soil required to attain specified compaction. The field density and actual moisture content of the compacted material shall also be determined as prescribed previously herein.

1. Reference Density: The maximum laboratory density as determined by the specified compaction test shall be the density to which the field density is referred for comparison or percentage of these for each type of soil used in the work. Density shall be determined by procedures stipulated in ASTM D698.
2. Optimum Moisture: The optimum moisture content shall be the moisture content corresponding to the maximum density on the specified compaction test curve.
3. Moisture Range: The moisture range shall be the limits of moisture content of the soil with the optimum as a reference.
4. Field Density: The field density shall be the density of the in-place compacted material determined by the field density test. If an in-field density test shows results below the minimum requirements, the lift or area in question shall be retested after additional compactive efforts are performed. If the original in-field density test results are more than two percentage points below minimum requirements, additional tests are required, and the area in question shall be scarified and recompacted. Additional testing and scarification shall be performed by the contractor without any additional payment and shall be considered incidental to the completion of the project.
5. Moisture Content: The moisture content shall be the actual moisture content of the soil in the compacted embankment or fill at the time of compaction.

B. Scope of Tests:

1. Borrow Areas: All areas selected to supply backfill and area fill materials requiring a specified density shall have moisture-density relationships determined by ASTM Designation D-698, when the soil is initially excavated. In-place density of compacted soil shall be tested in accordance with ASTM Designation D2167-63T, D2922, or D1556, latest revision, to determine compliance with specifications. Specific testing locations will be determined by the Engineer.
2. Granular Stone and Sand: Granular stone and sand shall have moisture-density relationships determined by ASTM Designation D2049. In place density shall be determined by ASTM Designation D2167, ASTM D-698, or D2922.
3. Compacted Soil Sub-Base Supporting Concrete, Steel, or Masonry Structures: Density shall be determined by a minimum of three samples and/or tests per structure, or two samples

and/or tests per 1,000 S.F. of area, for each two lifts of fill by ASTM Test Designation D2167-63T, D2922, or D1556.

4. Compacted Soil Sub-Base Supporting Rigid and Flexible Pavements & Crushed Stone Surfacing: Density shall be determined by a minimum of three samples and/or tests, or two samples and tests per 1000 S.Y. of area, for each six (6) inches of fill per ASTM D2167, D2922, or D1556.
5. Compacted Granular Stone Supporting Concrete, Steel, Masonry Structures, Rigid and Flexible Pavements: The compacted base shall be tested for in-place density by ASTM Method 6938, latest revision, at the rate of five (5) determinations for each 1500 square yards of base surface. In addition, all areas of compacted base shall be proof-rolled by a loaded dump truck and witnessed by a qualified testing facility.
6. Engineered fill (including scarified compacted subgrade): Shall be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved. One (1) field density test for each 2500 and 5000 sq. ft. of fill lift, but no less than 3 tests per lift, is recommended in building and pavement areas, respectively.

END OF SECTION 312250

## SECTION 312260 - FINISH GRADING

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section consists of bringing to finish grade the site and furnishing all labor, materials, tools, and equipment necessary to complete this section. It shall be performed on all areas that are disturbed by construction activities, except those areas noted on the drawings that are to receive crushed stone, asphalt, or concrete surfacing.
- B. Related Sections:
  - 1. Section 312000 Earthwork
  - 2. Section 312319 Dewatering
  - 3. Section 313200 Site Geotechnical Report
  - 4. Section 329219 Seeding

#### 1.2 QUALITY ASSURANCE

- A. Finish grading shall be completed by a contractor specializing in such work. Contractor shall have a satisfactory record of performance on completed project of comparable size and quality.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. The Contractor shall grade the earth as indicated on the drawings and as directed in the field by the Owner's Representative.
- B. The top six (6) inches of all excavated areas to be seeded or other areas indicated on the plans shall consist of topsoil. Refer to Section 329219-Seeding, for additional details and seedbed preparation.
- C. Areas within the construction limits shall be graded smooth and left with a neat and sightly appearance. The final grade around all structures shall be pitched to drain water away from the structures and toward the roadside ditches and natural drainage way.
- D. The Contractor shall make all necessary arrangements for the procurement of adequate topsoil to fully cover the designated areas. This may require stockpiling of material stripped from the site or if adequate topsoil is not stockpiled, obtaining of topsoil from a location outside the project property.

3.2 INSPECTION

- A. Examine finished surfaces, grades topsoil quality, and depth. Do not start fine grading work until unsatisfactory conditions are corrected.
- B. The Owner's representative shall inspect and provide approval of the finish grading prior to hydro-seed application.

END OF SECTION 312260

## SECTION 312270 - EROSION CONTROL

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. This section specifies minimum requirements of the Contractor toward control of erosion, sediment runoff, and storm water management during the performance of the contract, and periods of construction activities.
- B. The Contractor shall implement measures, including best management policies, to control pollution of the waters of the State by soil and sediment carryout from storm water runoff as required in the Storm Water Pollution Prevention Plan (SWPPP) and the Missouri State Land Disturbance Operating Permit (separate document). A copy of the site SWPPP and Operating Permit are required to be present at the construction site at all times.
- C. The Contractor shall be responsible for providing all necessary material and expenses associated with compliance with the SWPPP and the Missouri State Land Disturbance Operating Permit.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION (NOT USED)

END OF SECTION 312270

## SECTION 312319 – DEWATERING

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section consists of completing all dewatering work necessary for the initiation and prosecution of elements of work specified elsewhere.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. Workmanship: Using pumps, maintain all excavations and trenches free from water at all times while construction is in progress. Prevent surface runoff water from collecting in excavations or trenches or running down the faces of excavated cut or fill slopes, causing sloughing or caving, ponding in excavated areas, or saturating the soils below foundations of structures by adjusting grades to provide temporary drainage facilities. Furnish and operate sufficient pumps and appliances, and provide all materials, labor, etc. required to prevent interference with any work by water, ice, or snow. Damage of any kind resulting from insufficient pumping facilities or similar lack of proper conduct of the work shall be corrected. No structure or pipes shall be laid in water, and water shall not be allowed to run into or over any concrete work or pipe, or into or through any pipe, unless by special permission given in writing by the Engineer. Obtain approval of the Engineer as to methods and location of pumpage discharge.

END OF SECTION 312319



## SECTION 312400 – SHORING

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section shall consist of furnishing all equipment, labor, materials, tools, and incidentals necessary to provide for the protection of the personnel and to protect the excavations for both structural and trenching and existing structures; and as required by the applicable federal and state laws and regulations.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 METHODS

- A. Responsibilities: The Contractor is solely and totally responsible for the design, installation, maintenance, and safety of any shoring and/or bracing that may be required.
- B. Type of Shoring and Bracing: The type of shoring and bracing shall be that which is removable following the installation of the structure. No permanent type of shoring or sheeting shall be used which must remain within the limits of the excavation. The shoring or bracing shall be removed following approval by the Engineer of the excavation, installation of the structure, and installation of required backfill material.

END OF SECTION 312400

SECTION 313200 – SITE GEOTECHNICAL REPORT

CONTINUED ON NEXT PAGE

**GEOTECHNICAL ENGINEERING REPORT**

**ROARING RIVER STATE PARK**

**CAMPGROUND 3**

**12716 FARM ROAD 2239**

**CASSVILLE, MISSOURI**

Prepared for:

Allgeier, Martin & Associates, Inc  
7231 East 24th Street  
Joplin, Missouri 64804

Prepared by:



**Springfield, MO**

4168 W. Kearney Springfield, MO 65803  
Call 417.864.6000 Fax 417.864.6004  
[www.ppimo.com](http://www.ppimo.com)

**PROJECT NUMBER: 280196**

**June 23, 2022**

June 23, 2022 – Revision 1  
May 13, 2022 – Original Issue

Allgeier, Martin & Associates, Inc  
7231 East 24th Street  
Joplin, Missouri 64804

Attn: Mr. Michael Keaton, P.E.  
Email: [Michael.Keaton@amce.com](mailto:Michael.Keaton@amce.com)

RE: Geotechnical Engineering Report  
Roaring River State Park – Campground 3  
12716 Farm Road 2239  
Cassville, Missouri 65625  
PPI Project Number: 280196

Dear Mr. Keaton:

Attached, please find the report summarizing the results of the geotechnical investigation conducted for the proposed Roaring River State Park Campground 3 Improvements in Cassville, Missouri. We appreciate this opportunity to be of service and if you have any questions, please don't hesitate to contact this office.

PALMERTON & PARRISH, INC.  
By:



Matthew Hedgespeth  
Geotechnical Engineer

PALMERTON & PARRISH, INC.  
By:



Brandon R. Parrish, P.E.  
Vice-President



Submitted: One (1) Electronic .pdf Copy

MH/SR/BP

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## EXECUTIVE SUMMARY

A Geotechnical Investigation was performed for the Roaring River State Park Campground 3 Improvements located at 12716 Farm Road 2239 in Cassville, Missouri. Improvements are anticipated to understand a new bathhouse building with a slab on grade floor system, associated camp sites with drive area, and sanitary sewer/water and electrical hookups. Traffic loading was not provided but is assumed to be light. Cut and/or fill depths are anticipated to be minimal to moderate across the subject site to provide finished subgrade elevations.

Based upon the information obtained from the borings drilled and subsequent laboratory testing, the site is suitable for the proposed improvements to Campground 3. Important geotechnical considerations for the project are summarized below. However, users of the information contained in the report must review the entire report for specific details pertinent to geotechnical design considerations.

- Current pavement at the project site consisted of asphalt and was noted in all borings, except Boring B-2. Asphalt thicknesses at the site were relatively uniform and measured 3 inches in thickness. The aggregate base section below the existing pavements was generally 3 inches in thickness. Topsoil was noted at the surface in Boring B-2 with an approximate thickness of 7 inches;
- Moisture sensitive lean clays were noted near the surface of the subgrade exploration. This material is generally stable in dry conditions but is sensitive to the addition of moisture and repeated traffic. Some over excavation and replacement or stabilization may be required of these soils;

## EXECUTIVE SUMMARY - CONTINUED

- Undocumented fill material was encountered within Borings B-1 and B-5 ranging from 4 to 5 feet below the ground surface. The origin and method of placement for this fill material is unknown and for the purposes of this report should be considered uncontrolled. Any building foundations should penetrate this material and bear on native soils. Undocumented fill material below slab areas and pavements should be proof-rolled before construction. Areas not passing a proof-roll should be removed and replaced. Existing undocumented fill may be reused as controlled fill if complying with Section 7.8 below;
- Foundations bearing on native soil for the new Bathhouse (Boring B-2) can be designed for an allowable bearing capacity of 1500 psf for column footings and 1500 psf for continuous footings;
- The project site classifies as a Site Class E in accordance with Section 1613 of the 2018 International Building Code (IBC); and
- Palmerton & Parrish, Inc. should be retained for construction observation and construction materials testing. Close monitoring of subgrade preparation work is considered critical to achieve adequate pavement and subgrade performance.

**GEOTECHNICAL ENGINEERING REPORT**  
**ROARING RIVER STATE PARK**  
**CAMPGROUND 3**  
**12716 FARM ROAD 2239**  
**CASSVILLE, MISSOURI**

**1.0 INTRODUCTION**

This is the report of the Geotechnical Investigation performed for the proposed Roaring River State Park Campground 3 Improvements located at 12716 Farm Road 2239 in Cassville, Missouri. This investigation was authorized by a letter proposal dated February 3, 2022, and signed by Mr. Chris Erisman, P.E., Vice President of Allgeier, Martin & Associates, Inc. The approximate site location is shown below:





The purpose of the Geotechnical Investigation was to provide information for foundation design and construction planning, and to aid in site development. Palmerton & Parrish Inc.'s (PPI) scope of services included field and laboratory investigation of the subsurface conditions in the vicinity of the proposed project site, engineering analysis of the collected data, development of recommendations for foundation design and construction planning, and preparation of this engineering report.

## 2.0 PROJECT DESCRIPTION

Item	Description
Site Layout	See <a href="#">Figure 1</a> : Boring Location Plan
Bathhouse	Single story with a slab-on-grade.
Pavements	Asphalt pavement for camping sites and drive lanes.
Foundation Loadings	Light
Grading	Based on the existing site grading, the proposed Bathhouse is anticipated to have minimal cut and/or fill depths.

## 3.0 SITE DESCRIPTION

Item	Description
Physical Location	12716 Farm Road 2239 in Cassville, Missouri
Latitude/Longitude	36.577613°N / -93.827851°W
Available Historic Aerial Photography	Historic aerial photography available on Google Earth dating back to 1996 indicates that the Project Site has been developed as a campground during that entire timeframe. Based upon information provided by MDC representatives, the majority of this site was once a lake.
Current Ground Cover	Grass covered topsoil with existing asphalt in the parking areas and drive lane.
Existing Topography	The site is sloping from the north to south.
Drainage Characteristics	Fair

### 3.1 Site Information

During the field investigation, MDC representatives indicated that the majority of Campground 3 was once below a man-made pond/lake. After the property was acquired, the man-made dam was deconstructed. It was understood that Borings 1 and 5 were located outside of the lake, while Borings 2 through 4 would have been located beneath the lake. When the dam was deconstructed, surface conditions were allowed to dry prior to construction of the current camping features.

## 4.0 SUBSURFACE INVESTIGATION

Subsurface conditions were investigated through completion of five (5) subsurface borings and subsequent laboratory testing.

### 4.1 Subsurface Borings

Boring locations were selected and staked in the field by PPI using a site plan provided by the Client. Approximate boring locations are shown on [Figure 1, Boring Location Plan](#). The Missouri One-Call System was notified prior to the investigation to assist in locating buried public utilities. Further, MDC representatives were present to assist in determining where private utilities were located in the field prior to drilling.

Logs of the borings showing descriptions of soil and rock units encountered, as well as results of field tests, laboratory tests and a “Key to Symbols” are presented in [Appendix II](#).

Borings were drilled on April 20, 2022 using 4.5-inch O.D. continuous flight augers powered by an ATV-mounted drill-rig. Soil samples were collected at 2.5 to 5-foot centers during drilling. Soil sample types included split spoon samples collected while performing the Standard Penetration Test (SPT) in general accordance with ASTM D1586. Please refer to [Appendix III](#) for general notes regarding boring logs and additional soil sampling information.

### 4.2 Laboratory Testing

Collected samples were sealed and transported to the laboratory for further evaluation and visual examination. Laboratory soil testing included the following:

- Moisture Content (ASTM D2216);
- Atterberg Limits (ASTM D4318); and
- Pocket Penetrometers.

Laboratory test results are shown on each boring log in [Appendix II](#) and are summarized in the following table.

Boring	Depth (ft.)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Moisture Content (%)	USCS Symbol
B-2	3.5	41	25	16	39.4	CL
B-5	6.0	33	20	13	27.1	CL

## 5.0 SITE GEOLOGY

The general site area is underlain at depth by Ordovician Series Bedrock of the Cotter Formation. This bedrock unit characteristically consists of a light gray to brown, thin to medium bedded cherty dolomite. The upper surface of this dolomite is often irregular due to the effects of differential vertical weathering and solution activity. Overburden soils in the site area typically consist of residual cherty clays having developed through chemical and physical weathering of the underlying parent dolomite. The chert was once interbedded with the dolomite but is much more resistant to weathering and has retained rock-like properties within overburden soils. The boundary between overburden soils and comparatively unweathered bedrock is usually abrupt.

## 6.0 GENERAL SITE SUBSURFACE CONDITIONS

Based upon subsurface conditions encountered within the borings drilled at the project site, generalized subsurface conditions are summarized in the table below. Soil stratification lines on the boring logs indicate approximate boundary lines between different types of soil units based upon observations made during drilling. In-situ transitions between soil and some rock types are typically gradual.

### 6.1 Soils

Based on the results of the subsurface exploration, the subject site primarily consists of brown, lean clay with varying amounts of silt. The surface of the site is covered in approximately 3 inches of asphalt and 3 inches of aggregate baserock or 7 inches of topsoil containing roots from vegetation. Beneath the pavement and topsoil surface, soils transition into lean clay (CL) with varying amounts of silt. Variable amounts of gravel and possible boulders were noted in the lean clay material with some areas of clayey gravel. The lean clay layer extended to boring termination depth in all borings except Boring B-1, which terminated in clayey gravel. Beneath the pavement of

Borings B-1 and B-5, undocumented fill material composed of gravelly fat clay and clayey gravel was encountered extending to depths of 4 feet to 5 feet below the existing ground surface.

## 6.2 Groundwater

Shallow groundwater was observed within the borings at depths ranging from 4 to 10.5 feet below the existing ground surface on the date drilled. Groundwater levels should be expected to fluctuate with changes in site grading, precipitation, and regional groundwater levels due to the proximity to the Roaring River. Groundwater may be encountered at shallower depths during wetter periods.

## 7.0 EARTHWORK

### 7.1 Site Preparation

Based upon the project plans provided by AMA, minimal to moderate depths of cut and/or fill are anticipated to provide finish grade elevations. The initial phase of site preparation should include the steps listed below;

- It is recommended that a representative from PPI be present during site preparation to help identify the conditions described below;
- Stripping and removal of all topsoil and vegetation as described in Section 7.2;
- Areas of lean clay may be sensitive to moisture and require over excavation and replacement or stabilization if exposed to rain, excessive moisture, or repeated traffic as described in Section 7.4;
- Existing asphalt section should be removed. Asphalt maybe rubblized into particle sizes 4-inches or less and incorporated into controlled fills if material is as described in Section 7.8;
- Areas containing undocumented fill, if encountered, should be stripped and replaced, or measures taken as described in Section 7.5;

- All areas scheduled to receive new fill should be proof-rolled as described below. Fill should not be placed on a frozen subgrade.

Proof-rolling consists essentially of rolling the ground surface with a loaded tandem axle dump truck or similar heavy rubber-tired construction equipment and noting any areas which rut or deflect during rolling. All soft subgrade areas identified during proof-rolling should be undercut and replaced with compacted fill as outlined below. Proof-rolling, undercutting, and replacement should be monitored by a qualified representative of the Geotechnical Engineer. The depth and areal extent of undercutting, if any, should be minimal but will be largely dependent upon the time of year and related soil moisture conditions. If construction is initiated during wetter spring or winter months, the requirement for undercutting soft surficial soils below normal topsoil stripping should be anticipated and reflected in contract documents. As previously mentioned, lean clays at the project site are moisture sensitive and may pose difficulties regarding subgrade stability and proper compaction.

## 7.2 Topsoil

Topsoil was noted in Boring B-2 of the subsurface exploration to depth of 0.6 feet below the ground surface. Due to the influence of vegetation and trees, this material should be stripped from construction areas and stockpiled for use in non-structural areas or removed from the site. Large root systems, such as root balls from trees or any root over 6 inches in diameter should be included in the removal of topsoil from beneath structures and pavements. Root systems may extend to depths deeper than those noted in the subsurface exploration. It should be noted that the use of the term topsoil within this report is for site construction and does not imply that the material is suitable for sale as topsoil. Due to the increased gravel and sand contents and the plasticity of some of the topsoil, some of this material may not be suitable for re-use as a surficial landscaping material.

## 7.3 Soft Surficial Soils

Areas of lean clay were noted below the surface in all borings except B-1. Generally, these materials may be stable during dry weather; however, these materials are

anticipated to be sensitive to the addition of moisture. **During wet seasons or rain events or when exposed to repeated traffic, the lean clay soils may become unstable and require over excavation and replacement or stabilization.** The amount of over excavation will be dependent upon conditions encountered during construction.

**Due to the depth of the soft lean clays at the proposed Bathhouse location, i.e. Boring B-2, removal and replacement of the material will likely be required to achieve the recommended bearing pressure. A minimum undercut of 4 feet below the bottom of foundation bearing elevation is recommended to be performed. The undercut should extend horizontally a minimum distance equal to one half the depth between bottom of footing elevation and bottom of undercut, i.e. 2 ft. to both sides of the footing if the undercut is 4 ft. deep. A geogrid consisting of Tensar TX-5 or TX-140 should be placed in the bottom of the undercut to limit loss of stone into the undercut bottom. Large stone (4 to 8 inch topsize) should then be placed in the undercut bottom in 1 ft. lifts and consolidated. Some loss of the large stone into the soft subgrade should be anticipated. The large stone should be placed up to within 6 inches of footing bottom elevation. The large stone should be capped with 6 inches of compacted aggregate baserock to provide a working surface for rebar placement. Due to the excessively soft soils below the undercut, there is still a risk for some settlement and associated cracking of foundations and slabs. If limited cracking of brittle building materials cannot be tolerated, additional recommendations for deep foundations can be provided.**

#### **7.4 Inclement Weather**

If construction is initiated during wetter months, the requirement for undercutting soft surficial soils below normal site stripping should be anticipated and reflected in contract documents in areas where new construction is anticipated for the remodel. Undercut depths on the order of 2 or more ft. are considered possible within the development area. The shallow lean clay subgrade at the site is known to significantly lose strength when saturated and disturbed by construction equipment. Further,

material removed from undercuts may not be suitable for use as compacted fill due to high soil moisture if poor drying conditions (cool temperatures and/or frequent precipitation) occur during site grading. If the construction schedule will not permit delay for better drying conditions, the project budget should include an allowance for subgrade undercut and replacement soil material containing appreciable quantities of chert or sand and gravel from an off-site borrow area that meet the requirements above. As an alternate to select fill, rock fill subbase (4 to 6-inch top size stone) may be placed to improve subgrade stability.

### 7.5 Undocumented Fill

Undocumented fill material was encountered within Borings B-1 and B-5 of the subsurface exploration extending to depths of 4 feet to 5 feet below the existing ground surface. **The origin and method of placement of this undocumented fill is unknown and for the purpose of this project should be considered uncontrolled.** Due to the possibility for loosely compacted zones within this fill and the increased risk of large differential settlements, foundations are recommended to bear on new controlled fill or on native soils as describe in Section 8. Areas containing undocumented fill where slab on grade floors and pavements will be placed should be proof-rolled prior to construction of slabs and pavements. Areas of undocumented fill that do not pass proof-rolling should be removed and replaced with controlled fill as noted in Sections 7.5 and 7.8. Existing undocumented fill material may be reused as controlled fill if approved by the geotechnical engineer in accordance to Section 8.3.

### 7.6 Shallow Groundwater Considerations

Groundwater was encountered during the subsurface exploration at depths between 4 and 10.5 feet below the ground surface. As previously mentioned, water levels at the subject site should be anticipated to fluctuate with seasonal changes in moisture. Contractors should be prepared to encounter areas of shallow groundwater at the subject site. Generally, the shallow groundwater should be able to be removed with conventional pumping equipment; however, construction below the river's water level,

if required, may require additional drainage systems to be implemented. PPI can provide these recommendations if needed.

## 7.7 Scarifying and Recompacting

Subgrade areas approved after proof-rolling should be scarified to a depth of at least 8 inches and soil moisture adjusted and compacted to comply with project specifications.

## 7.8 Fill Material Types

Fill Type <sup>1</sup>	USCS Classification	Acceptable Location for Placement
Low Volume Change (LVC) Engineered Fill <sup>2</sup>	Non-shaley CL <sup>5</sup> , GC, or SC (LL < 45)	All locations and elevations
On-Site Natural Soils	CL <sup>5</sup> & GC	All locations and elevations
On-Site Undocumented Fill	CL <sup>5</sup> & GC	All locations and elevations
Potential Borrow Material	CL <sup>5</sup> , SC, GC	All locations and elevations
	CL-CH & CH	See Note 3
Rock Fill <sup>4</sup>	GW	All locations and elevations

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris and contain maximum rock size of 4 to 6 in. Frozen material should not be used and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to its use.
2. Non-shaley, low plasticity cohesive soil or granular soil having at least 15% low plasticity fines.
3. CL-CH or CH clays with a Liquid Limit equal to or above 45 are considered suitable for use as controlled fill, only if the percentage of rock fragments exceeds 35% or if placed 2 feet below shallow foundations, pavements, or slab areas.
4. If rock fill will be utilized at the project site see [Section 7.8.1](#).
5. Caution should be exercised when utilizing on-site lean clays as fill material. These soils are moisture sensitive and may not provide a stable subgrade even when properly compacted when soil moisture is above optimum.

### 7.8.1 Rock Fill

If rock is to be used as the primary filling medium, embankments should be constructed using rock having maximum dimensions in excess of 4 inches, but no greater than 8 inches. Rock material should be placed in horizontal layers having a thickness of approximately the maximum size of the larger rock comprising the lift, but not greater than 12 inches. Rocks or boulders too large to permit placing in a 12-inch-thick lift should be reduced in size as necessary to permit placement or be bladed over the edge of the fill and not used in the compacted fill. Rock fill



should not be dumped into place but should be distributed in horizontal lifts by blading and dozing in such a manner as to ensure proper placement into final position in the embankment. Finer material including rock fines and limited soil fines should be worked into the rock voids during this blading operation. Excessive soil and rock fine particles preventing interlock of cobble and boulder sized rock should be prohibited. Rock fill should be consolidated by a minimum of three (3) passes of a large diameter self-propelled vibratory compactor. Terminal fill slopes using rock may be constructed 1.5 horizontal to 1 vertical for fill height of 15 feet or less. The testing of rock fill quality should include the requirements that a representative of the Geotechnical Engineer be present daily, but not necessarily continuously during the placement of the fill to observe the placement of rock fill in order to determine fill quality and to observe that the contractors work sequence is in compliance with this specification. Progress reports indicative of the quality of the fill should be made at regular intervals to the Owner. If improper placement procedures are observed during the placement of the fill the Geotechnical Engineer should inform the Contractor, and no additional fill should be permitted on the affected area until the condition causing the low densities has been corrected and the fill has been reworked to obtain sufficient density.

## 7.9 Compaction Requirements

Item	Description
Subgrade Scarification Depth	At least 8 inches
Fill Lift Thickness	8-inch (loose)
Compaction Requirements <sup>1</sup>	<ul style="list-style-type: none"> <li>70% Relative Density, or compacted by a minimum of three (3) passes of a self-propelled smooth drum vibratory compactor.</li> <li>95% Standard Proctor Density (ASTM D-698).</li> </ul>
Moisture Content	<ul style="list-style-type: none"> <li>± 2% optimum moisture for CL, SC, or GC soil types; or</li> <li>0 to 4% above optimum for CL-CH or CH soil types.</li> </ul>
Recommended Testing Frequency	<ul style="list-style-type: none"> <li>One (1) Field Density (compaction) test for each 2,500 sq. ft. of fill within building areas;</li> <li>One (1) Field Density (compaction) test for each 5,000 sq. ft. of fill within paving areas; and</li> <li>A minimum of three (3) tests per lift.</li> </ul>
<p>1. We recommend that engineered fill (including scarified compacted subgrade) be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.</p>	

## 7.10 Landscaping & Site Drainage

Discharge from roof downspouts should be collected and diverted well away from the building perimeter and incorporated into the design plans. Rapid, efficient runoff away from the building should also be provided. In addition, landscaping requiring frequent watering should be prohibited adjacent to building foundations.

In addition, provisions should be implemented to reduce the potential for large fluctuations in moisture within the subgrade soils adjacent to the structure. Ponding of surface water immediately adjacent to the structures and pavements can significantly increase subgrade moisture and may result in undesirable subgrade movement. As previously mentioned, careful consideration should be given to the landscaping and drainage elements to be installed at the project site adjacent to building and pavement areas. **Trees and some large bushes can draw significant moisture from the subgrade soils, resulting in shrinkage and subsequent foundation/pavement movement.**

## 7.11 Earthwork Construction Considerations

Once grading and filling operations have been completed, the moisture within the subgrade should be maintained and soils not be allowed to dry and desiccate prior to construction of floor slabs and footings. Grading of the site should be performed in such a manner so that ponding of surface water on prepared subgrade or in excavations is avoided. During construction, if the prepared subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be scarified or removed, moisture conditioned and recompacted prior to floor slab construction.

## 7.12 Excavations

Based upon the subsurface conditions encountered during this investigation, the on-site soils typically classify as Type C in accordance with OSHA regulations. Temporary excavations in soils classifying as Type C with a total height of less than 20 feet should be cut no steeper than 1.5H:1V in accordance with OSHA guidelines. Confirmation of soil classification during construction, as well as construction safety (including shoring, if required), is the responsibility of the contractor.

## 8.0 FOUNDATIONS

### 8.1 Building Foundations

Based upon the subsurface conditions encountered near the proposed building and anticipated site grading, footings for the proposed building are anticipated to bear in controlled fill. **The foundations for the bathhouse will require over excavation and replacement due to the depth of the soft lean clays, especially in Boring B-2. Removal, stabilization and replacement will likely be required to achieve the bearing pressure as described in Section 7.3 above.**

## 8.2 Shallow Foundation Design Recommendations

Description	Column (Spread Footing)	Wall (Continuous Footing)
Net allowable bearing pressure <sup>1</sup>	1500 psf	1500 psf
Minimum dimensions	2.5 feet	1.5 feet
Minimum embedment below finished grade for frost protection and variation in soil moisture <sup>2</sup> (footings on soil)	2.5 feet	2.5 feet
Estimated total settlement <sup>3</sup>	1 inch or less	1 inch or less
Allowable passive pressure <sup>4</sup>	500 psf	500 psf
Coefficient of sliding friction <sup>5</sup>	0.4 (controlled fill)	0.4 (controlled fill)

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. The recommended pressure considers all unsuitable and/or soft or loose soils, if encountered, are undercut and replaced with tested and approved new engineered fill. Footing excavations should be free of loose and disturbed material, debris, and water when concrete is placed. A factor of safety value of 3 has been applied to these values.

2. For perimeter footings and footings beneath unheated areas.

3. The foundation movement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations.

4. Allowable passive pressure value considers a factor of safety of about 2. Passive pressure value applies to undisturbed native clay or properly compacted fill. If formed footings are constructed, the space between the formed side of a footing and excavation sidewall should be cleaned of all loose material, debris, and water and backfilled with tested and approved fill compacted to at least 95% of the material's Standard Proctor dry density. Passive resistance should be neglected for the upper 2.5 feet of the soil below the final adjacent grade due to strength loss from freeze/thaw and shrink/swell.

5. Coefficient of friction value is an ultimate value and does not contain a factor of safety.

## 8.3 Uplift

Resistance of shallow spread footings to uplift ( $U_p$ ) may be based upon the dead weight of the concrete footing structure ( $W_c$ ) and the weight of soil backfill contained in an inverted cone or pyramid directly above the footings ( $W_s$ ). The following parameters may be used in design:

Description	Weights
Weight of Concrete ( $W_c$ )	150 pcf
Weight of Soil Resistance ( $W_s$ )	100 pcf
Weight for on-site soils placed in accordance with <u>Section 7</u>	

The base of the cone or pyramid should be the top of the footing and the pyramid or cone sides should form an angle of 30 degrees with the vertical. Allowable uplift capacity ( $U_p$ ) should be computed as the lesser of the two (2) equations listed below:

$$U_P = (W_s/2.0) + (W_c/1.25) \text{ or } U_P = (W_s + W_c)/1.5$$

## 9.0 SEISMIC CONSIDERATIONS

Code Used	Site Classification
2018 International Building Code (IBC) <sup>1</sup>	E
1. In general accordance with the <i>2018 International Building Code</i> , Section 1613	

## 10.0 FLOOR SLABS

A slab-on-grade or slab-on-fill floor system is considered appropriate at the site based upon subsurface conditions encountered and future site grading. Listed below are key considerations for design purposes of the floor slab.

- Subgrade materials containing undocumented fills in the areas of the floor slabs should be proof-rolled prior to the construction of the floor slabs. Areas not passing the proof rolled should be treated as noted in Section 7.5;
- Prior to placement of **controlled** fill, if any, natural soils should be scarified, moisture content adjusted and re-compacted in accordance with Section 8 of this report; and
- Prior to slab placement, soil moisture should be adjusted and maintained within the parameters specified in Section 8 of this report.

Placement of 4 or more inches of compacted free-draining granular base course below slabs that are not below grade is recommended to limit moisture rise through slabs and to improve slab support, particularly at joints. An impervious moisture barrier consisting of 6-mil plastic sheeting or equivalent should be provided in accordance with the 2018 IBC. Use of a 10-mil vapor barrier is recommended below all slab areas with an intended use sensitive to slab moisture.

## 11.0 PAVEMENT

Pavement subgrades should be prepared in accordance with Section 8 of this report. It is anticipated that any new pavements associated with this project will be constructed of either an asphaltic concrete wearing surface placed over a base or a rigid Portland Cement Concrete pavement over a granular base.

### 11.1 Flexible Pavement

If asphaltic paving is selected, the aggregate base may be a granular compacted crushed limestone with a gradation and quality conforming to the requirements of the Missouri Department of Transportation, Standard Specification 1007 for either Type 1 or Type 5 aggregates. The maximum lift thickness for the granular base is 4 inches. Granular base thicknesses in excess of 4 inches should be placed in multiple lifts with each lift being of approximate equal thickness. The granular base should be compacted to at least 100% of Standard Proctor Compaction (ASTM D698). The base may also be a bituminous base.

Asphaltic concrete, both base and surface, should conform to the applicable gradational requirements of MoDOT Standard Specification 401 to 403 except that sampling for testing compliance during laydown should be from hot mix samples taken behind the paver. Asphaltic concrete should be compacted to 92 to 96% of Maximum Theoretical Specific Gravity (ASTM D2041). 95% of 50-Blow Marshall compaction is also accepted as a minimum compaction if the void content ( $V_a$ ) is within the specification value range. Substitution of an appropriate Superpave Mix Design (MoDOT Section 403) is permitted. SP-190C or SP-250C can be used in place of the bituminous base. SP-190C or SP-125C may be used for the surface.

All asphalt mixes should comply with the following density, gradation, oil content and volumetric requirements during laydown. However, all Owners, Developers and Contractors should be aware that minor changes in conditions (environmental, materials or mechanical) during production can cause variations in the volumetric properties of an asphalt mix design. Volumetric properties which vary slightly from the requirements below should be reported to the producer to allow plant adjustments.

Asphalt mix properties which consistently vary appreciably from the requirements in the following table should be considered deficient. All bituminous mix designs should have been prepared or verified within six (6) months of the date of placement on this project and should recognize the tendency of the mineral aggregate to “fine up” in the mixer.

<b>Asphalt Properties &amp; Recommended Specifications</b>				
<b>Tested Property</b>	<b>Test Method</b>	<b>Testing Frequency</b>	<b>Sample Source or Test Location</b>	<b>Specification</b>
Mixture Temperature		As Needed	N/A	For Informational Purposes
Temperature of Base & Air		As Needed	N/A	For Informational Purposes
Max Density (% of Theoretical Maximum Density)	AASHTO T166 or ASTM D2041	1 Test Each 1,000 Tons per Day or Fraction Thereof or as directed by Engineer	Location selected by testing lab at least 2 ft. from joint	92 to 96%
Gradation	AASHTO T27	1 Sample Each 1,000 Tons per Day or Fraction Thereof or as directed by Engineer	HMAC at Paver	<sup>1</sup> MoDOT 401.3
Combined Aggregate Asphalt Content	AASHTO T308	1 Sample Each 1,000 Tons per Day or Fraction Thereof or as directed by Engineer	HMAC at Paver	± 0.3% from Mix Design
VMA @ N <sub>des</sub> Gyration (Voids in Mineral Aggregate)	AASHTO 312	1 Sample Each 1,000 Tons per Day or Fraction Thereof or as directed by Engineer	HMAC at Paver	>13.0% for Base >13.5% for BP-1 >14.0% for BP-2 >15.0% for BP-3
V <sub>a</sub> @ N <sub>des</sub> Gyration (Air Voids)	AASHTO 312	1 Sample Each 1,000 Tons per Day or Fraction Thereof or as directed by Engineer	HMAC at Paver	± 1% From Mix Design
Percent Voids Filled	AASHTO 312	1 Sample Each 1,000 Tons per Day or Fraction Thereof or as directed by Engineer	HMAC at Paver	60 – 80%
Theo. Max SG of the Mixture	AASHTO T209	1 Sample Each 1,000 Tons per Day or Fraction Thereof or as directed by Engineer	HMAC at Paver	N/A
Thickness	AASHTO T148	1 Test Each 1,000 Tons per Day or Fraction Thereof or as directed by Engineer	As directed by Engineer	Total Asphalt Thickness to be No Less than 0.5” from Specified Thickness

<sup>1</sup>. See MoDOT 403.3.1 for SP Mixes

## 11.2 Rigid Pavement

If rigid concrete paving is selected a minimum 4-inch thick granular base compacted to 100% of Standard Proctor should be placed on the prepared subgrade. The

Portland Cement Concrete mix should have a minimum 28-day compressive strength of 4000 pounds per square inch (psi). Concrete should be placed at a low slump (1 to 3 inches) and have an entrained air content of 5 to 7%. If an increased slump is desired, use of Super Plasticizer is recommended. The use of 6x6-inch welded wire mesh is also recommended for reinforcement.

### 11.3 Pavement Thickness

A pavement thickness would best be computed if traffic frequencies and wheel loadings were provided to us, but a typical pavement design for this type of facility would generally generate a Structural Number of 3.0 to 3.5 within heavy duty areas and 2.4 to 2.6 within light duty areas, depending on the subgrade conditions. The following table presents corresponding typical flexible and rigid pavement thicknesses using the general Structural Numbers. The pavement thicknesses provided below are conservative and can be re-evaluated if a final grading plan, traffic frequencies and wheel loadings are provided, if desired.

Pavement Type	Anticipated Traffic Frequency	Asphaltic Surface (in.)	Asphaltic Base (in.)	Concrete Thickness (in.)	Aggregate Base (in.)
Flexible Pavement	Heavy Duty	3.0	4.0	-	6.0
	Heavy Duty w/ Tensar TX5 Geogrid*	3.0	3.0	-	6.0
	Light Duty	2.0	2.0	-	6.0
	Light Duty w/ Tensar TX5 Geogrid*	3.0	-	-	6.0
Rigid Pavement	Heavy Duty	-	-	7.0	4.0
	Light Duty	-	-	5.0	4.0

\*Geogrid to consist of Tensar TX5, installed below aggregate baserock section per manufacturer's recommendations.

### 12.0 CONSTRUCTION OBSERVATION & TESTING

The construction process is an integral design component with respect to the geotechnical aspects of a project. Since geotechnical engineering is influenced by variable depositional and weathering processes and because we sample only a small portion of the soils affecting the performance of the proposed structures, unanticipated or changed conditions can be disclosed during grading. Proper geotechnical observation



and testing during construction is imperative to allow the Geotechnical Engineer the opportunity to evaluate assumptions made during the design process. Therefore, we recommend that PPI be kept apprised of design modifications and construction schedule of the proposed project to observe compliance with the design concepts and geotechnical recommendations, and to allow design changes in the event that subsurface conditions or methods of construction differ from those assumed while completing this study. We recommend that during construction all earthwork be monitored by a representative of PPI, including site preparation, placement of all engineered fill and trench backfill, and all foundation excavations as outlined below.

- An experienced Geotechnical Engineer or Engineering Technician of PPI should observe the subgrade throughout the proposed project site immediately following stripping to evaluate the native clay, identify areas requiring undercutting, and evaluate the suitability of the exposed surface for fill placement;
- An experienced Engineering Technician of PPI should monitor and test all fill placed within the building and pavement areas to determine whether the type of material, moisture content, and degree of compaction are within recommended limits;
- An experienced Technician or Engineer of PPI should observe and test all footing excavations. Where unsuitable bearing conditions are observed, remedial procedures can be established in the field to avoid construction delays; and
- The condition of the subgrade should be evaluated immediately prior to construction of the building floor slabs to determine whether the moisture content and relative density of the subgrade soils are as recommended.

### **13.0 REPORT LIMITATIONS**

This report has been prepared in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Palmerton & Parrish, Inc. observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Palmerton & Parrish's

findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of this investigation. Other than this, no warranty is implied or intended.

## APPENDIX I - FIGURES



**LEGEND**

 Boring Location

SCALE  
1" = 300'

Project: Roaring Rivers State Park - Campground 3  
Client: Allgeier Martin & Associates, Inc.

**Boring Location Plan**

Date: April 25, 2022

Project Number: 280196



**PALMERTON & PARRISH, INC.**  
GEOTECHNICAL AND MATERIALS ENGINEERS/MATERIALS TESTING LABORATORIES/ENVIRONMENTAL SERVICES

**FIGURE 1**

## **APPENDIX II - BORING LOGS & KEY TO SYMBOLS**



4168 W. Kearney St.  
Springfield, MO 65803  
Telephone: 417-864-6000

# GEOTECHNICAL BORING LOG

BORING NUMBER

1

PAGE 1 OF 1

CLIENT Allgeier Martin & Associates, Inc. PROJECT NAME Roaring Rivers State Park - Campground 3  
 PROJECT NO. 280196 PROJECT LOCATION Barry County, Missouri  
 DATE STARTED 4/20/22 COMPLETED 4/20/22 SURFACE ELEVATION \_\_\_\_\_ BENCHMARK EL. \_\_\_\_\_  
 DRILLER SP DRILL RIG 2014 CME-55 GROUND WATER LEVELS \_\_\_\_\_  
 HAMMER TYPE Auto AT TIME OF DRILLING 6.25 ft  
 LOGGED BY CJ CHECKED BY MH AT END OF DRILLING \_\_\_\_\_  
 NOTES \_\_\_\_\_

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 5/9/22 13:34 - \\MAIN-SERVER\NETWORK\SHARED\MASTER PROJECT FILE\2022\MOIAMA-280196-ROARING RIVERS CAMPGROUND 3 RENO-SUBBORING LOGS\BORING LOGS - 280196.GPJ

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	◆ DRY UNIT WT (pcf) ◆ 20 40 60 80 100 ▲ N VALUE ▲ 20 40 60 80 PL MC LL 20 40 60 80 ■ SHEAR STRENGTH (ksf) ■ 1 2 3 4				ELEVATION (ft)
0.0			ASPHALT (3") 0.3 ft									
			AGGREGATE (3") 0.5 ft									
			FILL - GRAVELLY LEAN CLAY, Brown, Stiff, Moist (CL)	SPT 1		9-10-4 (14)	1.25					
2.5												
			LEAN CLAY, Scattered Gravel, Brown, Stiff to Very Stiff, Moist (CL) 4.0 ft	SPT 2		5-6-4 (10)	2.25					
5.0												
			CLAYEY GRAVEL, Red to Brown, Medium Dense to Loose, Moist (GC) 6.3 ft	SPT 3		5-9-9 (18)						
7.5												
				SPT 4		5-4-5 (9)						
10.0												

Bottom of borehole at 10.0 feet.

CFA - 4.5" O.D.



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# GEOTECHNICAL BORING LOG

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PAGE 1 OF 1

CLIENT Allgeier Martin & Associates, Inc. PROJECT NAME Roaring Rivers State Park - Campground 3  
 PROJECT NO. 280196 PROJECT LOCATION Barry County, Missouri  
 DATE STARTED 4/20/22 COMPLETED 4/20/22 SURFACE ELEVATION \_\_\_\_\_ BENCHMARK EL. \_\_\_\_\_  
 DRILLER SP DRILL RIG 2014 CME-55 GROUND WATER LEVELS \_\_\_\_\_  
 HAMMER TYPE Auto AT TIME OF DRILLING 7.33 ft  
 LOGGED BY CJ CHECKED BY MH AT END OF DRILLING \_\_\_\_\_  
 NOTES \_\_\_\_\_

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 5/9/22 13:34 - \\MAIN-SERVER\NETWORK\SHARED\MASTER PROJECT FILE\2022\MOIAMA-280196-ROARING RIVERS CAMPGROUND 3 RENO-SUBBORING LOGS-280196.GPJ

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)				ELEVATION (ft)
								20	40	60	80	
0.0			TOPSOIL - Grass Covered (7")									
0.6			LEAN CLAY, with Gravel and Scattered Sand, Brown to Red, Stiff, Moist (CL)	SPT 1		3-8-6 (14)	0.75					
2.2			SILTY LEAN CLAY, Brown, Soft, Moist (CL)									
5.0			- Very Soft Between 6' to 8.3'	SPT 2		1-1-1 (2)	0.75					
7.5			- with Gravel, and Stiff Below 8.3'	SPT 3		0-0-0 (0)	0.25					
10.0				SPT 4		3-5-4 (9)						

CFA - 4.5" O.D.

Bottom of borehole at 10.0 feet.



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# GEOTECHNICAL BORING LOG

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PAGE 1 OF 1

CLIENT Allgeier Martin & Associates, Inc. PROJECT NAME Roaring Rivers State Park - Campground 3  
 PROJECT NO. 280196 PROJECT LOCATION Barry County, Missouri  
 DATE STARTED 4/20/22 COMPLETED 4/20/22 SURFACE ELEVATION \_\_\_\_\_ BENCHMARK EL. \_\_\_\_\_  
 DRILLER SP DRILL RIG 2014 CME-55 GROUND WATER LEVELS \_\_\_\_\_  
 HAMMER TYPE Auto AT TIME OF DRILLING 4 ft  
 LOGGED BY CJ CHECKED BY MH AT END OF DRILLING \_\_\_\_\_  
 NOTES \_\_\_\_\_

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 5/9/22 13:34 - \\MAIN-SERVER\NETWORK\SHARED\MASTER PROJECT FILE\2022\MOI\AMA-280196-ROARING RIVERS CAMPGROUND 3 RENO-SUBBORING LOGS\BORING LOGS - 280196.GPJ

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	SOIL PROPERTIES				ELEVATION (ft)		
								DRY UNIT WT (pcf)	N VALUE	PL	MC		LL	SHEAR STRENGTH (ksf)
								20	40	60	80	100		
								20	40	60	80			
								20	40	60	80			
								1	2	3	4			
0.0			ASPHALT (3")											
			AGGREGATE (3")											
			GRAVELLY LEAN CLAY, Brown, Medium Stiff, Moist (CL)	SPT 1		9-2-3 (5)	2.25							
			SILTY LEAN CLAY, Brown, Medium Stiff, Moist (CL)											
2.5			- Very Soft Between 3' and 5.5'											
				SPT 2		0-0-0 (0)	0.75							
5.0			- with Gravel, Medium Stiff below 5.5'											
				SPT 3		2-3-5 (8)	1							
7.5														

Bottom of borehole at 7.5 feet.

CFA - 4.5" O.D.





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# GEOTECHNICAL BORING LOG

BORING NUMBER

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CLIENT Allgeier Martin & Associates, Inc. PROJECT NAME Roaring Rivers State Park - Campground 3  
 PROJECT NO. 280196 PROJECT LOCATION Barry County, Missouri  
 DATE STARTED 4/20/22 COMPLETED 4/20/22 SURFACE ELEVATION \_\_\_\_\_ BENCHMARK EL. \_\_\_\_\_  
 DRILLER SP DRILL RIG 2014 CME-55 GROUND WATER LEVELS \_\_\_\_\_  
 HAMMER TYPE Auto AT TIME OF DRILLING None  
 LOGGED BY CJ CHECKED BY MH AT END OF DRILLING \_\_\_\_\_  
 NOTES \_\_\_\_\_

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 5/9/22 13:34 - \\MAIN-SERVER\NETWORK\SHARED\MASTER PROJECT FILE\2022\MOIAMA-280196-ROARING RIVERS CAMPGROUND 3 RENO-SUBBORING LOGS-280196.GPJ

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	◆ DRY UNIT WT (pcf) ◆ 20 40 60 80 100 ▲ N VALUE ▲ 20 40 60 80 PL MC LL 20 40 60 80 ■ SHEAR STRENGTH (ksf) ■ 1 2 3 4				ELEVATION (ft)
0			ASPHALT (3")									
			AGGREGATE (3")									
			SILTY LEAN CLAY, Trace Sand, Brown, Soft to Medium Stiff, Moist (CL)									
1												
2				SPT 1		2-2-2 (4)	1.5	▲	○			
3												
4			- with Sand and Gravel Below 3.5'	SPT 2		1-3-4 (7)	0.25	▲	○			
5			Bottom of borehole at 5.0 feet.									

CFA - 4.5" O.D.



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# GEOTECHNICAL BORING LOG

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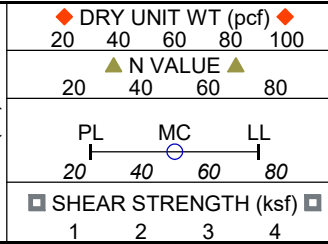
CLIENT Allgeier Martin & Associates, Inc. PROJECT NAME Roaring Rivers State Park - Campground 3  
 PROJECT NO. 280196 PROJECT LOCATION Barry County, Missouri  
 DATE STARTED 4/20/22 COMPLETED 4/20/22 SURFACE ELEVATION \_\_\_\_\_ BENCHMARK EL. \_\_\_\_\_  
 DRILLER SP DRILL RIG 2014 CME-55 GROUND WATER LEVELS \_\_\_\_\_  
 HAMMER TYPE Auto AT TIME OF DRILLING 10.5 ft  
 LOGGED BY CJ CHECKED BY MH AT END OF DRILLING \_\_\_\_\_  
 NOTES \_\_\_\_\_

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 5/9/22 13:34 - \\MAIN-SERVER\NETWORK\SHARED\MASTER PROJECT FILE\2022\MOI\AMA-280196-ROARING RIVERS CAMPGROUND 3 RENO-SUBBORING LOGS\BORING LOGS - 280196.GPJ

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)				ELEVATION (ft)
								20	40	60	80	
0.0			ASPHALT (3")									
0.3			AGGREGATE (3")									
0.5			FILL - CLAYEY GRAVEL, with Sand, Brown, Dense, Moist (GC)	SPT 1		9-16-13 (29)	2					
2.5			- Loose Below 3'									
5.0			LEAN CLAY, Scattered Silt and Sand, Brown, Soft to Medium Stiff, Moist (CL)	SPT 2		9-4-5 (9)						
5.0				SPT 3		3-2-2 (4)	0.5					
7.5				SPT 4		5-4-4 (8)	0.5					
10.0			- with Gravel and Sand Below 10'	SPT 5		4-4-4 (8)						
12.0												

Bottom of borehole at 12.0 feet.

CFA - 4.5" O.D.





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# KEY TO SYMBOLS

**CLIENT** Allgeier Martin & Associates, Inc.

**PROJECT NAME** Roaring Rivers State Park - Campground 3

**PROJECT NO.** 280196

**PROJECT LOCATION** Barry County, Missouri

## LITHOLOGIC SYMBOLS (Unified Soil Classification System)



ASPHALT: Asphalt



CL: USCS Low Plasticity Clay



CLG: USCS Low Plasticity Gravelly Clay



FILL: Fill (made ground)



GC: USCS Clayey Gravel



TOPSOIL: Topsoil

## SAMPLER SYMBOLS



Standard Penetration Test

## WELL CONSTRUCTION SYMBOLS

## ABBREVIATIONS

LL - LIQUID LIMIT (%)  
PI - PLASTIC INDEX (%)  
W - MOISTURE CONTENT (%)  
DD - DRY DENSITY (PCF)  
NP - NON PLASTIC  
-200 - PERCENT PASSING NO. 200 SIEVE  
PP - POCKET PENETROMETER (TSF)

TV - TORVANE  
PID - PHOTOIONIZATION DETECTOR  
UC - UNCONFINED COMPRESSION  
ppm - PARTS PER MILLION  
▽ Water Level at Time Drilling, or as Shown  
▼ Water Level at End of Drilling, or as Shown  
▽ Water Level After 24 Hours, or as Shown

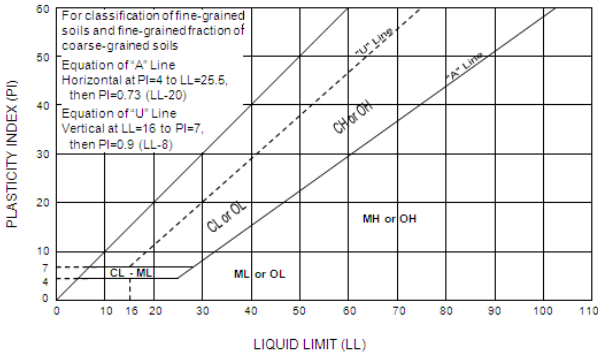
## APPENDIX III - GENERAL NOTES

## GENERAL NOTES

### SOIL PROPERTIES & DESCRIPTIONS

#### COHESIVE SOILS

Consistency	Unconfined Compressive Strength (Qu)	Pocket Penetrometer Strength	N-Value
	(psf)	(tsf)	(blows/ft)
Very Soft	<500	<0.25	0-1
Soft	500-1000	0.25-0.50	2-4
Medium Stiff	1001-2000	0.50-1.00	5-8
Stiff	2001-4000	1.00-2.00	9-15
Very Stiff	4001-8000	2.00-4.00	16-30
Hard	>8000	>4.00	31-60
Very Hard			>60



Group Symbol	Group Name
CL	Lean Clay
ML	Silt
OL	Organic Clay or Silt
CH	Fat Clay
MH	Elastic Silt
OH	Organic Clay or Silt
PT	Peat
CL-CH	Lean to Fat Clay

Plasticity		Moisture	
Description	Liquid Limit (LL)	Descriptive Term	Guide
Lean	<45%	Dry	No indication of water
Lean to Fat	45-49%	Moist	Indication of water
Fat	≥50%	Wet	Visible water

Fine Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: SILT, LEAN CLAY, FAT CLAY, ELASTIC SILT	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders with sand, with gravel, with cobbles, with boulders scattered sand, scattered gravel, scattered cobbles, scattered boulders a trace sand, a trace gravel, a few cobbles, a few boulders	>30-50]
	>15-30] – secondary coarse grained constituents
	5-15]
	<5]
The relationship of clay and silt constituents is based on plasticity and normally determined by performing index tests. Refined classifications are based on Atterberg Limits tests and the Plasticity Chart.	

#### NON-COHESIVE (GRANULAR) SOILS

RELATIVE DENSITY	N-VALUE	MOISTURE CONDITION	
		Descriptive Term	Guide
Very Loose	0-4	Dry	No indication of water
Loose	5-10	Moist	Damp but no visible water
Medium Dense	11-24	Wet	Visible free water, usually soil is below water table.
Dense	25-50		
Very Dense	≥51		

**GRAIN SIZE IDENTIFICATION		
Name	Size Limits	Familiar Example
Boulder	12 in. or more	Larger than basketball
Cobbles	3 in. to 12 in.	Grapefruit
Coarse Gravel	¾-in. to 3 in.	Orange or lemon
Fine Gravel	No. 4 sieve to ¾-in.	Grape or pea
Coarse Sand	No. 10 sieve to No. 4 sieve	Rock salt
Medium Sand	No. 40 sieve to No. 10 sieve	Sugar, table salt
Fine Sand*	No. 200 sieve to No. 40 sieve	Powdered sugar
Fines	Less than No. 200 sieve	

\*Particles finer than fine sand cannot be discerned with the naked eye at a distance of 8 inches.

Coarse Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: GRAVEL, SAND, COBBLES, BOULDERS	PRIMARY CONSTITUENT
Sandy, gravelly, abundant cobbles, abundant boulders with gravel, with sand, with cobbles, with boulders scattered gravel, scattered sand, scattered cobbles, scattered boulders a trace gravel, a trace sand, a few cobbles, a few boulders	>30-50]
	>15-30] – secondary coarse grained constituents
	5-15]
	<5]
Silty (MH & ML)*, clayey (CL & CH)* (with silt, with clay)* (trace silt, trace clay)*	<15 ]
	5-15 ] – secondary fine grained constituents
	<5]
*Index tests and/or plasticity tests are performed to determine whether the term "silt" or "clay" is used.	

\*Modified after Ref. ASTM D2487-93 & D2488-93

\*\*Modified after Ref. Oregon DOT 1987 & FHWA 1997

\*\*\*Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

## GENERAL NOTES

### BEDROCK PROPERTIES & DESCRIPTIONS

ROCK QUALITY DESIGNATION (RQD)	
Description of Rock Quality	*RQD (%)
Very Poor	< 25
Poor	25-50
Fair	50-75
Good	75-90
Excellent	90-100

\*RQD is defined as the total length of sound core pieces 4 in. or greater in length, expressed as a percentage of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.

SCALE OF RELATIVE ROCK HARDNESS		
Term	Field Identification	Approx. Unconfined Compressive Strength (tsf)
Extremely Soft	Can be indented by thumbnail	2.6-10
Very Soft	Can be peeled by pocket knife	10-50
Soft	Can be peeled with difficulty by pocket knife	50-260
Medium Hard	Can be grooved 2 mm deep by firm pressure of knife	260-520
Moderately Hard	Requires one hammer blow to fracture	520-1040
Hard	Can be scratched with knife or pick only with difficulty	1040-2610
Very Hard	Cannot be scratched by knife or sharp pick	>2610

DEGREE OF WEATHERING	
Slightly Weathered	Rock generally fresh, joints stained and discoloration extends into rock up to 25mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered	Rock mass is decomposed 50% or less, significant portions of rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
Highly Weathered	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

GRAIN SIZE (TYPICALLY FOR SEDIMENTARY ROCKS)		
Description	Diameter (mm)	Field Identification
Very Coarse Grained	>4.76	Individual grains can easily be distinguished by eye.
Coarse Grained	2.0-4.76	
Medium Grained	0.42-2.0	Individual grains can be distinguished by eye.
Fine Grained	0.074-0.42	Individual grains can be distinguished by eye with difficulty.
Very Fine Grained	<0.074	Individual grains cannot be distinguished by unaided eye.

VOIDS	
Pit	Voids barely seen with the naked eye to 6mm *1/4-inch)
Vug	Voids 6 to 50mm (1/4 to 2 inches) in diameter
Cavity	50 to 6000mm (2 to 24 inches) in diameter
Cave	> 600mm

BEDDING THICKNESS	
Very Thick Bedded	> 3' Thick
Thick Bedded	1' to 3' Thick
Medium Bedded	4" to 1' Thick
Thin Bedded	1-1/4" to 4" Thick
Very Thin Bedded	1/2" to 1-1/4" Thick
Thickly Laminated	1/8" to 1/2" Thick
Thinly Laminated	1/8" or less (paper thin)

### DRILLING NOTES

Drilling & Sampling Symbols		
NQ – Rock Core (2-inch diameter)	CFA- Continuous Flight (Solid Stem) Auger	WB – Wash Bore or Mud Rotary
HQ – Rock Core (3-inch diameter)	SS – Split Spoon Sampler	TP – Test Pit
HSA – Hollow Stem Auger	ST – Shelby Tube	HA – Hand Auger
Soil Sample Types		
<p><b>Shelby Tube Samples:</b> Relatively undisturbed soil samples were obtained from the borings using thin wall (Shelby) tube samplers pushed hydraulically into the soil in advance of drilling. This sampling, which is considered to be undisturbed, was performed in accordance with the requirements of ASTM D 1587. This type of sample is considered best for the testing of "in-situ" soil properties such as natural density and strength characteristics. The use of this sampling method is basically restricted to soil containing little to no chert fragments and to softer shale deposits.</p>		
<p><b>Split Spoon Samples:</b> The Standard Penetration Test is conducted in conjunction with the split-barrel sampling procedure. The "N" value corresponds to the number of blows required to drive the last 1 foot of an 18-inch long, 2-inch O.D. split-barrel sampler with a 140 lb. hammer falling a distance of 30 inches. The Standard Penetration Test is carried out according to ASTM D-1586.</p>		
Water Level Measurements		
<p>Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, shallow groundwater may indicate a perched condition. Caution is merited when interpreting short-term water level readings from open bore holes. Accurate water levels are best determined from piezometers.</p>		
Automatic Hammer		
<p>Palmerton and Parrish, Inc.'s CME's are equipped with automatic hammers. The conventional method used to obtain disturbed soil samples used a safety hammer operated by company personnel with a cat head and rope. However, use of an automatic hammer allows a greater mechanical efficiency to be achieved in the field while performing a Standard Penetration resistance test based upon automatic hammer efficiencies calibrated using dynamic testing techniques.</p>		

\*Modified after Ref. ASTM D2487-93 & D2488-93

\*\*Modified after Ref. Oregon DOT 1987 & FHWA 1997

\*\*\*Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

**APPENDIX IV - IMPORTANT INFORMATION REGARDING YOUR GEOTECHNICAL  
REPORT**

# Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

## Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared solely for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

## Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

## You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

## This Report May Not Be Reliable

*Do not rely on this report* if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

## Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.



### **This Report's Recommendations Are Confirmation-Dependent**

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

### **This Report Could Be Misinterpreted**

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

### **Give Constructors a Complete Report and Guidance**

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

### **Read Responsibility Provisions Closely**

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

### **Geoenvironmental Concerns Are Not Covered**

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old*.

### **Obtain Professional Assistance to Deal with Moisture Infiltration and Mold**

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration*. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists*.



Telephone: 301/565-2733

e-mail: [info@geoprofessional.org](mailto:info@geoprofessional.org) [www.geoprofessional.org](http://www.geoprofessional.org)

## SECTION 321216 - ASPHALTIC CONCRETE PAVING

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section consists of furnishing all labor, materials, equipment, and tools for construction of asphaltic concrete paving. The asphaltic concrete shall be placed in one or more courses on a prepared stone base or underlying course in conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Base Course: Shall conform to specification Section 312232 "Granular Stone Base."
- B. Prime Coat: The prime coat shall be medium-curing, cut back (MC-30) asphalt and shall conform to AASHTO-82.
- C. Tack Coat: The tack coat shall be an emulsified asphalt (SS-1) and shall conform to ASTM D977.
- D. Surface Course: The asphaltic concrete surface course shall comply with MoDOT Type BP-1, Section 401, and shall consist of a mineral aggregate compound of crushed stone and/or crushed gravel, sand gravel, sand, mineral filler, if needed, and asphaltic cement in such proportions that the composition of the finished mix is within the following range:

	<b>% Min.</b>	<b>% Max</b>
Passing 3/4-inch sieve	100	100
Passing 1/2-inch sieve	95	100
Passing No. 4 sieve	60	90
Passing No. 8 sieve	40	70
Passing No. 30 sieve	15	35
Passing No. 200 sieve	4	12
Asphalt Cement	3.5	8

1. Mineral Filler: Mineral filler shall consist of limestone dust, portland cement, or other suitable mineral matter. It shall be thoroughly dry and free of lumps consisting of aggregations of fine particles. When tested in accordance with AASHTO T37, the mineral filler shall conform to the following gradation requirements:

	<b>Percent</b>
Passing No. 30 sieve	100
Passing No. 50 sieve	95-100
Passing No. 100 sieve	90-100
Passing No. 200 sieve	70-100

2. Voids in Mineral Aggregate: The minimum voids in the mineral aggregate (VMA) shall be as listed below. The Engineer may make adjustments in the job-mix formula submitted by the Contractor in order that 60 to 80 percent of the VMA are filled with asphalt and the ratio of minus No. 200 material to asphalt cement is between 0.6 and 1.2. The percentage of VMA filled with asphalt will be approved by the Engineer. Approved mixtures, when compacted and tested in the laboratory in accordance with AASHTO T-167, shall have an air void content within the range listed below, when calculated from a voidless mixture composed of the same materials in like proportions. Such mixtures shall have a minimum stability as listed below when tested in accordance with AASHTO T-167. The mixture of aggregates, filler, if needed, and asphalt cement shall show satisfactory cohesion when tested in accordance with AASHTO T165.

Type of Mixture	Air Voids	AASHTO T167 Stability PSI	Voids in Mineral Aggregate (VMA)
Surface	3.0 – 6.0	300	15.0

- E. Bituminous Base Course: The bituminous base course shall consist of a mineral aggregate compound of crushed stone and/or crushed gravel, sand gravel, sand, mineral filler, if needed, and asphaltic cement in such proportions that the composition of the finished mix is within the following range:

Passing 1-inch sieve	100	-
Passing 1/2-inch sieve	60	90
Passing No. 4 sieve	35	65
Passing No. 8 sieve	25	50
Passing No. 30 sieve	10	35
Passing No. 200 sieve	5	12
Asphalt Cement	3.5	6

- F. Asphalt Cement: Shall be 60-70 penetration grade asphalt cement, or approved by Engineer, homogenous and free of water and shall not, in heating, foam below 232 degrees centigrade. Asphalt cement shall be prepared by refining crude petroleum by suitable methods, and shall conform to the requirements of Section 1015 of the Missouri Standard Specifications for Highway Construction for penetration graded asphalt cement.

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. Existing Roadway: The existing roadway surfacing shall be saw cut, removed, prepared and/or modified to the depth, locations, or configuration as shown on the plans.
- B. Subgrade Preparation: Shall be as described in specifications Section 312100 "Subgrade Compaction."
1. Following the grading of the subgrade, the moisture content of the surface shall be adjusted, as required, to achieve the proper moisture content for optimum compaction. The subgrade shall then be rolled with a smooth wheeled roller to compact the subgrade.

C. Base Course:

1. Contractor shall furnish, place, and compact a thickness of base course, as specified on the plans, of crusher run limestone on a prepared subgrade, as described in Section 312232 "Granular Stone Base."
2. In no case shall the Contractor be permitted to place the granular base or manipulate granular base on muddy or frozen subgrade. Any mixture containing frost or frozen particles shall not be placed on the subgrade, or compacted.
3. The granular base shall be handled in such manner as to avoid undue segregation. If segregation occurs or if the mixture becomes contaminated, such segregation or contaminated material shall be removed and replaced with material of suitable quality and gradation. Segregated or contaminated materials ordered removed by the Engineer shall be replaced at the sole expense of the Contractor.
4. Preliminary compaction shall be performed by means of pneumatic-tired rollers. After preliminary compaction has been secured, finish compaction shall be carried to completion by means of self-propelled steel wheeled rollers weighing not less than ten tons. Shaping and compacting shall be carried on until a true, even, uniform base course of proper grade, cross-section, and density is obtained. Proper moisture content shall be maintained by wetting the surface or allowing it to dry, as required, during shaping and compacting operations. The use of excess water resulting in runoff or in the formation of a slurry on the surface shall be avoided. The stone base shall be compacted to not less than 95 percent of the maximum density of optimum moisture content as determined by Mod AASHTO T180.

D. Prime Coat: The prime coat shall be placed only on a dry or slightly damp, clean base free from loose or foreign material when atmospheric temperature is above 50°F. The rate of application shall be from 0.2 to 0.5 gallons per square yard, depending upon the surface texture. Temperature of the prime coat at the time of application shall not be less than 100°F, nor more than 180°F. Any prime coat overspray on adjacent concrete surfaces shall be removed to the Owner's satisfaction.

1. The prime coat will be allowed to cure a minimum of 24 hours before application of the surface course.

E. Tack Coat: The tack coat shall be placed on an existing asphaltic surface that is free of all dust, loose material, grease, or other foreign materials when atmospheric temperature is above 40°F. The asphalt cement shall be applied uniformly with a pressure distributor at a rate of application from 0.02 to 0.10 gallons per square yard. Water may be added to the asphalt emulsion and mixed therewith in such proportion that the resulting mixture will not contain more than 50 percent of added water. The application of the resulting mixture shall be such that the original emulsion will be spread at the specified rate. Temperature of the tack coat at the time of application shall not be less than 75°F nor more than 130°F.

F. The tack coat shall be allowed to properly cure and the tacked surface shall be cleaned of all dirt and surplus sand before the next course is placed.

G. The tack coat shall be applied in such a manner as to cause the least inconvenience to traffic and to permit one-way traffic without pickup or tracking of the asphalt emulsion.

H. Surface and Bituminous Base Course: The asphalt concrete surface course shall be a hot plant-mix of specified thickness suitably placed and compacted and shall be placed in layers not

exceeding three inches in compacted thickness.. The asphaltic concrete shall be delivered to the work area in dump trucks properly lubricated to prevent sticking. The asphaltic concrete shall be covered during transit, and shall arrive at the job site at not less than 275°F. Placing of asphaltic concrete shall be as follows:

1. The asphaltic concrete shall not be placed when either the air temperature or temperature of the surface on which the mixture is to be placed is below 50°F for the surface course, or 40°F for the bituminous base course, or on any wet or frozen surface, or when weather conditions prevent the proper handling or finishing of the mixture, or when authorized by the Engineer.
  2. The asphalt concrete surface shall be compacted while the mixture is hot, with power roller equipment as specified. Rolling shall continue until a uniform, even textured surface of the thickness specified is produced. Rolling shall begin at the outer edge and continue toward the center. Each pass shall overlap the preceding one by at least one-half of the rear roller width. Delays in rolling freshly spread mixture will not be allowed. Traffic shall not be permitted on the finished pavement until it has cooled to atmospheric temperature. Final rolling shall be done with either a two or three-wheel tandem-type roller weighing not less than 10 tons. Intermediate rolling shall be completed using a pneumatic tire roller weighing not less than ten tons. Initial rolling shall be completed by the use of a breakdown roller consisting of either a two- or three-wheel tandem-type roller weighing not less than ten tons. All rolling shall be completed prior to the surface temperature of the mixture decreasing to 175°F.
  3. Around areas not accessible to power rollers, compaction shall be secured by hand tamping, and all joints must be effectively sealed.
  4. The finished surface shall be rolled until it is free from waves and irregularities. All surplus material shall be removed prior to final acceptance.
  5. If the asphaltic concrete construction consists of more than a single layer, each layer shall be compacted as specified, and allowed to cool to the ambient temperature before the next layer is placed.
  6. The contractor shall provide a leveling course at areas and at a thickness necessary to obtain the elevation and cross sections as shown on the plans, prior to placing the surface course. The areas of existing asphaltic pavement that require an overlay of asphaltic concrete shall be as specified on the plans. The finished surface course as placed shall be performed in such a manner as to provide the smoothest possible riding surface.
- I. Equipment: All equipment, tools, and machines used in the performance of the work shall be subject to the approval of the Engineer and shall be maintained in satisfactory working condition at all times.
1. The Asphalt Distributor: Shall be a machine manufactured for the specific purpose of applying heated asphaltic materials by pressure spray application. The Distributor shall be designed to permit the application of the heated asphalt material in a uniform spray without atomization and at the rate, temperature, and pressure specified by the Asphalt Institute. The Distributor shall be equipped for circulation and agitation of the bituminous material during the heating process.
  2. The Power Roller: All rollers, vibrators, or other equipment used to compact the asphaltic mixture shall be in satisfactory working condition. All rollers shall be capable of reversing without backlash, and steel wheel rollers shall be equipped with scrapers. Pneumatic tire rollers shall be self-propelled, of the oscillating-type and equipped with smooth tires of equal size, diameter, and ply rating, all maintained at the same inflation pressure. The Contractor shall furnish evidence regarding tire size, pressure, and loading.

Rollers shall have a system for moistening each wheel or roller. Diesel fuel, fuel oil, or other detrimental products shall not be used as wetting agents. Rollers shall be of a size and used in sufficient numbers to achieve specified compaction. Trench rollers, vibrators, and other special equipment used for compacting mixtures placed in areas inaccessible to the rollers specified shall be of a weight (mass) and design approved by the Engineer.

3. Mechanical Spreaders and Finishers: Shall be adjustable and capable of spreading upon the prepared surface a tamped, screeded and finished wearing surface of asphalt concrete of the specified thickness. Bituminous pavers shall be self-contained units, provided with an activated screen or strike-off assembly, heated, if necessary, and capable of spreading and finishing asphaltic concrete in lane widths applicable to the specified typical sections and thicknesses shown on the plans. The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed or strike-off. For screed extensions greater than one foot (300 mm), the distribution system shall be increased accordingly. The screed or strike-off assembly shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture. When laying mixtures, the paver shall be capable of operating at forward speeds consistent with satisfactory laying of the mixture. Equipment used for shoulders and similar construction shall be capable of spreading and finishing the courses in widths shown on the plans.
  - a. The base course, primed or tacked surface, or preceding course or layer shall be cleaned of all dirt, packed soil, or any other foreign material prior to spreading the asphaltic mixture. The mixture, when delivered to the spreading and finishing machine, shall have a temperature of not less than 260°F (130°C), and be within 25°F (15°C) of that specified by the Engineer. If lumps are present or a crust of mixture has formed, the entire load shall be rejected. The paver shall be operated at a speed that will give the best results. The rate of delivery of the mixture to the paver shall be coordinated so as to provide, where practicable, a uniform rate of placement without intermittent operation of the paver.
  - b. For pavements having a width of 16 to 24 feet (5 to 7 m), inclusive, the asphaltic concrete pavement shall be laid in lanes approximately one-half the full width of the completed pavement and the full width completed as soon as practicable. Unless otherwise permitted, a single-lane of any course shall not be constructed to a length that cannot be completed to full width of the pavement the succeeding operating day. For pavements greater than 24 feet (7.3 m) wide, single-lane width construction shall be limited to one day's production, and completion to full width shall be accomplished as soon as practicable.
4. Broom Drag and Power Brooms: Shall be of the type suitable for effectively cleaning the surface to be treated.
5. Asphalt Plant: Bituminous mixing plants shall be state approved and shall conform to the requirements set forth in Section 404 of the Missouri Standard Specifications for Highway Construction, 2011 Edition.

J. Compaction and Testing:

1. After final rolling, the finished course shall at no point have a density less than ninety-two (92) percent of maximum theoretical density (ASTM D2041). Contractor shall provide access to the Engineer and his representatives for any and all inspection of

asphaltic concrete paving. The Contractor shall pay and arrange for all testing of asphalt required by these specifications.

2. The density of the compacted mixture may be determined by the direct transmission nuclear method by an approved testing laboratory. Density tests shall be performed at a rate of one (1) per day or at a minimum interval of 300-feet.
3. Thickness samples shall be taken at the same intervals as specified for density samples.
4. Loose mix samples to determine asphaltic cement content, aggregate gradation and content, and attainable density shall be taken from the paving spreader not less than one (1) sample for each 500 Tons or a minimum of once per day.

### 3.2 REMEDY AND CORRECTION OF DEFICIENCY

A. The Contractor shall provide, at no cost to the Owner, remedy and correction of deficiencies in the asphaltic surfacing, in the following specified form and procedures:

1. Deficiency in Asphalt Cement: Should test on uncompacted samples or core samples indicate the asphalt content is below the specified amount, the Contractor shall provide additional asphaltic concrete overlays to the entire surfacing area for which the tests indicated an asphalt cement deficiency. One (1) inch of compacted asphaltic concrete overlay shall be added for each one-tenth percent the asphalt cement content falls below specified minimum. The percent deficiency shall be determined from the average of the percent asphalt cement content from five samples.
2. Deficiency in In-Place Density: Should tests on core samples or in-place density tests indicate density of the asphaltic concrete to be below the specified minimum density, the basis of payment for deficiency in in-place densities for any one day's run of asphaltic concrete shall be determined as follows:

Field Density Percent of Maximum Theoretical Density	Percent of Contract Unit Price
91.5 or above	100
91.0 to 91.4, inclusive	97
90.5 to 90.9, inclusive	94
90.0 to 90.4, inclusive	90
89.5 to 89.9, inclusive	80
Below 89.5	Remove and replace

3. Deficiency in Surface Limit: Surface finish shall be provided such that surface water drains to ditches and guttering. Depressions in the surfacing, which are exhibited by ponding of water, shall be remedied by the addition of an overlay of asphaltic concrete to eliminate the depression.
4. Deficiency in course and total thickness: Should tests on core samples indicate the thickness is less than the design thickness, the Contractor shall provide additional asphaltic concrete overlay to the entire surfacing area for which the tests indicated a thickness deficiency. One-inch minimum of compacted asphaltic concrete overlay shall be added to those deficient areas. The areas which are found to be deficient shall be first cold milled ½ inch minimum over the entire deficient area, then overlaid with a thickness sufficient to bring the area up to the design thickness and grade. The deficient area shall

be determined in the from core samples taken at a minimum distance of 200 feet between cores, or as approved by the Engineer.

END OF SECTION 321216



## SECTION 321313 - 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 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes Concrete Paving

- 1. Driveways.
- 2. Roadways.
- 3. Parking lots.
- 4. Curbs and gutters.
- 5. Walks.

- B. Related Requirements:

- 1. Section 033110 "Normal Weight Structural Concrete" for general building applications of concrete.
- 2. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

#### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product.
- B. Concrete Pavement Joint Plan: Contractor shall submit to the Engineer for approval proposed jointing plan. Plan shall be submitted no later than 4 weeks prior to concrete pavement placement. Plan shall include proposed location of all construction, isolation, and contraction joints.
- C. 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.

- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
  - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
- E. Material Certificates: For the following, from manufacturer:
  - 1. Cementitious materials.
  - 2. Steel reinforcement and reinforcement accessories.
  - 3. Admixtures.
  - 4. Curing compounds.
  - 5. Bonding agent or epoxy adhesive.
  - 6. Joint fillers.
- F. Field quality-control reports.

#### 1.5 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
  - 1. 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 C1077 and ASTM E329 for testing indicated.
  - 1. 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.

#### 1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

#### 1.7 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Cold-Weather Concrete Placement: See Section 033051
- C. Hot-Weather Concrete Placement: See Section 033052

## PART 2 - PRODUCTS

### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

### 2.2 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.
  - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.
- 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.

### 2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A615/A615M, Grade 60; deformed.
- C. Joint Dowel Bars: ASTM A615/A615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
- D. Epoxy-Coated, Joint Dowel Bars: ASTM A775/A775M; with ASTM A615/A615M, Grade 60 plain-steel bars.
- E. Tie Bars: ASTM A615/A615M, Grade 60; deformed.
- F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
  - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
  - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

### 2.4 CONCRETE MATERIALS

- A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
  - 1. Portland Cement: ASTM C150, gray portland cement Type I.

2. Fly Ash: ASTM C618, Class F.
  3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
  4. Blended Hydraulic Cement: ASTM C595/C595M, Type IS, portland blast-furnace slag, Type IP, portland-pozzolan cement.
- B. Normal-Weight Aggregates: ASTM C33, uniformly graded. Provide aggregates from a single source with documented MoDOT inspection record.
1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
  2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Exposed Aggregate: Selected, hard, and durable; washed; free of materials with deleterious reactivity to cement or that cause staining; from a single source, with gap-graded coarse aggregate as follows:
1. Aggregate Sizes: 1/2 to 3/4 inch nominal.
  2. Aggregate Source, Shape, and Color: As determined by the Engineer
- D. Air-Entraining Admixture: ASTM C260.
- 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.
1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
  2. Retarding Admixture: ASTM C494/C494M, Type B.
  3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
  5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
  6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- F. Water: Potable and complying with ASTM C94/C94M.

## 2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- E. White, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 2, Class B, dissipating.
- F. Liquid Release Agent: Manufacturer's standard, clear, evaporating formulation designed to facilitate release of stamp mats.

## 2.6 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
  - 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
  - 1. Mix design shall correspond to Missouri Department of Transportation (MoDOT) Class B Concrete.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
  - 1. Air Content: 5 percent plus or minus 1-1/2 percent for 3/4-inch nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use plasticizing and retarding admixture in concrete as required for placement and workability.
  - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- F. Concrete Mixtures: Normal-weight concrete.
  - 1. Compressive Strength (28 Days): 4000 psi.
  - 2. Maximum W/C Ratio at Point of Placement: 0.45.
  - 3. Slump Limit: 4 inches, plus or minus 1 inch.

## 2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M and ASTM C1116/C1116M. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

## 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 excess yielding.
  1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
  2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
  3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch.
- 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 INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, 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.
- E. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D3963/D3963M.
- F. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

### 3.5 JOINTS

- A. General: Form construction, isolation, and contraction 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.
  - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. 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.
  - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
  - 2. Provide tie bars at sides of paving strips where indicated.
  - 3. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
  - 1. Locate expansion joints at intervals of 50 feet unless otherwise indicated.
  - 2. Extend joint fillers full width and depth of joint.
  - 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
  - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
  - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
  - 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:
  - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
    - a. Tolerance: Ensure that sawed joints are within 3 inches either way from centers of dowels.
  - 2. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement 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. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. 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.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Screed paving surface with a straightedge and strike off.



- I. Commence initial floating using bull floats or darbies to impart an 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.
- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
  - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

### 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 bleedwater 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.
  - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to 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/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.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by, moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or 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.

### 3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 (ACI 117M) and as follows:

1. Elevation: 1/4 inch (19 mm).
2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long; unlevelled straightedge not to exceed 1/2 inch (13 mm).
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches (13 mm per 300 mm) of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch (25 mm).
6. Vertical Alignment of Dowels: 1/4 inch (6 mm).
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches (6 mm per 300 mm) of dowel.
8. Joint Spacing: 3 inches (75 mm).
9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
10. Joint Width: Plus 1/8 inch (3 mm), no minus.

### 3.10 FIELD QUALITY CONTROL

A. Testing Agency: **Contractor will engage** a qualified independent testing agency to perform tests and inspections.

B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C172/C172M shall be performed according to the following requirements:

1. Testing Frequency: Per day, the number of strength tests shall not be less than one per day, not less than one per 20 cu. yd. concrete placed, nor less than one for each 1,000 square feet of slab surface area.
  - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M; 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.
3. Air Content: ASTM C231/C231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Concrete Temperature: ASTM C1064/C1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when it is 80 deg F (27 deg C) and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C31/C31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C39/C39M; test one specimen at seven days and two specimens at 28 days.
    - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from 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 (3.4 MPa).
- D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- 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 Architect.
- 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 with specified requirements.
- I. Prepare test and inspection reports.

### 3.11 REPAIR 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 Architect.
- B. Drill test cores, where directed by Architect, 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 paving 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 321313

## SECTION 321373 - 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 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Cold-applied joint sealants.
- 2. Joint-sealant backer materials.
- 3. Primers.

- B. Related Requirements:

- 1. Section 321313 – Concrete Paving for constructing joints in concrete pavement.

#### 1.3 SUBMITTALS

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

- B. Product Certificates: For each type of joint sealant and accessory.

- C. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

- 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
- 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

- B. Product Testing: Test joint sealants using a qualified testing agency.

## 1.5 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer **or are below 40 deg F.**
  2. When joint substrates are wet.
  3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- 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.
- B. Colors of Exposed Joint Sealants: As selected by Engineer from Manufacturer's full range.

### 2.2 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Nonsag, Silicone Joint Sealant: ASTM D5893/D5893M, Type NS.

### 2.3 JOINT-SEALANT BACKER MATERIALS

- A. Joint-Sealant Backer Materials: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and 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 D5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D5249, 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 D5249; 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.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints 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: Before installing joint sealants, clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
- 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. 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 C1193 for use of joint sealants as applicable to materials, applications, and conditions.
- C. Install joint-sealant backings 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.
  - 1. Do not leave gaps between ends of joint-sealant backings.
  - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
  - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

- D. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:
  - 1. Place joint sealants so they fully contact joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
  
- E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
  - 1. Remove excess joint sealant from surfaces adjacent to joints.
  - 2. Use 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 AND PROTECTION

- A. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.
  
- B. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

END OF SECTION 321373



## SECTION 322521 - ROADWAY AND PARKING MARKING

### 1. GENERAL

- 1.1 This work shall consist of furnishing all materials, equipment, labor, and supervision for applying paint on parking lines, and other items in designated locations of the parking areas.

### 2. MATERIALS

- 2.1 Paint shall be chlorinated rubber traffic type such as Pittsburgh Plate Glass - PPG traffic and zone marking paint, Sherwin Williams, PRO-MAR, or equal. It shall be mixed or shaken thoroughly before using on the Project.
- 2.2 No solvent or thinner is to be used unless necessary to reduce viscosity due to lowered ambient temperature. All paint shall be yellow, unless specifically noted otherwise on the drawing.

### 3. APPLICATION

- 3.1 Paint shall be applied to asphaltic or concrete surfaces that are clean, dry, and free of any film of dust, grease, or moisture. Application can be made by roller, brush, or spray. Lines shall be nominal 4" in width for the length designated on the plans. All lines and other objects such as letters, arrows, or graphic symbols shall be laid out using proper tools and marking methods that produce straight lines.
- 3.2 Temperature should be above 40 Degrees Fahrenheit for application. If not, the Contractor shall provide protection for the paint during the lengthened drying period. No thinner should be applied unless cooler weather has increased viscosity. Thinner may be xylol or other that is compatible with chlorinated rubber type paint.
- 3.3 Application rate for 4-inch lines shall be one gallon or more for each 250 feet of line.
- 3.4 HAND-I-CAPPED Graphic Symbol shall be painted with a template to assure proper proportions and quality control, as shown on the plans.

END OF SECTION 322521

## SECTION 322575 - ROADWAY SURFACE AND SIDEWALK REPLACEMENT

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals necessary to replace all roadway surfaces and sidewalks removed during sewer line construction. This section shall include, but not be limited to, vehicular and pedestrian pavements, and surfacings of stone, gravel, Portland cement concrete, and asphalt, in addition to parking areas.
- B. All roadway surfaces removed during sewer line construction shall be replaced with the same type of surface as existed prior to construction. The Contractor shall be responsible for determining the nature and thickness of all pavement and surfacings to be cut and replaced, including any base courses. Concrete pavement, asphaltic pavement, macadam pavements, crushed stone, and any type of roadway surface, whether public or private, which is cut or damaged during construction of the project shall be replaced so as to conform to the lines and grades of the original roadway surface, and shall be of a quality, thickness, and appearance equal to or better than that of the roadway as it existed prior to construction.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. General: Existing paving shall be cut vertically and horizontally to straight lines. The trench shall be backfilled with controlled backfill material compacted to 95 percent of maximum density, to within eight inches of the final roadway surface. The top eight-inches shall be backfilled with crushed stone meeting ASTM C33, Gradation 67 compacted level with the existing riding surface of the roadway. This level shall be maintained by the Contractor until all secondary settling has occurred. Any crushed stone required to maintain the trenches in a suitable condition for traffic during this period shall be furnished at the Contractor's expense. When the trench has been properly backfilled and has settled sufficiently to permit final repairs, roadway surfacing shall be applied according to this specification. At the time of final repairs, the Contractor shall remove sufficient material to allow placement of roadway surfacing to the thicknesses specified below.
- B. Roadway Surface Replacement:
  - 1. Asphaltic Concrete: Asphaltic concrete roadway surfaces of a thickness greater than 4 inches shall be replaced with a concrete base of 8 inches thickness and 2 inches of asphaltic concrete. Edges of the existing pavement at the trench shall be trimmed vertically to produce a neat even edge. The base surface and vertical edge shall be sprayed with a prime coat of Grade RC-250 liquid asphalt heated to no less than 130°F, at

a rate of 0.15 gallons per square yard. This primer shall be applied only when the base and existing pavement are free of moisture. The asphaltic concrete shall be MoDOT Type BP-1 Plant Mix Bituminous Pavement hot mixed in an approved plant and delivered to the work area in dump trucks at a minimum temperature of 275°F. The asphaltic concrete shall be placed and then rolled while hot with an approved five-ton steel wheel roller to the same thickness as the existing pavement. In no case shall the total compacted thickness of a layer be less than two inches nor greater than four inches. No traffic shall be permitted on the finished pavement until it has cooled to atmospheric temperature.

2. **Crushed Stone:** Along or across unpaved roadways, including county roads, and city streets, as well as dirt, or gravel shoulders of paved streets, roads, or highways, shall be backfilled in compliance with these specifications. The trench shall be backfilled to a level with the existing riding surface of the roadway. When the trench has been properly backfilled and has settled sufficiently to permit final repairs, the backfill shall be removed as necessary for crushed stone surfacing. The crushed stone shall be rolled and thoroughly compacted in layers to a minimum finished thickness of 6 inches and shall conform to Section 312232 “Granular Stone Base.”
3. **Concrete:** Concrete surfaces, including private drives, shall be replaced with concrete surfacing equal to the thickness of existing pavement, or 6 inches, whichever is greater. Concrete shall have a minimum 28-day compressive strength of 3000 psi, and shall conform to Section 033110 “Normal Weight Structural Concrete.” Edges of existing pavement at the trench shall be trimmed vertically to produce a neat, even edge.
4. **Chip and Seal Asphalt Paving:** The area to be repaired shall be bladed to eliminate minor depressions and humps. Following the blading operation, the surface shall be thoroughly cleaned and swept to remove all mud, matted earth, dust, and other foreign material. A prime coat of liquid asphalt shall be applied at the rate of 0.30 gallons per square yard at a minimum temperature of 120°F for asphalt grade CRS-2. On the primed base, a course of aggregate shall be spread at the rate of twenty-five (25) pounds per square yard. This stone shall be roller compacted from sides to center with a steel wheeled roller weighing a minimum of five tons. Immediately following the compaction of the first course of asphalt and aggregate, a second course, identical to the first shall be applied. The finish surface shall be swept to remove any loose stones. No traffic shall be allowed on the finished surface until it has cooled to atmospheric temperature.

- C. **Sidewalk Replacement:** The existing concrete sidewalk and base material shall be removed for a distance equal to the trench width plus two feet, as shown on the drawings. The trench shall be backfilled to a height that will allow the placement of four inches of crushed stone and a four-inch thick concrete walk above. The elevation of the top of the new sidewalk section shall match that of the existing walk.

END OF SECTION 322575

## SECTION 329219 - SEEDING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes:

1. This part of the Specification includes all labor, materials, equipment and supervision required for Seeding.
2. This section includes the specifications for seedbed preparation; fertilization; seeding; and mulching.

#### 1.2 SUBMITTALS

A. Manufacturers or vendor's certified analysis of fertilizer.

B. Seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentages by weight, and percentages of purity, germination, and weed seed for each grass seed species.

C. Planting Schedule: Proposed seeding schedule, indicating dates for seeding work during normal seasons. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

D. Normal seasons for this work are as follows:

1. Spring: March 1 - May 31.
2. Fall: August 10 - September 30.

E. Furnish detailed written recommended maintenance program to the Owner with a copy to the Owner's Representative, prior to final inspection of the seeding.

#### 1.3 QUALITY ASSURANCE

A. Subcontract seeding to a single firm specializing in seeding as specified.

B. Source Quality Control:

1. Ship seeding materials with certificates of inspection required by governing authorities.
2. Comply with regulations applicable to seeding materials.
3. Do not make substitutions. If specified material is not obtainable, submit proof of non-availability to Owner's Representative, together with proposal for use of equivalent material.
4. Analysis and Standards: Package standard products with manufacturers certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

#### 1.4 DELIVERY, STORAGE, AND HANDLING:

- A. If seed is mixed prior to delivery on site, it shall be tagged showing a guaranteed statement of composition of mixture and percentage of purity and germination of each variety.
- B. If seed is to be mixed at the site, it shall be delivered in original containers bearing producers certification of germination and purity.
- C. Tags shall show producers or dealers Missouri Permit Number and date of testing; test date shall be no more than 90 days previous to time of use.
- D. Fertilizers shall conform to State of Missouri laws and regulations. If delivered in bulk, bills of lading or other labels shall be furnished to the Landscape Architect or labels indicating analysis and weight information from each container shall be preserved and furnished to the Owner's Representative within twenty-four (24) hours of application.
- E. Handling of materials as recommended by manufacturer.
- F. Store all packaged materials off ground and protect from moisture and rodents.
- G. Storage of all materials in locations designated and approved by Owner's Representative.

#### 1.5 JOB CONDITIONS

- A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required.
- B. Grade Stakes: Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.
- C. Protect existing irrigation system, structures, utilities, sidewalks, pavements, and other facilities during seeding operations. Repair any damage at no cost to the Owner.

#### 1.6 SEQUENCING & SCHEDULING

- A. Planting Time: Proceed with, and complete seeding as rapidly as portions of site become available, working within seasonal limitations for each kind of seed required.
- B. Chronological procedure for seeding is to remove any existing vegetation, disc, fertilize, prepare the seedbed, seed, and then mulch.
- C. Schedule seeding work to occur as roadway work progresses. Identify areas ready for seeding and obtain approval of Landscape Architect to proceed. As areas of seeding are completed, proceed in accordance with paragraph 3.06 INSPECTION AND ACCEPTANCE.

#### 1.7 SPECIAL PROJECT WARRANTY

- A. Warranty lawns to provide specified germination and seed emergence.

PART 2 - PRODUCTS

2.1 FERTILIZER

- A. Grade: Commercial grade conforming to current requirements of the Missouri Department of Agriculture, uniform in composition, liquid or dry and free flowing.
- B. Formulation: 8:32:16, or plant food ratio of 1:4:2.

2.2 SEEDING MATERIALS

- A. Grass Seed: Shall be fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America.
- B. Seed Mix: Provide commercial seed mix consisting of the following grass species and properties as specified:

Species	% of Mix by Weight	
Fineleaf Tall Fescue	50%	Hounddog, Rebel, Falcon, Mustang
Kentucky Bluegrass	20%	Enoble, Nassau, Rugby
Creeping Red Fescue	10%	Ensylva
Perennial Rye Grass	10%	Regal, Diplomat, Derby, Palmer, Prelude
Hard Fescue	10%	Reliant, Scaldis
TOTAL MIX	100%	

- C. Each seed mix bag shall bear supplier's "blue tag" certification.

2.3 STRAW MULCH

- A. If Hydro seeding is not performed, provide clean, weed free threshed straw of wheat, rye, or oats. Straw harvested after killing frost or during dormant periods as well as discolored, weathered, rotted, brittle, moldy, or caked materials is unacceptable.
- B. Fifty percent (50%) of fiber of each straw bale shall be ten inches (10") or longer.

PART 3 - EXECUTION

3.1 EQUIPMENT

- A. Cultipacker: Use a pull-type cultipacker with individual rollers or wheels. The cultipacker must produce a corrugated surface on the area being compacted. Operate the cultipacker separately

from all other operations, and do not attach the cultipacker to the seeder or disk, unless combined cultipacker seeder is manufactured for such use as is utilized.

- B. Disk: When preparing a seedbed on ground having heavy vegetation, use a disk with cutaway blades. Use weights or other provisions to obtain proper cutting depth.
- C. Drop Seeder: Use one piece of equipment containing pulverizer rollers in front of the seed tubes, ground driven seed meters, maximum seed tube spacing of 3 inches delivering seed between the pulverizer rollers and packer wheels, and packer wheels that press and firmly pack seed into the soil.
- D. Endgate Cyclone Seeders: Endgate cyclone seeders must be suitably mounted. Movement must be provided by mechanical means. The seed drops through an adjustable flow regulator onto a rotating, power driven, horizontal disk or fan.
- E. Field Tiller: Tiller designed for the preparation of the seedbed as specified.
- F. Gravity Seeders: Gravity seeders must provide agitation of the seed, have an adjustable gate opening, and uniformly distribute seed on the prepared seedbed. Use a seed hopper equipped with baffle plates spaced no more than 2 feet apart. The baffle plates must extend from the agitator shaft to within approximately 2 inches of the top of the seed hopper. Wind guards are required to facilitate seeding when moderate wind conditions exist. Place wind guards in front or in back (or both) of the seed outlet and extend them to near the ground line.
- G. Hydraulic Seeder: Use hydraulic seeding equipment with a pump rated at no less than 100 gallons per minute. Inoculant, seed, and fertilizer may be applied in a single operation. The equipment must have a suitable working pressure and a nozzle adapted to the type of work. Supply tanks must have a means of agitation. Calibrate tanks and provide them with a calibration stick or other approved device to indicate the volume used or remaining in the tank.
- H. Mowers: Shall be rotary, flail, disk, or sickle type. Do not use mowers that bunch or windrow the mowed material.
- I. Mulch Anchoring Equipment: Equipment designed to anchor straw or hay mulch into soil by means of dull blades or disks. It shall have flat blades or disks, may have cutaway edges and must be spaced at approximately 8 inch intervals. The mulch anchoring equipment must be pulled by mechanical means and have sufficient weight to crimp the straw.
- J. Native Grass Seed Drill: Use a native grass seed drill designed to provide uniform distribution of native grass and wildflower seeds. Provide separate seed boxes to apply both small seeds as well as fluffy bearded seeds. If a no-till attachment is specified, use an attachment of the same manufacturer as the drill.
- K. Rotary Tiller: Equipment with rotary-type blades designed for the preparation of seedbed as specified.
- L. Slit Seeder: Use a gas, diesel or electric powered mechanical slit seeder that is capable of cutting vertical grooves a maximum of 1/4 inch deep into the soil with a maximum horizontal blade spacing of 3 inches, deposits metered seed directly after the formation of the vertical grooves, and contains packer wheels that press and firmly pack seed into the soil.

- M. Straw Mulching Machine: Use a machine to uniformly apply mulch material over the desired area without excessive pulverization. Excessive pulverization is the general absence of straw longer than 6 inches after distribution.

### 3.2 SEEDBED PREPARATION

- A. Limit preparation of seedbed to areas that will be seeded immediately upon completion.
- B. Work areas accessible to field equipment to a depth of no less than 3 inches. Use mechanical rotary tillage equipment for the preparation of seedbed on earth shoulders, urban or raised medians, and rest areas. Prepare by hand areas inaccessible to field machinery, to a depth of no less than 2 inches. Where weed growth has developed extensively, they may be disked into the ground. If weed growth develops sufficiently to interfere with proper seedbed preparation, mow the weeds and remove them from the project at no additional cost to the Owner.
- C. Use crawler type or dual-wheeled tractors for seedbed preparation. Operate equipment in a manner to minimize displacement of soil and disturbance of the design grading. Harrow ridging in excess of 4 inches due to operation of tillage equipment prior to rolling with the cultipacker. Roll the area with no less than one pass of the cultipacker prior to seeding.
- D. Shape and fine grade to remove rills or gullies, water pockets, undesirable vegetation, and irregularities to provide a smooth, firm, and even surface true to grade and cross- section. Prepare to a fine texture and without soil lumps. Till parallel to the contours.
- E. Smooth the seedbed with a cultivator-type tillage tool having a rake bar or a rock rake. Pick up and remove all debris, such as rocks, stones, and concrete 2 inches in diameter or larger(1/2 inch maximum for lawn seeding), or roots and other objectionable material that will interfere with the seeding operation. A spring tooth cultivator may be used in lieu of a rock picker. Remove the rock by hand after each use of the cultivator; repeat the process until the soil is relatively free of rock.
- F. Choose equipment to minimize soil compaction. Operate equipment in a manner to minimize displacement of soil and disturbance of the design grading. Roll the area with at least one pass of the cultipacker. Remove ruts that develop during the sequence of operations before subsequent operations are performed. This must be completed just prior to seeding.

### 3.3 FERTILIZATION

- 3.4 A. Apply fertilizer immediately prior to seedbed preparation. Incorporate the fertilizer into the top 2 to 3 inches of topsoil during the seedbed preparation. Equipment that results in ruts or excessive compaction will not be allowed.
- B. Do not apply fertilizer with native grass, wildflower, or wetland seeding.

### 3.5 CONVENTIONAL SEEDING

- A. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.



- B. Use methods and procedures consistent with equipment manufacturer's recommendations; however, do not operate ground-driven equipment at speeds greater than 10 mph.
- C. On all areas accessible to machinery, sow seed with a gravity seeder, endgate cyclone seeder, or seed drill. Each application of seed shall overlap the previous application by one-half (1/2) the application width to insure double coverage.
- D. On areas inaccessible to field machinery, the use of hand-operated cyclone seeders will be allowed, but no other hand-seeding methods will be accepted.
- E. All seeded areas will have one pass with a roller or cultipacker to firm the soil.
- F. Sow seed mix at the rate of 8-10 lbs. per 1000 sq. ft.

### 3.6 HYDRAULIC SEEDING

- A. Order of Operations:
  - 1. Seedbed Preparation
  - 2. Seed application, fertilizing and mulching
  - 3.
- B. Seedbed Preparation: Follow seedbed preparation for conventional seeding.
- C. Seed Application, Fertilizing and Mulching:
  - 1. Application Process:
    - a. Combination: Place all material, seed, fertilizer, mulch, and tackifier (if applicable) in hydraulic mulching equipment specifically manufactured for hydraulic seeding.
    - b. Separate: At the Contractor's option and at no additional cost to the Owner, the hydraulic seeding, fertilizing, and mulching may be undertaken separately. If operations are undertaken separately, complete fertilizing and mulching application within 24 hours of completing seeding work. Do not separate the applications if inclement weather is forecasted within 24 hours of the scheduled application period.
  - 2. Ensure the hydraulic equipment, pump, and application process do not damage or crack seeds.
  - 3. Mix materials with fresh potable water using a combination of both recirculation through the equipment's pump, and mechanical agitation to form a homogeneous slurry.
  - 4. Apply mixture within 1 hour after seed and fertilizer are placed in the hydraulic seeder.
  - 5. If necessary, dampen dry, dusty soil, to prevent balling of the material during application.
  - 6. Apply the slurry evenly over all specified areas at component material rates specified.
    - a. Wood Cellulose Mulch:
      - 1) Mulch: Minimum 3,000 lb./acre dry weight.
      - 2) Tackifier: Minimum 50 lb./acre.
    - b. Bonded Fiber Matrix: Minimum 3,000 lb./acre dry weight.
    - c. Mechanically bonded Fiber Matrix: Minimum 3,000 lb./acre dry weight.
  - 7. Provide documentation to ensure final application rate.

### 3.7 MULCHING

- A. Protect seeded areas against erosion by spreading specified mulch after completion of seeding operations.
- B. Spread uniformly to form a continuous blanket and apply at a rate of one and one half (1 1/2) tons per acre.
- C. Anchor mulch by crimping into the soil a minimum depth of two inches (2").
- D. Provide and install additional erosion control materials where shown on the drawings.

### 3.8 WATERING

- A. Provide water, equipment, transportation, water tanker, hoses, and sprinklers.
- B. Use enough water to keep the soil and mulch moist to a depth of 1 inch and ensure growth of the seed. For turfgrass seeding areas, sufficiently water to keep the soil moist for a minimum of 21 days. If natural rainfall is adequate to keep the soil and mulch moist, artificial watering may not be needed.

### 3.9 RE-SEEDING

- A. When all work related to seeding, fertilizing, and/or mulching has been completed on an area, and is washed out or damaged, re-seed, fertilize, and/or mulch the area as necessary at no additional cost to the Owner.
- B. The contractor shall be responsible for maintaining erosion control throughout construction.

### 3.10 CLEANUP AND PROTECTION

- A. All work related to clean up throughout the project and upon completion is the responsibility of the Contractor, at no additional cost to the Owner.
- B. Restore to proposed grade, reseed, and remulch all eroded and/or washed-out areas which develop prior to acceptance of seed.
- C. During seeding work, keep pavements clean and work area in an orderly condition.
- D. Remove all excess materials, debris, and equipment upon completion of work.
- E. Repair any damage resulting from seeding operations.
- F. Upon completion of job, clean-up all debris, caused by work, and excess material and leave area within contract limits in a neat and clean condition. Remove hydraulic slurry and other excess debris related to seeding operations from buildings, landscaping, mulch, pavement, signs, sign posts, and any other areas not specified for application, at the end of each day.

### 3.11 ACCEPTANCE AND WARRANTY

- A. Guarantee in writing that all work has been completed as specified and provide the date that all activities were completed. Upon completion of the work and fulfillment of the requirements of this Section, notify the Owner's Representative in writing that the work is ready for final inspection.
- B. Request a definite date for final inspection.
- C. Notify the Owner's Representative five (5) days prior to the requested final inspection date.
- D. Acceptance will occur, provided seeded areas are in a live, healthy, growing, and well-established condition without eroded areas, bare spots, weeds, undesirable grasses, disease, or insects. Any areas having less than 90% coverage will not be accepted.
- E. Projects will be accepted no sooner than 60 days from the date that all activities were completed.
- F. Reseed and maintain all seeded lawn areas which do not meet the requirements of this Section at the time of final inspection. Reseeded areas will be accepted no sooner than 60 days from the date that reseeding occurred.
- G. Replacement work shall be as specified for original seeding.
- H. Replacement work shall be reinspected before acceptance.

END OF SECTION 329219

## SECTION 332601 - PRECAST MANHOLES AND MANHOLE DROPS

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section consists of furnishing, hauling, and placing all precast concrete manholes for sanitary sewer systems and storm sewer systems shown on the drawings and as specified herein.
- B. Precast concrete manholes shall be of the type and configuration shown on the drawings, and all manholes shall be provided by one sole manufacturer. Precast risers shall be the eccentric cone type that can be assembled in such a way as to prevent lateral movement either by using bolt down construction or an interlocking tongue and groove construction, as shown on the drawings.
- C. Manhole Sizes: Manholes shall be sized for particular diameters of sewer lines, as designated on the drawings.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Portland Cement: Shall conform to ASTM C150, latest revision, Type I, II, or V.
- B. Concrete Reinforcement: Shall be reinforcing bars conforming to ASTM 615, Grade 60.
- C. Aggregate: Shall conform to ASTM C33, latest revision, for coarse and fine aggregate.
- D. Mortar: Shall conform to ASTM C270, latest revision, Type M.
- E. Water: Mixing water shall be clean and potable.
- F. Dampproofing: Shall conform to Koppers Specifications for Coal Tar Bitumastic Super Service Black or an approved alternate.
- G. Joint Sealant: Shall meet AASHTO Specification M-198, and shall be suitable for application in vertical and horizontal joints.
- H. Manhole Pipe Connectors: Shall be a resilient connector designed to make a watertight seal between the precast manhole and sewer pipe, conforming to the requirements of ASTM C923, latest revision.
- I. Grout: Grout shall be a pre-mixed, packaged, non-ferrous, aggregate non-shrink grout.
- J. Manhole Castings: Shall be of the size and type indicated on the plans. The iron used for the castings shall conform to AAASHTO M306, latest revision, for Class 35 gray iron.

- K. Manhole Steps (Storm sewer manholes): Copolymer polypropylene plastic steps with 1/2-inch grade 60 steel, or polyethylene steps with 3/4-inch O.D. 6351-T6 aluminum tubing.
- L. Manhole Drops:
  1. Type A Drop: Shall be constructed of SDR-35 PVC pipe as shown on the drawings. Type A drops shall be utilized for all drops of two feet minimum up to eight feet maximum.
  2. Type B Drop: Shall be constructed of Class 50 ductile iron pipe as shown on the drawings. Type B drops shall be utilized for all depths greater than eight feet.

PART 3 - EXECUTION

3.1 EXECUTION

- A. Fabrication and Manufacturing: Precast reinforced concrete manholes shall be manufactured to requirements of ASTM C478, latest revision and shall be of the type, size, and configuration shown on the drawings. Manhole tops shall be of the eccentric type. The minimum allowable wall thickness shall be determined by the manhole depth as below:

<u>Depth</u>	<u>Minimum Wall Thickness</u>
0 to 16 feet	1/12 of internal diameter
16 feet or greater	1/12 of internal diameter + 1"

- B. Minimum internal diameter of any manhole section shall be 4 feet. Dampproofing shall be factory applied on all exterior surfaces. Dampproofing system shall be applied to manufacturer's specifications. Two coats, each of minimum 14 mils dry thickness, shall be applied. A 75-volt maximum wet sponge detector shall be employed to check for holidays in the dried finish film.
- C. Construction:
  1. Precast units shall be set into a reinforced concrete base constructed of 3,500 min. psi concrete, 4-inch max. slump, and #4 rebars at 12-inch on center each way. Bottom section shall set into the base a minimum of 12 inches. Base shall extend not less than 6 inches from outside manhole wall. The joints in the precast concrete manhole shall be set in a pre-molded mastic material or a rubber gasket to produce an absolutely watertight joint under full hydrostatic head conditions.
  2. Precast manhole bases will be allowed on manholes where practical. Inverts shall be constructed within precast bases in the field as described by this specification. Precast manhole bases with integral inverts shall not be allowed except at the Engineer's discretion after review of detailed shop drawings submitted by the Contractor.
  3. Precast riser sections shall be set plumb and oriented with manhole steps and access opening to match the detailed drawings designations.
  4. Inlet and outlet pipes shall extend through the walls of the structures a sufficient distance beyond the outside surface to allow for connections, and shall extend six inches beyond the inside surface of the wall. The new manhole shall be cleaned of silt, debris, or other foreign matter prior to acceptance.

5. Openings for sewer pipe in manhole sections shall be formed at the factory, with cast-in-place manhole pipe connector gaskets.
  6. Invert channels shall be smooth and semi-circular in shape conforming to the inside of the adjacent pipe line sections with change in flow direction made by a smooth curve of as large a radius as the manhole size will permit, and changes in the size and grade of the channels being made gradually and evenly. Manhole floor shall rise a minimum of 1 inch per foot from side of channel to wall.
  7. All lifting holes shall be thoroughly wetted and completely filled with non-shrinking grout to form a watertight seal.
  8. All castings, frames, and covers shall be set true to line and to correct elevation upon a mastic gasket. Manhole frames shall be attached to manholes with anchor bolts. Frames and covers shall have true common bearing surfaces, such that the covers will seat firmly without rocking or shifting.
  9. Manholes shall not leak more than 1.14 gallons per day per vertical foot of manhole under a full hydrostatic head.
  10. The drop pipe in manhole drops shall be constructed using standard pipe sections and fittings so as to enter at the bottom of the manhole and also continue the incoming line in a straight line to enter the manhole at a higher elevation, all as shown on the detailed drawings.
- D. New Manhole Over an Existing Line: Manholes to be located over an existing sewer line will be built so that all of the manhole inverts will be smooth and continuous after the sewer pipe is broken open. All pipe to manhole connections shall be made with connector gaskets as manufactured by A-Lok Products, Inc. or an approved equal.
- E. Connections to Existing Manholes: Existing manholes used for connecting new sewer lines to the existing sewerage system will have the invert chipped out and grouted back as required to facilitate the uninterrupted sewage flow from the new connection. This operation will be directed by the Engineer.
- F. Inspection and Rejection: The quality of materials, the process of manufacture, and the finished manhole sections shall be subject to inspection and approval by the Engineer. Manhole sections shall be subject to rejection for failure to conform to any of the specified requirements. In addition, individual sections may be rejected because of any of the following:
1. Fractures or cracks passing through the wall;
  2. Defects that indicate imperfect proportioning, mixing, and molding.
  3. Surface defects indicating honeycombed or open texture;
  4. Damaged or cracked ends where such damage would prevent making a satisfactory joint;
  5. Any continuous crack having a surface width of 0.01 inch or more and extending for a length of 4 inches or more.

END OF SECTION 332601

## SECTION 332615 – DUCTILE IRON PIPE AND FITTINGS

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work in this section consists of furnishing, hauling, placing, and backfilling, as necessary, the ductile iron pipe, fittings, and fitting restraints for water line construction in the designated locations and to the lines and grades as shown on the drawings.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Ductile Iron Pipe: Unless otherwise specified or shown on the drawings, ductile iron pipe shall be pressure class 350, and shall conform to the latest revision of ANSI A21.51 (AWWA C151) Standard for Ductile Iron Pipe Centrifugally Cast, for Water or Other Liquids. The pipe shall be standard asphaltic varnish coated on the outside except for piping installed inside buildings or structures that shall not be tar coated. Pipe shall be cement mortar lined in conformance with ANSI A21.4 (AWWA C104) unless specified otherwise.
- B. Fittings: The fittings to be used with ductile iron pipe may be either gray iron or ductile iron, and shall conform to the requirements of ANSI/AWWA C110 or C153, latest revision. All fittings shall be coated and lined in the same manner as the pipe. All fittings up to and including 12 inches shall be Class 250, with all larger fittings of Class 150. Flanged fittings shall be Class 125 unless noted otherwise on the drawings. Mechanical joint and push-on joint fittings shall meet all applicable requirements of ANSI A21.11 (AWWA C11).
- C. Joints: Unless specifically noted otherwise, joints for ductile iron pipe that are to be buried shall be either a push-on type or a mechanical joint. Unless noted otherwise, joints for pipe used inside buildings or structures shall be either flanged or a lock coupling for grooved-end pipe.
  - 1. Push-on Type Joint: Required joint materials, including the neoprene gasket and the lubricant, shall be furnished with the pipe in accordance with AWWA C111.
  - 2. Mechanical Joint: Mechanical joint ends shall comply with the requirements of ANSI A21.11 (AWWA C111). All required joint materials, including neoprene gasket, gland, bolts, and nuts, shall be included with the pipe.
  - 3. Flanged Joint: The flanged joint shall be integrally cast and shall conform to the requirements of ANSI Specification B16.1 for Class 125. Screw-on flanges will be acceptable, but any required threading of pipe barrel shall be done by the factory in conformance with AWWA C115 utilizing Class 53 pipe. Flanges shall be ductile iron. The pipe barrel and flange shall not be field assembled. The flanges shall be furnished with factory-purchased full face gaskets 1/8-inch thick of rubber per ANSI/AWWA C111/A21.11.

4. **Restrained Joint:** The restrained joint for pipes 14-inch diameter and larger shall be a boltless connection type that utilizes a square, alloy steel, welded-on retainer ring in conjunction with a split ring and socket groove to provide the means of restraint. The joint shall be disassembleable using a closure-spreader mechanism integral to the split ring. The split ring, retainer ring, and all parts associated with the closure-spreader mechanism shall be corrosion-resistant, high strength, low alloy (HSLA) steel conforming to ANSI/AWWA C111/A21.11. All required joint materials including neoprene gasket and lubricant shall be supplied with the pipe. Restrained joint shall be "Lok-Ring Joint Pipe" as manufactured by American Ductile Iron Pipe. As an alternate to the preceding, the restrained joint may be TR-FLEX or TR-FLEX GRIPPER, as manufactured by U.S. Pipe and Foundry Co., SUPER-LOCK, as manufactured by Clow Water System Company, or approved equal.

## PART 3 - EXECUTION

### 3.1 EXECUTION

- A. **Cutting, Cleaning, and Inspecting:** All cutting of ductile iron pipe shall be done by a means of mechanical cutter. Wheel cutters shall be used wherever practical. After cutting, the interior of the pipe shall be thoroughly swabbed or cleaned of all foreign matter before being installed into the system and shall be kept clean during and after installation. Before installation of any pipe or fitting, each piece shall be inspected for defects and shall be rung with a light hammer to detect any cracks. All defective, damaged, or unsound pipe or fittings shall be rejected.
- B. **Installation:**
  1. **Mechanical Joint:** The last eight (8) inches outside of the spigot and the inside of the bell of the mechanical joint or push-on fittings shall be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter from the joint, and then coated with a soap solution. The ductile iron gland shall then be slipped on the spigot end of the pipe with the lip extension of the gland toward the socket or bell end. The rubber gasket shall be coated with soap solution and placed on the spigot end in the bell. The gasket shall then be pressed into place with the bell. Care shall be taken to locate the gasket evenly around the entire joint. The ductile iron gland shall be moved into position for bolting. Nuts spaced 180 degrees apart shall be tightened alternately in order to produce an equal pressure on all parts of the gland.
  2. **Flanged Joint:** When assembling the flange joint, the Contractor shall insure that the ring gasket is properly located and placed flat against the face of the flange. Flanges shall be assembled by alternately tightening bolts spaced 180 degrees apart in order to produce an equal pressure on all parts of the gland.
  3. **Restrained Joint:** Installation of restrained joint fittings shall be in strict accordance with the manufacturer's printed literature.

END OF SECTION 332615



SECTION 332622 – PLASTIC PIPE

PART 1 - GENERAL

1.1 GENERAL

- A. Description: The work of this section shall consist of furnishing, storing, and installing solid wall polyvinyl chloride (PVC) plastic pipe for gravity sewer, sewer service, water distribution, water service lines, and pressure sewer mains.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Solid Wall PVC Gravity Sewer Pipe: PVC pipe for gravity sewers shall be solid wall meeting the requirements of ASTM D3034, latest revision, with wall thickness for pipe sizes 6" through 15" being SDR35 for pipe buried less than 12 feet and SDR 26 for pipe buried 12 feet or greater; and meeting ASTM F-679 for 18" and larger. Pipe shall be extruded with one end to serve as a spigot end and the other as a bell end, with a gasket groove molded inside for retention of a rubber gasket used in making the joint. Standard laying lengths shall be 12.5 feet or 20 feet. All 4" and 6" PVC service lateral pipe, fittings, and associated cleanouts shall be Schedule 40 PVC meeting all applicable testing and ASTM standards, latest revision, for Schedule 40 PVC pipe.

- 1. Drop Impact Test: Pipe shall withstand, without failure at 73°F, an impact of a falling missile (20 pounds Tup A) at the following levels, in accordance with ASTM D2444, latest revision.

<u>Nom. Size ("</u>	<u>Ft.-Lbs.</u>
4	150
6	210
8	210
10 or Larger	220

- 2. Pipe Stiffness: Minimum pipe stiffness (F/delta-y) at 5% deflection shall be 46 PSI for all sizes when tested in accordance with ASTM D2412, latest revision.
- 3. Flattening: There shall be no evidence of splitting, cracking, or breaking when a specimen of pipe, six (6) inches long, is flattened between parallel plates in a suitable press until the distance between the plates is forty percent of the outside diameter of the pipe. The rate of loading shall be uniform and such that the compression is completed within two to five minutes.

- B. Pressure Sewer and Water Distribution Line: PVC pipe shall be solid wall meeting the requirements of ASTM D2241, latest revision, with wall thickness SDR 21 (Class 200), or AWWA C900, with wall thickness DR18, as called for on the drawings. All water pipe must bear the National Sanitation Foundation seal for potable water pipe. Pipe shall have an integral bell with a locked-in, solid cross section elastomeric gasket that meets the requirements of ASTM F477, latest revision. Provisions must be made for contraction and expansion at each

rubber ring bell and spigot joint. Pipe shall be made from clean, virgin, NSF approved PVC material conforming to ASTM D1784, latest revision.

1. SDR 21 PVC pipe shall be suitable for use at maximum hydrostatic pressure of 200 psi at 75°F
2. DR18 PVC pipe shall be suitable for use at maximum hydrostatic pressure of 150 psi at 75°F
3. Physical and Chemical Tests: Pipe shall meet the following physical and chemical test requirements. All physical and chemical tests shall be conducted at 73°F ± 3.6°F.

<u>Test</u>	<u>Requirements</u> <u>ASTM Ref.</u>	
Quick Burst Test	D1599	630 PSI applied in 60 to 70 sec.
Sustained Pressure Test	D1598	1000 hrs. @ 420 PSI
Acetone Immersion Test	D2152	No visible spalling or cracking after 20 minutes
Vise Test		No splitting or shattering when compressed 60% in 2 to 5 minutes

C. Water Service Line: Shall be solvent weld PVC pipe or polybutylene pipe or tubing meeting the following specifications:

1. PVC pipe for water service lines shall be solvent weld PVC pressure pipe, Schedule 80, meeting the requirements of ASTM D1785, latest revision. All pipe shall bear the National Sanitation Foundation seal for potable water pipe. Pipe shall be made from clean, virgin, NSF approved material conforming to ASTM D1784, latest revision. All connections shall be joined by primer and PVC solvent cement conforming to ASTM D2564, latest revision.
2. Polybutylene pipe or tubing shall conform to all applicable requirements in the latest revision of ASTM D2581, ASTM D2666, ASTM D2662, and AWWA C902. Polybutylene extrusion material shall comply with PB2110, Type II, Grade 1, Class "B" requirements as described in ASTM D2581, latest revision. Polybutylene pipe or tubing shall be rated for use with water at 73.4°F at a hydrostatic design stress of 1000 PSI and a maximum working pressure of 250 PSI. Minimum burst pressure shall be 350 PSI at 73.4°F, as determined in accordance with ASTM D1599, latest revision. Pipe or tubing shall meet the sustained pressure requirements as described in the latest revision of ASTM D2666 and ASTM D3000 at 73.4 and 100°F. In addition, pipe or tubing shall withstand without failing, bursting, or weeping, for a period of at least 300 hours at 180°F, a test pressure of 150 PSI. The test procedure outlined in ASTM D1598 shall be followed. Polybutylene pipe or tubing shall be permanently marked to indicate the nominal size, PB2110, SDR, pressure rating 73.4°F, manufacturer's name, date, code, appropriate ASTM designation, and the National Sanitation Foundation seal for potable water applications.

D. Fittings:

1. Fittings to be used with PVC water distribution and pressure sewer lines larger than four (4) inches in diameter shall be either gray iron or ductile iron, and shall conform to the requirements of ANSI/AWWA C110. Fittings shall be standard asphaltic varnish coated on the outside. Fittings shall be cement mortar lined in conformance with ANSI A21.4 (AWWA C104). Fittings shall be mechanical joint. Joint ends shall conform to the

requirements of ANSI A21.11 (AWWA C111). All required joint materials including neoprene gasket, gland, bolts, and nuts shall be included with the fitting.

2. Fittings to be used with PVC water distribution lines four (4) inches in diameter and smaller shall be of the same material as that of the pipe, and shall meet the requirements of paragraph 2.2 of this section.

- E. Valves: Valves to be used in the water distribution system shall be as specified in Section 332641 - GATE VALVE AND BOXES.

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. Installation: PVC water pipe shall be installed as specified in Section 332713 "Water Supply Systems"– and PVC sewer pipe shall be installed as specified in Section 332722 "Sanitary Sewer Systems."

END OF SECTION 332622

## SECTION 332641 - GATE VALVE AND BOX

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. The work in this section shall include furnishing and placing the gate valves and boxes as shown on the plans and as herein specified.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Unless specifically noted otherwise on the drawings, all gate valves shall be iron body, bronze-mounted, encapsulated disc, elastomer seat, non-rising stem with O-ring gaskets. The valves shall be equipped with a two-inch square operating nut as indicated on the plans.
- B. The gate valve shall conform to AWWA C509, latest revision, for design working water pressures of 200 psig for valves 12 inches NPS in diameter or smaller, and 150 psig for valves with diameter 16 inches NPS and larger, with the following listed characteristics:
  - 1. Body and Bonnet: Cast or ductile iron, minimum thickness per Table 2, AWWA C509 with cadmium plated ASTM A307 bolts, studs, and nuts.
  - 2. Valve Ends: Shall be ANSI/AWWA C111/A21.11 for mechanical joint end, or push-on ends, as shown on the plans.
  - 3. Disc: Shall be of cast iron completely encapsulated with resilient material. Resilient sealing material shall be permanently bonded to the cast iron disc with a rubber tearing bond to meet ASTM D429, latest revision.
  - 4. Stems: NRS stems shall be cast bronze with internal collars in compliance with AWWA C509. OS&Y stems shall be bronze. NRS stuffing box shall have two O-ring seals above the thrust collar. Rings shall be field replaceable without removing the valve from service.
- C. Valve Boxes: Valve boxes shall be required for all buried valves, and shall be specified below:
  - 1. Valve boxes shall be as shown on the plans.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Each gate valve shall be installed at the locations and grades as shown on the plans. The Contractor shall insure that the valve is operating freely and that the valve box is properly placed to allow the use of the necessary tools for the operation of the valve and is plumb and centered over the operating nut on the valve.

- B. The tops of the valve boxes shall be level with the finish elevation of the ground or paving surface. If the top of the operating nut is more than two feet below the finish grade, a permanently installed valve stem extension shall be installed in the valve box, raising the nut to within six inches of the ground surface.

END OF SECTION 332641

## SECTION 332645 – BLOW-OFF HYDRANTS

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. The work in this section shall include furnishing and placing the blow-off hydrants as shown on the plans and as herein specified.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Unless specifically noted otherwise on the drawings, all blow-off hydrant shall be steel pipe, with all working parts being brass, galvanized steel, or PVC. The hydrants shall be equipped with a two-inch FIP horizontal side inlet connecting, a two-and-half-inch NST or smaller, and a non-turning operating rod and shall open to the left as indicated on the plans. Operating drive shall operate with a standard universal slotted valve wrench. When open the flow of water shall be unobstructed and the drain hole shall be covered.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Each blow-off hydrant shall be installed at the locations and grades as shown on the plans. The hydrant shall be set in 4 cubic feet of crushed stone to allow for proper drainage of hydrants. Hydrant shall have twenty-four-inch square and four-inch thick concrete pad poured around it. Recommendation of the AWWA should be followed when installing the hydrants.
- B. The tops of the valve boxes shall be level with the finish elevation of the ground or paving surface. If the top of the operating nut is more than two feet below the finish grade, a permanently installed valve stem extension shall be installed in the valve box, raising the nut to within six inches of the ground surface.

END OF SECTION 33264X

## SECTION 332647 - TAPPING SLEEVES AND VALVES/CUTTING-IN SLEEVES

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. The work of this section consists of furnishing and installing tapping valves and sleeves and cutting-in sleeves as shown on the plans and herein specified, including all tools, labor, equipment, and incidentals to complete the installation.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Tapping Sleeves: All tapping sleeves shall be 18-8 type 304 stainless steel for corrosion control, mechanical joint type with outlet flange. For the mechanical joint, all end and side gaskets shall be totally confined to eliminate cold flow. Selection shall be made for the proper end gaskets in order to utilize one size of sleeve for a specific nominal size of pipe for all classes of cast or ductile iron and PVC pipe regularly used. The outlet flange shall be machined recess for mating with the tapping valve.
- B. Tapping Valves: All tapping valves shall have an inlet flange (CL 125, ANSI B16.1) for attachment to the tapping sleeve. The outlet shall be standard mechanical joint with gland and gasket as required to match the pipe as shown on the drawings. The inlet flange shall have a machined projection that will mate with the machined recess on the tapping sleeve to assure proper alignment. The tapping valve shall have an oversized seat opening to allow entry of the tapping machine cutters and permit full diameter cuts. The tapping valve shall meet Specifications Section 332641 "Gate Valves and Boxes" in all aspects except for changes as noted in this paragraph.
- C. Cutting-in Sleeves: Shall be of either gray iron or ductile, and shall conform to the requirements of ANSI/AWWA C110. Cutting-in sleeves shall be standard asphaltic varnish coated on the outside, and shall be cement mortar lined in conformance with ANSI A21.4 (AWWA C104) unless specified otherwise. All cutting-in sleeves shall be mechanical joint by plain-end and shall be of such dimensions to fit all classes of cast iron pipe. Sleeve gland shall be equipped with setscrews to hold the sleeve in place. Mechanical joint end shall comply with the requirements of ANSI A21.11 (AWWA C111).

### PART 3 - EXECUTION (NOT USED)

END OF SECTION 332647

## SECTION 332713 - WATER SUPPLY SYSTEMS

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work in this section consists of furnishing and installing all underground water distribution piping in the designated locations and to the lines and grades as shown on the plans and herein specified, and all tools, labor, equipment, materials, and incidentals necessary to complete this section.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Piping: All underground water distribution piping shall be plastic pipe with gasketed joints meeting the specifications given in Section 332622 "Plastic Pipe," unless noted otherwise on the drawings.
- B. Bends and Fittings: All bends and fittings shall be in accordance with Section 332615 "Ductile Iron Pipe and Fittings."

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. General: Installation of plastic pipe shall be in accordance with the manufacturer's instructions and in compliance with appropriate sections of ASTM D2321, or latest revision.

#### 3.2 DELIVERY OF MATERIALS TO JOB

- A. All materials delivered by truck shall be inspected as they are unloaded. Damaged pipe or material shall not be left at the storage yard or taken to the job site, but shall be removed as soon as possible in order that rejected material will not mistakenly be used on construction.
- B. All pipe fittings, valves, and other accessories shall be unloaded by the use of hoists or skidways. Same shall be handled in such manner as to avoid damage due to shock. Under no circumstances shall pipe be dropped to the ground from cars or trucks. Special precaution shall be taken to prevent the rolling of pipe to strike another forcefully. Machined materials - valves, hydrants, etc. - shall be handled in such manner as to protect the alignment and finished parts of same.



### 3.3 TRENCH EXCAVATION

- A. Trench Excavation: Shall be as specified in Section 312221 “Trenching, Backfilling and Compacting.”

### 3.4 PVC PIPE INSTALLATION

- A. General: Only competent workers at laying plastic type pipe shall be employed on this phase of the work, and complete suitable equipment necessary for the execution of same is required. Any incompetency observed by the Engineer must be removed at his request, and where improper equipment or lack of same appears to be impairing the quality or speed of the work, such adjustment in same shall be made to the Engineer's satisfaction.
- B. The pipe, fittings and valves shall be placed in the trench with care. Under no circumstances shall pipe or other materials be dropped or dumped into the trench. The pipe shall be snaked into the trench, either employing the natural snaking tendency of some plastic pipe or the pipe shall be laid from one side to the other on alternate lengths.
- C. Pipe Cleaning During Laying Operations: The plastic pipe, if furnished from the factory with dust covers over the ends, shall be examined carefully during laying operations to insure that such covers are not lost inside the pipe. At the termination of pipe laying, the open end of the pipeline shall be closed off by a suitable cover until laying operations are resumed. No pipe shall be placed in the trench unless it is intended to make the joint to the pipeline at that time.
- D. Inspection of Materials During Construction: Any materials not meeting the specifications, or obviously faulty material, shall be rejected by the Engineer and removed from the job site by the Contractor.
- E. Joining Plastic Pipe: In joining sections of pipe, the Contractor shall use good working practices. All pipe ends shall be cleaned thoroughly inside and out before application of lubricant. The recommendations of the manufacturer of the pipe shall be followed closely in joining this type of pipe. Care shall be taken in lowering pipe into the trench in order that a tensile stress is not created that would cause partial or complete separation of the joints. Concrete thrust blocks shall be installed at all bends, tees, crosses, and reducers. The Contractor shall arrange for a qualified manufacturer's representative to instruct his workmen in this pipe joining method.
- F. Breaks in Pipe and Joints: Breaks in the pipe or joints shall be repaired to the satisfaction of the Engineer and at the expense of the Contractor.
- G. Bedding of Plastic Pipe: The Contractor shall bed the pipe in accordance with the requirements of Section 312221 “Trenching, Backfilling and Compacting.”
- H. Allowance for Expansion: The Contractor is cautioned that expansion and contraction of PVC pipe is relatively great. It is necessary to snake the pipe in the trench or allow in other ways for some expansion or contraction of the pipe.
- I. Avoidance of Unnecessary Bends: Excessive bends in the alignment of the pipe will not be permitted. Where obviously required, sweep ells shall be used in making connections between

two sections having differing alignment. Standard 90° elbows are not to be used, except in confined locations.

- J. Anchorage of Bends, Tees, and Plugs: All tees, plugs, caps, and bends exceeding 22-1/2° shall be squarely anchored by suitable thrust concrete backing. Such concrete backing shall be so placed that the pipe or fitting joints will be accessible for repair. The concrete shall be of 1:3:5 mix and shall be placed between solid ground and the fitting to be anchored. The area of the bearing on the pipe and the ground in each instance shall be a minimum of three square feet or as determined by the Engineer.
- K. Testing: Installed water distribution lines shall be hydrostatically tested as follows. Testing shall include both a "pressure test" of at least two hours duration for the purpose of blowing defective joints, and a "leakage test" to determine actual loss of water from the system. The use of compressed air for testing pipe will not be permitted. Contractor shall be responsible for adequately plugging and bracing, as necessary, the ends of the water line, regardless of location, to allow the for hydrostatic testing.
- L. Pressure Test: After the pipe has been laid, all newly laid pipe shall be subjected to a hydrostatic pressure of at least 100 psi at the lowest point in the system.
  - 1. Test Pressure Restrictions: Test pressures shall be (1) of at least 2-hour duration; (2) not vary by more than ±5 psi; (3) not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants.
  - 2. Pressurization: Each valve or isolated section of pipe shall be filled with water slowly and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Owner.
  - 3. Air Removal: Before applying the specified test pressure, air shall be expelled completely from the pipe. After all the air has been expelled, the test pressure shall be applied.
  - 4. Examination: All exposed pipe, fittings, valves, and joints shall be examined fully during the test. Any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated until it is satisfactory to the Owner.
- M. Leakage Test: A leakage test shall be conducted concurrent with the pressure test.
  - 1. Leakage Defined: Leakage shall be defined as the quantity of water that must be supplied into the new laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.
  - 2. Allowable Leakage: No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{ND \sqrt{P}}{7400}$$

In which L is the allowable leakage in gallons per hour; N is the number of joints in the length of pipeline tested; D is the nominal diameter of the pipe in inches; and P is the average test pressure during the leakage test, in pounds per square inch gauge. When

testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr/in. of nominal valve size shall be allowed.

3. Acceptance of Installation: Acceptance shall be determined on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than that specified above, the Contractor shall, at his own expense, locate and repair the defective material until the leakage is within the specified allowance. All visible leakages are to be repaired regardless of the amount of leakage.

N. Flushing and Disinfecting: The completed water distribution system shall be flushed and disinfected in accordance with AWWA C651. The "Continuous-Feed Method" shall be utilized. This method is summarized below:

1. Calcium hypochlorite granules shall be placed in pipe sections during construction. Granules shall be placed at upstream end of the first section of pipe, at the upstream end of each branch main, and at 500 foot intervals. One-half ounce of calcium hypochlorite granules shall be placed at the locations specified. Calcium hypochlorite granules shall not be placed within solvent weld PVC pipe or in screwed joint steel pipe.
2. Prior to disinfection, the completed water line shall be filled and flushed. All air shall be expelled from the pipeline as described in paragraph 3.6 of this specification. The flushing velocity shall not be less than 2.5 feet per second (fps) unless approved otherwise by the Engineer. The following table shows the approximate rates of flow required to produce a velocity of 2.5 fps in pipes of various diameters:

<u>Pipe Dia., In.</u>	<u>Approx. Flow Req'd. to Produce 2.5 fps, GPM</u>
1.....	10
2.....	30
3.....	65
4.....	105
6.....	230
8.....	400
10.....	600
12.....	900

3. Potable water from an approved source shall be introduced into the water line at a constant, measured rate. At a point no more than 10 feet downstream from the beginning of the new water line, water entering the line shall receive a dose of one percent chlorine/water solution, fed at a rate such that the water shall have not less than 25 mg/l free chlorine. The Contractor shall measure the chlorine concentration at regular intervals using appropriate chlorine test kits. The following table shows the gallons of one percent chlorine/water solution required per 100 feet of pipe to produce a 25 mg/l concentration in the pipeline:

<u>Pipe Dia., In.</u>	<u>Gallons of 1% Solution Req'd. per 100 Ft. of Pipe</u>
1.....	.01
2.....	.05
3.....	.11
4.....	.16
6.....	.36
8.....	.65

10.....	1.02
12.....	1.44

- O. Approximately one pound of liquid chlorine (100% available chlorine) is required for 12 gallons of water to produce a one percent solution. Approximately one pound of calcium hypochlorite (HTH) is required per 8 gallons of water to produce a one percent solution.
- P. The chlorinated water shall be allowed to stand in the new water line for at least 24 hours, during which time all valves and hydrants shall be operated. At the end of the 24-hour period, water in all portions of the line shall have a residual of not less than 10 mg/l free chlorine. If a concentration less than 10 mg/l is found after the 24-hour period, the entire disinfection procedure shall be repeated by the Contractor at his expense.
- Q. Upon satisfactory completion of the disinfection procedure, the heavily chlorinated water shall be flushed from the system until the chlorine concentration throughout the entire system is no higher than one mg/l or the chlorine concentration of the water source.
- R. After final flushing and filling of the system and prior to placing the system in service, the Contractor shall arrange with the Missouri Department of Natural Resources for collecting samples for required tests. If bacteriological test results are unsatisfactory, the entire disinfection procedure shall be repeated by the Contractor at his expense. The Contractor shall be available to assist the Missouri Department of Natural Resources in collecting samples if required.

### 3.5 WATER MAINS NEAR SEWERS

- A. Horizontal Separation: A water main shall be laid at least ten feet horizontally from any existing or proposed drain or sewer line. Should local conditions prevent a lateral separation of ten feet, a water main may be laid closer than ten feet to a storm or sanitary sewer line, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer line and at such an elevation that the bottom of the water main is at least eighteen inches above the top of the sewer line. When it is impossible to obtain vertical or horizontal separation, the sewer line must be relaid and constructed equal to the water line pipe, and should be pressure-tested to assure watertightness before backfilling.
- B. Vertical Separation: Where water mains must cross over sewers, storm drains, or sanitary sewers, the water main must be laid at such an elevation that the bottom of the water main is at least eighteen inches above the top of the sewer, and a full length of water main pipe must be centered over the sewer to be crossed so that the joints will be equally distant from the sewer and as remote therefrom as possible. This vertical separation must be maintained for that portion of the water main located within ten feet horizontally of any sewer or sewer line that it crosses, said ten feet to be measured as the normal distance from the water main to the sewer.
- C. Unusual Conditions: Where it is necessary for the water main to pass under a sewer line, the water main must be laid with ductile iron pipe which must extend on each side of the crossing until the normal distance from the water main to the sewer is at least ten feet. In making such crossings, a full length of pipe must be centered over or under the sewer to be crossed so that the joints will be equally distant from the sewer and as remote therefrom as possible. The sewer line must also be constructed of cast iron pipe with mechanical, compression, or leaded joints until the normal distance from the sewer to the water main is at least ten feet. Where a water

main must cross under a sanitary sewer, a vertical separation of at least 18 inches between the bottom of the sewer line and the top of the water main must be maintained with adequate support for the larger size sewer lines to prevent them from settling or their breaking the water main. Where these conditions cannot be met, the Missouri Department of Natural Resources shall be consulted as to the precautions to be taken to protect the public water supply.

D. No water pipe shall pass through or come into contact with any part of a sewer manhole.

### 3.6 REPAIRS

A. The Contractor's performance bond shall remain in effect for one year from the date of acceptance of the water distribution system by the Owner. In the event of leaks or breaks or other malfunctions of material within this year, the Contractor shall repair such defects at his expense or arrange with the Owner to reimburse the Owner for expenses incurred in such repairs.

END OF SECTION 332713

## SECTION 332715 - TRACER WIRE

### 1. GENERAL

- 1.1 Description: The work in this section consists of furnishing and installing a tracer wire system for locating all main line pipe and service line pipe, as shown on the plans and herein specified, including all tools, labor, equipment, materials, and incidentals necessary to complete this section.

### 2. MATERIALS

- 2.1 Open Trench Pipe Installation: Tracer wire shall be a #12 AWG (0.0808" diameter fully annealed, high strength solid copper clad steel conductor, HS-CCS), insulated with a 30 mil, high density, high molecular weight polyethylene (HDPE) insulation rated for direct burial use at 30 volts. HS-CCS conductor shall be at 21% conductivity for locate purposes and have a break load strength of 452 pounds. All wire splices shall be made with either rigid fittings or weatherproof connectors specifically designed for direct burial.

#### 2.3 Connectors:

2.3.1 All mainline tracer wires must be interconnected in intersections, at mainline tees, and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At crosses, the four wires shall be joined using a 4-way connector. Use of two 3-way connectors with a short jumper wire between them is an acceptable alternative.

2.3.2 Direct bury wire connectors shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground tracer wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.

2.3.3. Non-locking friction fit, twist-on, or taped connectors are prohibited.

#### 2.4 Termination/Access:

2.4.1 Tracer wire for water mains shall be extended to the surface into valve boxes at each valve and flush hydrant. Construct additional access points as described herein to obtain a maximum spacing of access points of 500 feet. Grounding anode wire shall be connected to the valve box.

2.4.2 Tracer wire for service laterals shall be rigidly affixed to the water main's tracer wire with a 3-way direct bury waterproof connector and extended into the meter pit. A minimum of 2 foot of slack wire shall be required within the meter pit. Grounding anode wire shall be connected to the meter pit.

2.4.3 On long runs in excess of 500 L.F. without service laterals, valves, or hydrants, tracer wire access must be provided utilizing an approved grade level/in-ground tracer wire access box located at the edge of the right-of-way, and out of the roadway. The access box shall be delineated using a minimum 48" polyethylene marker post, color coded per APWA standard.

#### 2.5 Grounding:

2.5.1 Tracer wire must be properly grounded at all dead ends by use of a drive-in magnesium grounding anode rod with a minimum of 20' of #12 red HDPE insulated copper clad steel wire connected to anode specifically manufactured for this purpose and buried at the same elevation as the utility.

2.5.2 When grounding the tracer wire at dead ends, the grounding anode shall be installed in a direction 180 degrees opposite of the tracer wire, at the maximum possible distance.

2.5.3 When grounding the tracer wire in areas where the tracer wire is continuous and neither the mainline tracer wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the tracer wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to tracer wire with a mainline to lateral lug connector.

2.5.4 Where the anode will be connected to a tracer wire access box, a minimum of 2' of slack wire is required after meeting final elevation.

### 3. EXECUTION

3.1 Tracer wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances in excess of 1,000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.

3.2 Tracer wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.

3.3 Any damage occurring during installation of the tracer wire must be immediately repaired by removing the damaged wire and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.

3.4 Tracer wire shall be installed at the bottom half of the pipe and secured by tape or tie at 5' intervals.

3.5 Tracer wire must be properly grounded, as specified in paragraph 2.5 above.

3.6 Tracer wire on all service laterals/stubs must terminate at an approved tracer wire access point as specified in paragraph 2.4 above.

3.7 At all mainline dead-ends, tracer wire shall go to ground using an approved connection to a drive-in magnesium grounding anode rod, buried at the same depth as the tracer wire.

3.8 Mainline tracer wire shall not be connected to existing conductive pipes. Treat as a mainline dead-end, ground using an approved waterproof connection to a grounding anode buried at the same depth as the tracer wire.

3.9 All service lateral tracer wires shall be a single wire, connected to the mainline tracer wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline tracer wire.

3.10 In occurrences where an existing tracer wire is encountered on an existing utility that is being extended or tied into, the new tracer wire and existing tracer wire shall be connected using approved splice connectors, and shall be properly grounded at the splice location as specified.

3.11 A mainline tracer wire must be installed with all service lateral tracer wires properly connected to the mainline tracer wire to ensure full tracing/locating capabilities from a single connection point.

3.12 Lay mainline tracer wire continuously, by-passing around the outside of valves and fittings on the North or East side.

3.13 Tracer wire on all water service laterals must terminate at an approved tracer wire access point color coded blue and located directly above the service lateral at the edge of the road right-of-way.

3.14 Prohibited Products and Methods:

- Uninsulated tracer wire;
- Tracer wire insulations other than HDPE;
- Tracer wire not domestically manufactured;
- Non-locking, friction fit, twist-on, or taped connectors;
- Brass or copper ground rods;
- Wire connections utilizing taping or spray-on waterproofing;
- Looped wire or continuous wire installations that have multiple wires laid side-by-side or in close proximity to one another;
- Tracer wire wrapped around water line;
- Brass fittings with tracer wire connection lugs;
- Wire terminations within the roadway;
- Connecting tracer wire to existing conductive utilities

3.15 Testing: All new tracer wire installations shall be located using typical low frequency (512 Hz) line tracing equipment, witnessed by the Contractor, Engineer, and Owner as applicable, prior to acceptance of ownership. This verification shall be performed upon completion of rough grading and again prior to final acceptance of the project. Continuity testing in lieu of actual line tracing shall not be accepted.

#### 4. MEASUREMENT AND PAYMENT

4.1 Tracer wire shall not be measured and paid for separately, but shall be included in the lump sum or unit bid price as set forth in the Bid Schedule for that work of which it is a part.

END OF SECTION 332715



## SECTION 332722 - SANITARY SEWER SYSTEMS

### PART 1 - GENERAL

#### 1.1 GENERAL

- A. Description: The work of this section shall consist of installing the sewer collection system to the lines and grades as shown on the drawings and as specified herein. This section sets forth procedures for installation of the gravity sewer line piping.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Gravity Sewer System: Gravity collector sewer lines shall be PVC pipe meeting the requirements of Section 332622 "Plastic Pipe." Manholes shall be as specified in Section 312601 "Precast Manholes and Manhole Drops."
- B. Sewer Service Lateral Lines: Shall be solid wall PVC pipe meeting the requirements of Section 332622 "Plastic Pipe."

### PART 3 - EXECUTION

#### 3.1 EXECUTION

- A. Handling, Receiving, and Delivery of Materials: All materials shipped by rail shall be carefully inspected for damage in transit in the cars. If damaged material is found, it shall not be unloaded except upon instructions from the official freight agent. In the event of damaged pipe, it may be lifted out of the cars and placed along the switch site, but no material shall be removed from the railroad company property. If materials are delivered by truck, they shall be inspected as they are unloaded. Damaged pipe shall not be left at the job site, but shall be removed promptly so that rejected material will not mistakenly be used in construction. All pipe, pipe fittings, and other accessories and materials shall be unloaded in such a way as to avoid damage due to shock. Under no circumstances shall pipe be dropped to the ground from cars or trucks. Special precautions shall be taken to prevent one pipe from striking another forcefully.
- B. Storage: All materials shall be placed for storage in suitable places as approved by the Engineer. As pipe is placed along the intended alignment of the trench, it shall be placed with bell ends facing the direction in which work will proceed (upstream), unless otherwise directed.
- C. Pipe Inspection: Before pipe is lowered into the trench, the pipe shall be inspected for defects. The pipe shall be rung with a light hammer to detect cracks. Any defective, damaged, or unsound pipe shall be rejected.

- D. Pipe Cleaning: A thorough cleaning of each pipe section shall be done just before the section is lowered into the trench. A suitable swab shall be pushed through the pipe. The pipe shall be kept clean by approved means during and after laying.
- E. Cutting Pipe: All cutting of pipe shall be done in a neat manner with the least amount of waste of pipe involved and without damage to existing or new pipe lines.
- F. Pipe Installation: All pipes, pipe fittings, etc. shall be lowered into the trench piece by piece by means of derricks, ropes, or other suitable equipment. Under no circumstances shall pipe or other materials be dropped into the trench. The pipe shall be laid with bell holes upstream, i.e., in the direction of laying operations. Pipe shall be laid in a bed of granular stone as shown on the drawings and as specified in Section 312222 "Granular Stone Bedding and Backfill." In all cases, full-length joints of pipe shall be used except in making closures. The pipe shall be laid on grade with a grade rod that has an iron heel for the invert and notches for the line stretched over the pipe between the grade boards. Grade lines shown on the profile drawings are the internal invert lines of the sewer pipe. Pipe laying machines, laser beams, or other devices may be used in lieu of a grade rod only with the prior approval of the Engineer. After the pipe is set and on grade, granular stone bedding shall be deposited in the trench to a depth of at least 6-inches over the top of the pipe. This shall be carefully deposited in uniform layers not exceeding 6 inches with each layer carefully and solidly tamped in such a manner to prevent disturbance of the line and grade. Bedding and backfilling of the pipe shall be in accordance with Section 312221 "Trenching, Backfilling and Compacting." At the close of each day's work, or when pipe is not being laid, the end of the pipe shall be stopped to overcome possible uplift and prohibit contamination. Any pipe which settles before acceptance, or which is not in true alignment, shall be taken up and replaced by the Contractor at his expense.
- G. Joints: At all pipe joints, the granular stone bedding shall be excavated sufficiently so that the pipe bell will not rest on the bedding materials, but all the weight of the pipe shall be evenly distributed along the entire length of the barrel of the pipe. Care shall be taken to insure that the joints of the pipe are clean and free of any foreign material, and constructed watertight at all points. Any leaks or other defects discovered at any time before the final acceptance of the work shall be immediately repaired, or that portion of the sewer rebuilt, if necessary.
- H. Removal of Buildings, Structures, and Improvements: Where buildings, structures, improvements, or materials of value are encountered in the area where sewer line is to be installed, the Contractor shall provide for the removal, protection, and disposition of these elements. The Contractor shall consult with the Owner and Engineer relative to the proposed means of removal. All fences disturbed during construction shall be restored to a condition at least equal to that which existed prior to construction, unless specifically directed otherwise by the drawings. Certain repaired fence sections shall require installation of a fence gate. Locations of these gates shall be as called out on the drawings. Gates shall conform to the details shown on the drawings.
- I. Separation of Sewer and Water Lines: Refer to Section 332713 Water Supply Systems
- J. Sewer Service Lateral Lines: Sewer service lateral lines shall be installed to within five (5) feet of building foundations for connection with proposed building service lines. Lateral lines shall be constructed free of defects that will permit infiltration of groundwater or exfiltration of wastewater.
  - 1. Slope: Lateral lines shall be laid at a uniform minimum slope of 0.011 ft/ft.

2. Trenching, Bedding, and Backfilling: Shall be as specified in Section 312221 "Trenching, Backfilling and Compacting," and Section 312222 "Granular Stone Bedding and Backfill."
3. Depth: Lateral lines shall be installed so as to have minimum 30 inches of cover above the top of the pipe.
4. Connection of the service lateral to the new sewer main shall be accomplished by use of watertight compression-fit service connection. The service connection shall be specifically designed for connection to the type of sewer main being installed.

### 3.2 GRAVITY SEWER TESTING

- A. General: All completed gravity sewers shall require pneumatic or hydrostatic testing for the purpose of locating potential infiltration and/or exfiltration within the system. Sewer service lateral lines shall be excluded from testing requirements.
- B. Pneumatic Testing Procedure: The Contractor shall perform low pressure air testing on all sections of completed sewer 8-inch through and including 24-inch diameters, in the presence of the Engineer. It will be the responsibility of the Contractor to furnish and operate equipment capable of making the required tests. Pneumatic plugs shall be utilized to isolate sewer sections for testing. Plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected. Pneumatic plugs shall resist internal test pressure without requiring external bracing or blocking. All air used shall pass through a single control panel and three individual hoses shall be used for connections from the control panel to 1) pneumatic plugs for inflation; 2) sealed line for introducing the low pressure air; and 3) to the sealed line for continually monitoring the air pressure rise in the sealed line. Testing methods and air leakage rates shall conform to ASTM F1417, latest revision, as a minimum. Otherwise, the following procedures shall be followed:
  1. Pipe Above Groundwater Table: All pneumatic plugs shall be seal-tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 psig. The sealed pipe shall be pressurized to 5 psig. The plugs shall hold against this pressure without bracing and without movement of the plugs of the pipe. After a manhole to manhole reach of pipe has been backfilled and cleaned and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any groundwater that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize. After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed "Acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig shall not be less than the time shown for the given diameters in the following table:

Pipe Diameter <u>In Inches</u>	Minimum <u>Time (min., sec.)</u>	Max. Length (ft.) <u>for Min. Time</u>	Time (sec.) for <u>Longer Length (L)</u>
4	3:46	597	0.380 L
6	5:40	398	0.854 L
8	7:34	298	1.520 L
10	9:26	239	2.374 L
12	11:20	199	3.418 L

15	14:10	159	5.342 L
18	17:00	133	7.692 L
21	19:50	114	10.470 L
24	22:40	99	13.674 L
27	25:30	88	17.306 L
30	28:20	80	21.366 L
33	31:10	72	25.852 L
36	34:00	66	30.768 L

2. Pipe Below Groundwater Table: In areas where groundwater is known to exist, the Contractor shall install a one-half inch diameter capped pipe nipple, approximately 10" long, through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the test, the groundwater shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the nipple. The hose shall be held vertically and a measurement of the height in feet of water over the invert of the pipe shall be taken after the water has stopped rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is 11-1/2 feet, then the added pressure will be 5 psig. This increases the 3.5 psig to 8.5 psig, and the 2.5 psig to 7.5 psig. The allowable drop of one pound and the timing remain the same.)
3. Other Pipe Materials: Low pressure air testing of sewer lines constructed with vitrified clay pipe or reinforced concrete pipe shall be as specified above, except that the minimum specified times required for a 1.0 psig pressure drop shall be as called for in ASTM C828, latest revision (vitrified clay pipe sewer lines), or ASTM C924, latest revision (concrete pipe sewer lines).

C. Testing of Manholes: The Contractor will be required to make either hydrostatic or vacuum infiltration/exfiltration tests of all manholes in the presence of the Engineer, to demonstrate that the manholes are free of leaks.

1. Hydrostatic Testing: Where the top of the sewer is below water level, a one-half inch (1/2") galvanized pipe nipple is to be cast into each manhole wall and capped on the inside. The pipe nipple is to be located at the top of the inside bore of sewer pipe. All tests are to be conducted in the following manner:
  - a. Test plugs are to be placed in the end of each sewer pipe on the downstream and upstream side of each manhole and inflated to a maximum pressure of 16 psig. Plugs are to be thoroughly blocked to prevent them from blowing out. The manhole is to be filled with water to a level four and one-half feet (4 1/2') above the groundwater level or seven (7') feet above the pipe invert, whichever is higher. Ten minutes shall then be allowed for absorption, after which the water level shall be brought back to the test elevation.
  - b. The specified head shall be maintained on the manhole for a period of eight (8) hours. Sufficient water shall be added to maintain this level. All water added shall be metered to within one-tenth of a gallon and recorded. The maximum allowable leakage shall be as specified herein.
  - c. The Contractor shall provide all water, pumping facilities, and metering facilities necessary to perform the tests. After each test, all test water is to be pumped out.

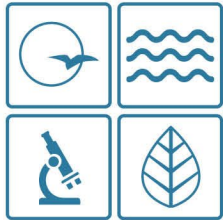
2. Vacuum Testing: Vacuum testing, performed in accordance with this specification, shall be allowed as a substitute for hydrostatic testing of manholes. The vacuum test equipment shall be approved by the Engineer prior to commencing manhole testing.
  - a. The vacuum "test head" assembly shall be placed inside the frame of the manhole cover, in order to include in the test the seal between the frame and the manhole cone section, slab, or adjusting rings.
  - b. Plugs shall be placed at least eight inches inside all pipes entering the manhole. Location of plugs shall be such that when inflated, they are past the gasket seal or joint of the manhole and sewer pipe. All plugs shall be braced sufficiently to prevent the plug or pipe from becoming dislodged and drawn into the manhole.
  - c. A vacuum of at least 10½ inches mercury shall be drawn on the manhole. The valve on the vacuum line to the manhole shall be closed, and the vacuum line disconnected. The vacuum within the manhole shall then be adjusted to 10 inches of mercury by opening the vacuum line valve.
  - d. A liquid-filled pressure gauge having a face of 3½ inches and reading from zero to 30 inches of mercury shall be utilized.
  - e. The time for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury must be equal to or less than the following values in order for the manhole to be considered as passing the vacuum test.

<u>Manhole Depth</u>	<u>Time (minutes)</u>
10 feet or less	2.0
10.1 feet to 15 feet	2.5
15.1 feet to 25 feet	3.0

- f. If vacuum drops less than one inch mercury within the test time, the manhole is considered acceptable and passes the test. If manhole fails and leaks, the contractor shall make the needed repairs and test again until satisfactory results are obtained. Test may be done before backfilling, but shall be repeated after backfill.
  - g. All safety procedures, placing of plugs, and bracing, labor, and other work required for testing will be the responsibility of the contractor.
  - h. The contractor shall supply all required test plugs, vacuum plate, and vacuum pump.
- D. Infiltration/Exfiltration Allowance: Infiltration or exfiltration for sewers 8-inch through 24-inch diameter shall not exceed 200 gallons per inch of pipe diameter per mile per day for any section of sewer. Infiltration or exfiltration for sewers greater than 30-inch diameter shall not exceed 6000 gallons per day per mile of pipe. Infiltration or exfiltration for manholes shall not exceed 1.14 gallons per day per vertical foot of manhole.
  - E. Infiltration/Exfiltration Elimination: The Contractor shall locate all sources of infiltration and exfiltration in the sewer lines, manholes, and appurtenances, and shall correct deficiencies and eliminate infiltration/exfiltration sources in a manner approved by the Engineer. All sections of sewer line, manholes, and appurtenances shall be re-tested after corrections are finalized. The Contractor shall carry the sole responsibility for providing a sewer system having infiltration or exfiltration below the specified limits.
  - F. Deflection Test: Deflection test shall be performed on all flexible pipe not less than thirty days after the placement of final backfill. The deflection test shall consist of hand-pulling a rigid ball or mandrel through the installed pipe in the presence of the Engineer. The rigid ball or mandrel

shall have a diameter equal to 95 percent of the inside diameter of the pipe. If the rigid ball or mandrel fails to pull through the pipe, the section being tested fails the test and will be replaced by the Contractor at no expense to the Owner.

END OF SECTION 332722



**MISSOURI**  
DEPARTMENT OF  
NATURAL RESOURCES

## APPENDIX A

**Michael L. Parson**  
Governor

**Dru Buntin**  
Director

August 1, 2022

Leanne Mattern  
Office of Administration, Facilities Management Design & Construction  
Harry S. Truman SOB,  
301 West High Street, Room 730  
Jefferson City, MO 65102

Dear Permittee:

Pursuant to the Federal Water Pollution Control Act, under the authority granted to the State of Missouri and in compliance with the Missouri Clean Water Law, we have issued and are enclosing your Missouri State Operating Permit for Office of Administration, MOR-100038.

Please read and review your permit and attached Standard Conditions. They contain important information on site management and reporting requirements. Quarterly reports required by this report must be submitted through our eDMR system.

This permit may include requirements with which you may not be familiar. If you would like The Department of Natural Resources to meet with you to discuss how to satisfy the permit requirements, an appointment can be set up by contacting the permit writer at 573-526-1139. These visits are called Compliance Assistance Visits and focus on explaining the requirements to the permit holder.

This permit is both your Federal NPDES Permit and your new Missouri State Operating Permit and replaces all previous State Operating Permits issued for this facility under this permit number. In all future correspondence regarding this facility, please refer to your State Operating Permit number and facility name as shown on page one of the permit.

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to 10 CSR 20-1.020 and 10 CSR 20-6.020; RSMo Section 621.250, 640.013, and 644.051.6. 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. Contact information for the AHC is: Administrative Hearing Commission, Truman State Office Building, Room 640, 301 W. High Street, P.O. Box 1557, Jefferson City, Missouri 65102, phone: (573) 751-2422, fax: (573) 751-5018; website: <http://ahc.mo.gov/>.

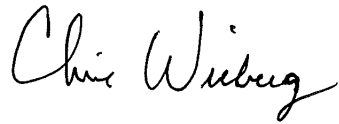


Office of Administration  
Page Two

Please be aware that this facility may also be subject to any applicable county or other local ordinances or restrictions. If you have any questions concerning this permit, please do not hesitate to contact the Water Protection Program at P.O. Box 176, Jefferson City, MO 65102, 573-522-4502.

Sincerely,

WATER PROTECTION PROGRAM

A handwritten signature in black ink that reads "Chris Wieberg". The signature is written in a cursive style with a large initial "C" and a long, sweeping underline.

Chris Wieberg  
Director

CW/qs

Enclosure



STATE OF MISSOURI  
DEPARTMENT OF NATURAL RESOURCES  
MISSOURI CLEAN WATER COMMISSION



## 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**

**(573) 526-1139**

**[Sarah.wright@dnr.mo.gov](mailto:Sarah.wright@dnr.mo.gov), [dnr.generalpermits@dnr.mo.gov](mailto:dnr.generalpermits@dnr.mo.gov)**