



# PROJECT MANUAL

## *RE-BID*

### *Replace Sewer Lines and Infrastructure*

### *Ozark Correctional Center Fordland, Missouri*

Designed By: Allgeier, Martin and Associates, Inc.  
7231 East 24th Street  
Joplin, Missouri 65804-3485

Date Issued: January 6, 2023

Project No.: C1907-01

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: C1907-01 Replace Sewer Lines/Infrastructure**

**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:**



**01-06-2023**

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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	Sheet G-001	01/06/2023	G-001.dwg
2.	Stormwater Management & Site Grading Plan & Details	Sheet C-101	01/06/2023	C-101.dwg
3.	WWTP Piping Plan & Site Plan	Sheet C-102	01/06/2023	C-102.dwg
4.	Outfall Sewer “A” Plan & Profile	Sheet C-103	01/06/2023	C-103.dwg
5.	Sanitary Sewer Renovation Plan	Sheet C-104	01/06/2023	C-104.dwg
6.	Water Distribution System Replacement Plan - North	Sheet C-105	01/06/2023	C-105.dwg
7.	Water Distribution System Replacement Plan - South	Sheet C-106	01/06/2023	C-106.dwg
8.	WWTP Hydraulic & Storm Sewer Profiles	Sheet C-301	01/06/2023	C-301.dwg
9.	Sanitary Sewer Renovation Profiles	Sheet C-302	01/06/2023	C-302.dwg
10.	Water Distribution System Replacement Profiles	Sheet C-303	01/06/2023	C-303.dwg
11.	Sludge Holding Tank Modifications - Plans	Sheet C-501	01/06/2023	C-501.dwg
12.	Sludge Holding Tank Modifications Sections & Details	Sheet C-502	01/06/2023	C-502.dwg
13.	Sludge Dewatering Building Plans	Sheet C-503	01/06/2023	C-503.dwg

14.	Sludge Dewatering Building Sections & Details	Sheet C-504	01/06/2023	C-504.dwg
15.	Sludge Dewatering System Plan	Sheet C-505	01/06/2023	C-505.dwg
16.	Sludge Dewatering System Sections & Details	Sheet C-506	01/06/2023	C-506.dwg
17.	Chemical Feed System Modifications & Details	Sheet C-507	01/06/2023	C-507.dwg
18.	Sanitary Sewer Details	Sheet C-508	01/06/2023	C-508.dwg
19.	Stormwater Management & Site Details	Sheet C-509	01/06/2023	C-509.dwg
20.	Water Details	Sheet C-510	01/06/2023	C-510.dwg
21.	Electrical Site Plan & Details	Sheet E-101	01/06/2023	E-101.dwg
22.	Electrical Details	Sheet E-501	01/06/2023	E-501.dwg

**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. RE-BID  
Replace Sewer Lines and Infrastructure  
Ozark Correctional Center  
Fordland, Missouri  
**Project No.: C1907-01**

### 3.0 BIDS WILL BE RECEIVED:

- A. Until: 1:30 PM, Thursday, November 16, 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 Work includes replacement of existing water mains, rehabilitation of existing sewer lines and manholes, wastewater treatment facility outfall sewer improvements, waste sludge dewatering system improvements, and chemical phosphorus removal improvements.
- 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.**
- C. **\*\*NOTE:** Bidders are provided new Good Faith Effort (GFE) forms on MissouriBUYS.

### 5.0 PRE-BID MEETING:

- A. Place/Time: 10 AM, Thursday, October 19, 2023, at 929 Honor Camp Lane, Fordland, Missouri 65652. You will be required to provide your full name, date of birth and social security number prior to entry.
- 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 and Associates, Inc., Tom Hancock, PE, 417-862-3355, email: [Tom.Hancock@amce.com](mailto:Tom.Hancock@amce.com)
- B. Project Manager: Eric Hibdon, PE, 573-522-0322, email: [Eric.Hibdon@oa.mo.gov](mailto:Eric.Hibdon@oa.mo.gov)

### 8.0 GENERAL INFORMATION:

- A. The State reserves the right to reject any and all bids and to waive all informalities in bids. No bid may be withdrawn for a period of 20 working days subsequent to the specified bid opening time. The contractor shall pay not less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, as determined by the Missouri Department of Labor and Industrial Relations and as set out in the detailed plans and specifications.
- B. Bid results will be available at <https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans> after it is verified that at least one bid is awardable and affordable.
- C. This is a federally funded/assisted construction project that requires compliance by the awarded Bidder with applicable federal laws and regulations. The Bidder should review Section 007333, Supplementary General Conditions for Federally Funded/Assisted Construction Projects and Section 007334, Terms and Conditions for Contractor Receipt of Federal ARPA SFRF Funds, which are made part of this Invitation to Bid and will be made part of the resulting contract by reference.

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

- A. The bidder shall submit his or her bid and all supporting documentation on MissouriBUYS eProcurement System. No hard copy bids shall be accepted. Go to <https://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."
- D. Any time a bidder wants to modify the bid, he or she will have to submit a new one. FMDC will open the last response the bidder submits. The bidder may revise and submit the bid up to the close of the solicitation (bid date and time). Be sure to allow for uploading time so that the bid is successfully uploaded prior to the 1:30 PM deadline; we can only accept the bid if it is uploaded before the deadline.
- E. If you want to verify that you are uploading documents correctly, please contact Paul Girouard: 573-751-4797, [paul.girouard@oa.mo.gov](mailto:paul.girouard@oa.mo.gov) ; April Howser: 573-751-0053, [April.Howser@oa.mo.gov](mailto:April.Howser@oa.mo.gov) ; or Mandy Roberson: 573-522-0074, [Mandy.Roberson@oa.mo.gov](mailto:Mandy.Roberson@oa.mo.gov).
- F. If you are experiencing login issues, please contact Web Procure Support (Proactis) at 866-889-8533 anytime from 7:00 AM to 7:00 PM Central Time, Monday through Friday. If you try using a userid or password several times that is incorrect, the system will lock you out. Web Procure Support is the only option to unlock you! If you forget your userid or password, Web Procure Support will provide a temporary userid or password. Also, if it has been a while since your last successful login and you receive an "inactive" message, contact Web Procure (Proactis). If you are having a registration issue, you may contact Cathy Holliday at 573-751-3491 or by email: [cathy.holliday@oa.mo.gov](mailto:cathy.holliday@oa.mo.gov).

## 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/wp-content/uploads/2023/07/list-certified-missouri-service-disabled-veteran-business-enterprises-sdves.pdf>

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



# State of Missouri Construction Contract

**THIS AGREEMENT** is made (DATE) by and between:

## ***Contractor Name and Address***

hereinafter called the "Contractor,"

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

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

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

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

**Project Name:**                    **RE-BID**  
**Replace Sewer Lines and Infrastructure**  
**Ozark Correctional Center**  
**Fordland, Missouri**

**Project Number:**            **C1907-01**

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 **240 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 \$1,500** per day for each and every day, Sunday and legal holidays excepted, during which the work remains incomplete and unfinished. Any sum which may be due the Owner for such damages shall be deducted and retained by the Owner from any balance which may be due the Contractor when said work shall have been finished and accepted. But such provisions shall not release the Bond of the Contractor from liability according to its terms. In case of failure to complete, the Owner will be under no obligation to show or prove any actual or specific loss or damage.



**ARTICLE 4. CONTRACT SUM**

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

Base Bid: \$

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

**UNIT PRICES:** The Owner accepts the following Unit Prices: Pursuant to the attached

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

**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  
**C1907-01**

NAME	First being duly sworn on oath states: that
he/she is the <input type="checkbox"/> sole proprietor <input type="checkbox"/> partner <input type="checkbox"/> officer or <input type="checkbox"/> manager or managing member of	a <input type="checkbox"/> sole proprietorship <input type="checkbox"/> partnership
NAME	<input type="checkbox"/> limited liability company (LLC)
or <input type="checkbox"/> 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

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
------------------------	------

<b>NOTARY INFORMATION</b>			
NOTARY PUBLIC EMBOSSER SEAL	STATE OF	COUNTY (OR CITY OF ST. LOUIS)	<b>USE RUBBER STAMP IN CLEAR AREA BELOW</b>
	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  
**C1907-01**

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



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

(PROJECT TITLE, PROJECT LOCATION, AND PROJECT NUMBER)

at

(ADDRESS OF PROJECT)

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

DOES HEREBY:

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

DATED this        day of        , 20    .

NAME OF SUBCONTRACTOR

BY (TYPED OR PRINTED NAME)

SIGNATURE

TITLE

ORIGINAL: FILE/Closeout Documents





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

**MBE/WBE/SDVE PROGRESS REPORT**

Remit with **ALL** Progress and Final Payments

(Please check appropriate box) CONSULTANT CONSTRUCTION

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

PROJECT TITLE

PROJECT LOCATION

FIRM

ORIGINAL CONTRACT SUM (Same as Line Item 1. on Form A of Application for Payment)  
\$

TOTAL CONTRACT SUM TO DATE (Same as Line Item 3. on Form A of Application for Payment)  
\$

THE TOTAL MBE/WBE/SDVE PARTICIPATION DOLLAR AMOUNT OF THIS PROJECT AS INDICATED IN THE ORIGINAL CONTRACT: \$

SELECT MBE, WBE, SDVE	ORIGINAL CONTRACT PARTICIPATION AMOUNT	PARTICIPATION AMOUNT PAID-TO-DATE (includes approved contract changes)	CONSULTANT/SUBCONSULTANT OR CONTRACTOR/SUBCONTRACTOR/SUPPLIER COMPANY NAME
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	
<input type="checkbox"/> MBE <input type="checkbox"/> WBE <input type="checkbox"/> SDVE	\$	\$	

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

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

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

At Initial Pay Application fill in the following:

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

For all subsequent Pay Applications fill in the following:

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



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

PROJECT NUMBER

**C1907-01**

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 EMBOSSEY OR BLACK INK RUBBER STAMP SEAL

STATE

COUNTY (OR CITY OF ST. LOUIS)

SUBSCRIBED AND SWORN BEFORE ME, THIS

**USE RUBBER STAMP IN CLEAR AREA BELOW**

DAY OF

YEAR

NOTARY PUBLIC SIGNATURE

MY COMMISSION EXPIRES

NOTARY PUBLIC NAME (TYPED OR PRINTED)

FILE: Closeout Documents

# GENERAL CONDITIONS

## INDEX

ARTICLE:

**1. General Provisions**

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

**2. Owner/Designer Responsibilities**

**3. Contractor Responsibilities**

- 3.1. Acceptable Substitutions
- 3.2. Submittals
- 3.3. As-Built Drawings
- 3.4. Guaranty and Warranties
- 3.5. Operation and Maintenance Manuals
- 3.6. Other Contractor Responsibilities
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- 4.1. Changes in the Work
- 4.2. Changes in Completion Time

**5. Construction and Completion**

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

**6. Bond and Insurance**

- 6.1. Bond
- 6.2. Insurance

**7. Termination or Suspension of Contract**

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

## SECTION 007213 - GENERAL CONDITIONS

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

## ARTICLE 1 – GENERAL PROVISIONS

### ARTICLE 1.1 - DEFINITIONS

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

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

8. **"INCIDENTAL JOB BURDENS"**: Shall mean those expenses relating to the cost of work, incurred either in the home office or on the job-site, which are necessary in the course of doing business but are incidental to the job. Such costs include office supplies and equipment, postage, courier services, telephone expenses including long distance, water and ice and other similar expenses.
9. **"JOINT VENTURE"**: An association of two (2) or more businesses to carry out a single business enterprise for profit for which purpose they combine their property, capital, efforts, skills and knowledge.
10. **"OWNER"**: Whenever the term "Owner" is used, it shall mean the State of Missouri, acting by and through the Office of Administration, Division of Facilities Management, Design and Construction.
11. **"PROJECT"**: Wherever the term "Project" is used, it shall mean the work required to be completed by the construction contract.
12. **"PROJECT MANUAL"**: The "Project Manual" shall consist of Introductory Information, Invitation for Bid, Instructions to Bidders, Bid Documents, Additional Information, Standard Forms, General Conditions, Supplemental General Conditions, General Requirements and Technical Specifications.
13. **"SUBCONTRACTOR"**: Party or parties who contract under, or for the performance of part or this entire Contract between the Owner and Contractor. The subcontract may or may not be direct with the Contractor.
14. **"WORK"**: All supervision, labor, materials, tool, supplies, equipment, and any incidental operations and/or activities required by or reasonably inferable from the Contract Documents necessary to construct the Project and to produce the results intended by the Contract Documents in a safe, expeditious, orderly, and workmanlike manner, and in the best manner known to each respective trade.
15. **"WORKING DAYS"**: are all calendar days except Saturdays, Sundays and the following holidays: New Year's Day, Martin Luther King, Jr. Day, Lincoln Day, Washington's Birthday (observed), Truman Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Columbus Day, Veterans Day (observed), Thanksgiving Day, Christmas Day.

## ARTICLE 1.2 DRAWINGS AND SPECIFICATIONS

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

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

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

forfeit as a penalty to the public body on whose behalf the contract is made or awarded, two thousand five hundred dollars plus one hundred dollars for each employee employed by the contractor or subcontractor, for each calendar day, or portion thereof, such employee is employed without the required training.

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

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

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

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

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

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

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

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

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

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

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

insurance contract, or any other contract pertaining to the project.

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

- A. The Contractor shall hold and save the Owner and its officers, agents, servants and employees harmless from liabilities of any nature or kind, including cost and expenses, for, or on account of, any patented or unpatented invention, process, article or appliance manufactured or used in the performance of this contract, including its use by the Owner, unless otherwise specifically stipulated in the contract documents.
- B. If the Contractor uses any design, device or materials covered by letters, patent or copyright, the Contractor shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device or material. It is mutually agreed and understood, without exception, that the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this contract and shall indemnify the Owner for any cost, expense or damage it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

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

- A. By virtue of statutory authority a preference will be given to Missouri labor and to products of mines, forests and quarries of the state of Missouri when they are found in marketable quantities in the state, and all such materials shall be of the best quality and suitable character that can be obtained at reasonable market prices, all as provided for in Section 8.280, Missouri Revised Statutes and Cumulative Supplements.
- B. Furthermore, pursuant to Section 34.076 Missouri Revised Statutes and Cumulative Supplements, a preference shall be given to those persons doing business as Missouri firms, corporations, or individuals, or which maintain Missouri offices or places of business, when the quality of performance promised is equal or better and the price quoted is the same or less. In addition, in order for a non-domiciliary bidder to be successful, his bid must be that same percentage lower than a domiciliary Missouri bidder's bid, as would be

required for a Missouri bidder to successfully bid in the non-domiciliary state.

- C. In accordance with the Missouri Domestic Products Procurement Act Section 34.350 RSMo and Cumulative Supplements any manufactured goods or commodities used or supplied in the performance of this contract or any subcontract thereto shall be manufactured, assembled or produced in the United States, unless the specified products are not manufactured, assembled or produced in the United States in sufficient quantities to meet the agency's requirements or cannot be manufactured, assembled or produced in the United States within the necessary time in sufficient quantities to meet the contract requirements, or if obtaining the specified products manufactured, assembled or produced in the United States would increase the cost of this contract for purchase of the product by more than ten percent.

#### **ARTICLE 1.8 - COMMUNICATIONS**

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

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

- A. The Owner reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his work with theirs.
- B. The Contractor shall consult the drawings for all other contractors in connection with this work. Any work conflicting with the above shall be brought to the attention of the Owner's Representative before the work is performed. If the Contractor fails to do this, and constructs any



work which interferes with the work of another contractor, the Contractor shall remove any part so conflicting and rebuild same, as directed by the Owner's Representative at no additional cost to the Owner.

- C. Each contractor shall be required to coordinate his work with other contractors so as to afford others reasonable opportunity for execution of their work. No contractor shall delay any other contractor by neglecting to perform contract work at the proper time. If any contractor causes delay to another, they shall be liable directly to that contractor for such delay in addition to any liquidated damages which might be due the Owner.
- D. Should the Contractor or project associated subcontractors refuse to cooperate with the instructions and reasonable requests of other Contractors or other subcontractors in the overall coordinating of the work, the Owner may take such appropriate action and issue directions, as required, to avoid unnecessary and unwarranted delays.
- E. Each Contractor shall be responsible for damage done to Owner's or other Contractor's property by him/her or workers in his employ through their fault or negligence.
- F. Should a Contractor sustain any damage through any act or omission of any other Contractor having a contract with the Owner, the Contractor so damaged shall have no claim or cause of action against the Owner for such damage, but shall have a claim or cause of action against the other Contractor to recover any and all damages sustained by reason of the acts or omissions of such Contractor. The phrase "acts or omissions" as used in this section shall be defined to include, but not be limited to, any unreasonable delay on the part of any such contractors.

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

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

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

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

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

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

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

- A. The Owner shall give all orders and directions contemplated under this contract relative to the execution of the work. During progress of work the Owner will be represented at the project site by the Construction Representative and/or Designer, whose responsibilities are to see that this contract is properly fulfilled.
- B. The Owner shall at all times have access to the work whenever it is in preparation or progress. The Contractors shall provide proper facilities for such access and for inspection and supervision.
- C. All materials and workmanship used in the work shall be subject to the inspection of the Designer and Construction Representative, and any work which is deemed defective shall be removed, rebuilt or made good immediately upon notice.

The cost of such correction shall be borne by the Contractor. Contractor shall not be entitled to an extension of the contract completion date in order to remedy defective work. All rejected materials shall be immediately removed from the site of the work.

- D. If the Contractor fails to proceed at once with the correction of rejected defective materials or workmanship, the Owner may, by separate contract or otherwise, have the defects remedied or rejected. Materials removed from the site and charge the cost of the same against any monies which may be due the Contractor, without prejudice to any other rights or remedies of the Owner.
- E. Failure or neglect on the part of Owner to observe faulty work, or work done which is not in accordance with the drawings and specifications shall not relieve the Contractor from responsibility for correcting such work without additional compensation.
- F. The Owner shall have the right to direct the Contractor to uncover any completed work.
  - 1. If the Contractor fails to adequately notify the Construction Representative and/or Designer of an inspection as required by the Contract Documents, the Contractor shall, upon written request, uncover the work. The Contractor shall bear all costs associated with uncovering and again covering the work exposed.
  - 2. If the Contractor is directed to uncover work, which was not otherwise required by the Contract Documents to be inspected, and the work is found to be defective in any respect, no compensation shall be allowed for this work. If, however, such work is found to meet the requirements of this contract, the actual cost of labor and material necessarily involved in the examination and replacement plus 10% shall be allowed the Contractor.
- G. The Designer shall give all orders and directions contemplated under this contract relative to the scope of the work and shall give the initial interpretation of the contract documents.
- H. The Owner may file a written notice to the Contractor to dismiss immediately any subcontractors, project managers, superintendents, foremen, workers, watchmen or other employees whom the Owner may deem incompetent, careless or a hindrance to proper or timely execution of the work. The Contractor shall comply with such notice as promptly as practicable without detriment to the work or its progress.

- I. If in the Owner's judgment it becomes necessary at any time to accelerate work, when ordered by the Owner in writing, the Contractor shall redirect resources to such work items and execute such portions of the work as may be required to complete the work within the current approved contract schedule.

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

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

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

- A. The Contractor may request use of any article, device, product, material, fixture, form or type of construction which in the judgment of the Owner and Designer is equal in all respects to that named. Standard products of manufacturers other than those specified will be accepted when, prior to the ordering or use thereof, it is proven to the satisfaction of the Owner and Designer that they are equal in design, strength, durability, usefulness and convenience for the purpose intended.
- B. Any changes required in the details and dimensions indicated on the drawings for the substitution of products other than those specified shall be properly made at the expense of the Contractor requesting the substitution or change.
- C. The Contractor shall submit a request for such substitutions in writing to the Owner and Designer within twenty (20) working days after the date of the "Notice to Proceed." Thereafter no consideration will be given to alternate forms of accomplishing the work. This Article does not preclude the Owner from exercising the provisions of Article 4 hereof.
- D. Any request for substitution by the Contractor shall be submitted in accordance with SECTION 002113 - INSTRUCTIONS TO BIDDERS.
- E. When a material has been approved, no change in brand or make will be permitted unless:
  - 1. Written verification is received from the manufacturer stating they cannot make delivery on the date previously agreed, or
  - 2. Material delivered fails to comply with contract requirements.

### ARTICLE 3.2 -- SUBMITTALS

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

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

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

- B. All subcontractors' shop drawings and schedules shall be submitted by the Contractor and shall bear evidence that Contractor has received, reviewed, and approved them. Any shop drawings and schedules submitted without this evidence will be returned to the Contractor for resubmission.
- C. The Contractor shall include with the shop drawing, a letter indicating any and all deviations from the drawings and/or specifications. Failure to notify the Designer of such deviations will be grounds for subsequent rejection of the related work or materials. If, in the opinion of the Designer, the deviations are not acceptable, the Contractor will be required to furnish the item as specified and indicated on the drawings.
- D. The Designer shall check shop drawings and schedules with reasonable promptness and approve them only if they conform to the design concept of the project and comply with the information given in the contract documents. The approval shall not relieve the Contractor from the responsibility to comply with the drawings and specifications, unless the Contractor has called the Designer's attention to the deviation, in writing, at the time of submission and the Designer has knowingly approved thereof. An approval of any such modification will be given only under the following conditions:
1. It is in the best interest of the Owner
  2. It does not increase the contract sum and/or completion time
  3. It does not deviate from the design intent
  4. It is without prejudice to any and all rights under the surety bond.
- E. No extension of time will be granted because of the Contractor's failure to submit shop drawings and schedules in ample time to allow for review,

possible resubmission, and approval. Fabrication of work shall not commence until the Contractor has received approval. The Contractor shall furnish prints of approved shop drawings and schedules to all subcontractors whose work is in any way related to the work under this contract. Only prints bearing this approval will be allowed on the site of construction

- F. The Contractor shall maintain a complete file on-site of approved shop drawings available for use by the Construction Representative.

### ARTICLE 3.3 – AS-BUILT DRAWINGS

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

### ARTICLE 3.4 – GUARANTY AND WARRANTIES

- A. General Guaranty
1. Neither the final certificate of payment nor any provision in the contract documents nor partial use or occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with contract requirements.
  2. The Contractor or surety shall remedy any defects in the work and pay for any damage to property resulting there from which shall appear within a period of one (1) year from the date of substantial completion unless a longer period is otherwise specified or a differing guaranty period has been established in the substantial completion certificate. The Owner will give notice of observed defects with reasonable promptness.
  3. In case of default on the part of the Contractor in fulfilling this part of this contract, the Owner may correct the work or repair the

damage and the cost and expense incurred in such event shall be paid by or recoverable from the Contractor or surety.

4. The work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's guaranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment

**B. Extended Warranty**

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

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

- A. Immediately after equipment submittals are approved and no later than ten (10) working days prior to the substantial completion inspection, the Contractor shall provide to the Designer three (3) copies of operating instructions and service manuals, containing the following:

1. Start-up and Shut-down Procedures: Provide a step-by-step write up of all major equipment. When manufacturer's printed start-up, trouble shooting and shut-down procedures are available; they may be incorporated into the operating manual for reference.
2. Operating Instructions: Written operating instructions shall be included for the efficient and safe operation of all equipment.
3. Equipment List: List of all major equipment as installed shall be prepared to include model number, capacities, flow rate, name place data, shop drawings and air and water balance reports.
4. Service Instructions: Provide the following information for all pieces of equipment.

- a. Recommended spare parts including catalog number and name of local supplier or factory representative.
- b. Belt sizes, types, and lengths.
- c. Wiring diagrams.

5. Manufacturer's Certificate of Warranty as described in Article 3.4.

6. Prior to the final payment, furnish to the Designer three (4) copies of parts catalogs for each piece of equipment furnished by him/her on the project with the components identified by number for replacement ordering.

- B. Submission of operating instructions shall be done in the following manner.

1. Manuals shall be in quadruplicate, and all materials shall be bound into volumes of standard 8½" x 11" hard binders. Large drawings too bulky to be folded into 8½" x 11" shall be separately bound or folded and in envelopes, cross referenced and indexed with the manuals.

2. The manuals shall identify project name, project number, and include the name and address of the Contractor, subcontractors and manufacturers who were involved with the activity described in that particular manual.

3. Internally subdivide the binder contents with permanent page dividers, logically organized with tab titles clearly printed under reinforced laminated plastic tabs.

4. Contents: Prepare a Table of Contents for each volume, with each product or system description identified.

**ARTICLE 3.6 – OTHER CONTRACTOR RESPONSIBILITIES**

- A. The Contractor shall keep on site, during progress of the work, a competent superintendent satisfactory to the Construction Representative. The superintendent shall represent the Contractor and all agreements made by the superintendent shall be binding. The superintendent shall carefully study and compare all drawings, specifications and other instructions and shall promptly notify the Construction Representative and Designer, in writing, any error, inconsistency or omission which may be discovered. The superintendent shall coordinate all work on the project. Any change of the superintendent shall be approved by the Construction Representative.
- B. Contractor shall, at all times, enforce strict discipline and good order among his employees,

and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him/her.

- C. The Contractor shall supply sufficient labor, material, plant and equipment and pay when due any laborer, subcontractor or supplier for supplies furnished and otherwise prosecute the work with diligence to prevent work stoppage and insure completion thereof within the time specified.
- D. The Contractor and each of his subcontractors shall submit to the Construction Representative, through the Designer such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed under this contract.
- E. The Contractor, subcontractors, and material suppliers shall upon written request, give the Owner access to all time cards, material invoices, payrolls, estimates, profit and loss statements, and all other direct or indirect costs related to this work.
- F. The Contractor shall be responsible for laying out all contract work such as layout of architectural, structural, mechanical and electrical work, which shall be coordinated with layouts of subcontractors for general construction work. The Contractor is also responsible for unloading, uncrating and handling of all materials and equipment to be erected or placed by him/her, whether furnished by Contractor or others. No extra charges or compensation will be allowed as a result of failure to verify dimensions before ordering materials or fabricating items.
- G. The Contractor must notify the Construction Representative at least one working day before placing concrete or burying underground utilities, pipelines, etc.
- H. Contractors shall prearrange time with the Construction Representative for the interruption of any facility operation. Unless otherwise specified in these documents, all connections, alterations or relocations as well as all other portions of the work will be performed during normal working hours.
- I. The Contractor shall coordinate all work so there will not be prolonged interruptions of existing equipment operation. Any existing plumbing, heating, ventilating, air conditioning or electrical disconnections necessary for the project, which affect portions of this construction or building or any other building must be scheduled with the Construction Representative to minimize or avoid any disruption of facility operations. In no case,

unless previously approved in writing by the Construction Representative, shall utilities be left disconnected at the end of a work day or over a weekend. Any interruption of utilities either intentionally or accidentally shall not relieve the Contractor responsible for the interruption from the responsibility to repair and restore the utility to normal service. Repairs and restoration shall be made before the workers responsible for the repair and restoration leave the job.

- J. Contractors shall limit operations and storage of materials to the area within the project, except as necessary to connect to existing utilities, and shall not encroach on neighboring property. The Contractor shall be responsible for repair of their damage to property on or off the project site occurring during construction of project. All such repairs shall be made to the satisfaction of the property owner.
- K. Unless otherwise permitted, all materials shall be new and both workmanship and materials shall be of the best quality.
- L. Unless otherwise provided and stipulated within these specifications, the Contractor shall furnish, construct, and/or install and pay for materials, devices, mechanisms, equipment, all necessary personnel, utilities including, but not limited to water, heat, light and electric power, transportation services, applicable taxes of every nature, and all other facilities necessary for the proper execution and completion of the work.
- M. Contractor shall carefully examine the plans and drawings and shall be responsible for the proper fitting of his material, equipment and apparatus into the building.
- N. The Contractor or subcontractors shall not overload, or permit others to overload, any part of any structure during the performance of this contract.
- O. All temporary shoring, bracing, etc., required for the removal of existing work and/or for the installation of new work shall be included in this contract. The Contractor shall make good, at no cost to the Owner, any damage caused by improper support or failure of shoring in any respect. Each Contractor shall be responsible for shoring required to protect his work or adjacent property and improvements of Owner and shall be responsible for shoring or for giving written notice to adjacent property owners. Shoring shall be removed only after completion of permanent supports.

- P. The Contractor shall provide at the proper time such material as is required for support of the work. If openings are required, whether shown on drawings or not, the Contractor shall see that they are properly constructed.
- Q. During the performance of work the Contractor shall be responsible for providing and maintaining warning signs, lights, signal devices, barricades, guard rails, fences and other devices appropriately located on site which will give proper and understandable warning to all persons of danger of entry onto land, structure or equipment.
- R. The Contractor shall be responsible for protection, including weather protection, and proper maintenance of all equipment and materials.
- S. The Contractor shall be responsible for care of the finished work and shall protect same from damage or defacement until substantial completion by the Owner. If the work is damaged by any cause, the Contractor shall immediately begin to make repairs in accordance with the drawings and specifications. Contractor shall be liable for all damage or loss unless attributable to the acts or omissions of the Owner or Designer. Any claim for reimbursement shall be submitted in accordance with Article 4. After substantial completion the Contractor will only be responsible for damage resulting from acts or omissions of the Contractor or subcontractors through final warranty.
- T. In the event the Contractor encounters an unforeseen hazardous material, the Contractor shall immediately stop work in the area affected and report the condition to the Owner and Designer in writing. The Contractor shall not be required, pursuant to Article 4, to perform, any work relating to hazardous materials.
- U. In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 4.
- V. Before commencing work, Contractors shall confer with the Construction Representative and facility representative and review any facility rules and regulations which may affect the conduct of the work.
- W. Project signs will only be erected on major projects and only as described in the specifications. If no sign is specified, none shall be erected.

## **ARTICLE 3.7 -- SUBCONTRACTS**

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

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

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

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

before such changes become effective and shall be determined, through submission of a request for proposal, as follows:

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

D. Overhead and Profit on Contract Changes shall be applied as follows:

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

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

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

compensation for such emergency work in writing to the Owner's Representative.

#### **ARTICLE 4.2 – CHANGES IN COMPLETION TIME**

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

the Contractor of any claim. Requests for extensions of time shall be for working days only.

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

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

- A. Upon receipt of the "Intent to Award" letter, the Contractor must submit the following properly executed instruments to the Owner:
    - 1. Contract;
    - 2. Performance/payment bond as described in Article 6.1;
    - 3. Certificates of Insurance, or the actual policies themselves, showing that the Contractor has obtained the insurance coverage required by Article 6.2.
    - 4. Written Affirmative Action Plans as required in Article 1.4.
- Above referenced items must be received by the Owner within ten (10) working days after the effective date of the contract. If not received, the Owner may treat the failure to timely submit them as a refusal by the Contractor to accept a contract for this work and may retain as liquidated damages the Contractor's bid bond, cashier's check or certified check as provided in the Instructions to Bidders. Upon receipt the Owner will issue a "Notice to Proceed" with the work to the Contractor.
- B. Within the time frame noted in Section 013200 - Schedules, following receipt of the "Notice to Proceed", the Contractor shall submit to the Owner a progress schedule and schedule of values, showing activities through the end of the contract period. Should the Contractor not receive written notification from the Owner of the disapproval of the schedule of values within fifteen (15) working days, the Contractor may consider it approved for purpose of determining when the first monthly Application and Certification for Payment may be submitted.
  - C. The Contractor may commence work upon receipt of the Division of Facilities Management, Design and Construction's "Notice to Proceed" letter. Contractor shall prosecute the work with faithfulness and energy, and shall complete the entire work on or before the completion time stated in the contract documents or pay to the Owner the damages resulting from the failure to timely complete the work as set out within Article 5.4.



## ARTICLE 5.2 -- PROJECT CONSTRUCTION

- A. Each Contractor shall submit for the Owner's approval, in reproducible form, a progress schedule showing the rate of progress and the order of the work proposed to carry on various phases of the project. The schedule shall be in conformance with the requirements outlined in Section 013200 – Schedules.
- B. Contractor shall employ and supply a sufficient force of workers, material, and equipment and shall pay when due, any worker, subcontractor or supplier and otherwise prosecute the work with such diligence so as to maintain the rate of progress indicated on the progress schedule, prevent work stoppage, and insure completion of the project within the time specified.

## ARTICLE 5.3 -- PROJECT COMPLETION

- A. Substantial Completion. A Project is substantially complete when construction is essentially complete and work items remaining to be completed can be done without interfering with the Owner's ability to use the Project for its intended purpose.
  1. Once the Contractor has reached what they believe is Substantial Completion, the Contractor shall notify the Designer and the Construction Representative of the following:
    - a. That work is essentially complete with the exception of certain listed work items. The list shall be referred to as the "Contractor's Punch."
    - b. That all Operation and Maintenance Manuals have been assembled and submitted in accordance with Article 3.5A.
    - c. That the Work is ready for inspection by the Designer and Construction Representative. The Owner shall be entitled to a minimum of ten working days notice before the inspection shall be performed.
  2. If the work is acceptable, the Owner shall issue a Certificate of Substantial Completion, which shall set forth the responsibilities of the Owner and the Contractor for utilities, security, maintenance, damage to the work and risk of loss. The Certificate shall also identify those remaining items of work to be performed by the Contractor. All such work items shall be complete within 30 working days of the date of the Certificate, unless the Certificate specifies a different time. If the

Contractor shall be required to perform tests that must be delayed due to climatic conditions, it is understood that such tests and affected equipment will be identified on the Certificate and shall be accomplished by the Contractor at the earliest possible date. Performance of the tests may not be required before Substantial Completion can be issued. The date of the issuance of the Certificate of Substantial Completion shall determine whether or not the work was completed within the contract time and whether or not Liquidated Damages are due.

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

approved estimate to complete the outstanding items. Upon completion of the outstanding items, when a final cost has been established, any monies remaining shall be paid to the Contractor. Failure to complete items of work does not relieve the Contractor from the obligation to complete the administrative requirements of the contract, such as the provisions of Article 5.3 FAILURE TO COMPLETE ALL ITEMS OF WORK UNDER THE CONTRACT SHALL BE CONSIDERED A DEFAULT AND BE GROUNDS FOR CONTRACT TERMINATION AND DEBARMENT.

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

#### **ARTICLE 5.4 -- PAYMENT TO CONTRACTOR**

- A. Payments on account of this contract will be made monthly in proportion to the work which has been completed. Request for payment must be submitted on the Owner's forms. No other pay request will be processed. Supporting breakdowns must be in the same format as Owner's forms and must provide the same level of detail. The Designer will, within 5 working days from receipt of the contractor's request for payment either issue a Certificate for Payment to the Owner, for such amount as the Designer determines is properly due, or notify the Contractor in writing of reasons for withholding a Certificate. The Owner shall make payment within 30 calendar days after the

"Application and Certification for Payment" has been received and certified by the Designer. The following items are to be attached to the contractor's pay request:

1. Updated construction schedule
  2. Certified payrolls consisting of name, occupation and craft, number of hours worked and actual wages paid for each individual employee, of the Contractor and all subcontractors working on the project
- B. The Owner shall retain 5 percent of the amount of each such payment application, except as allowed by Article 5.4, until final completion and acceptance of all work covered by this contract.
- C. Each payment made to Contractor shall be on account of the total amount payable to Contractor and all material and work covered by paid partial payment shall thereupon become the sole property of Owner. This provision shall not be construed as relieving Contractor from sole responsibility for care and protection of materials and work upon which payments have been made or restoration of any damaged work or as a waiver of the right of Owner to require fulfillment of all terms of this contract.
- D. Materials delivered to the work site and not incorporated in the work will be allowed in the Application and Certification for Payment on the basis of one hundred (100%) percent of value, subject to the 5% retainage providing that they are suitably stored on the site or in an approved warehouse in accordance with the following requirements:
1. Material has previously been approved through submittal and acceptance of shop drawings conforming to requirements of Article 3.2 of General Conditions.
  2. Delivery is made in accordance with the time frame on the approved schedule.
  3. Materials, equipment, etc., are properly stored and protected from damage and deterioration and remain so - if not, previously approved amounts will be deleted from subsequent pay applications.
  4. The payment request is accompanied by a breakdown identifying the material equipment, etc. in sufficient detail to establish quantity and value.
- E. The Contractor shall be allowed to include in the Application and Certification for Payment, one hundred (100%) of the value, subject to retainage,

of major equipment and material stored off the site if all of the following conditions are met:

1. The request for consideration of payment for materials stored off site is made at least 15 working days prior to submittal of the Application for Payment including such material. Only materials inspected will be considered for inclusion on Application for Payment requests.
  2. Materials stored in one location off site are valued in excess of \$25,000.
  3. That a Certificate of Insurance is provided indicating adequate protection from loss, theft conversion or damage for materials stored off site. This Certificate shall show the State of Missouri as an additional insured for this loss.
  4. The materials are stored in a facility approved and inspected, by the Construction Representative.
  5. Contractor shall be responsible for, Owner costs to inspect out of state facilities, and any delays in the completion of the work caused by damage to the material or for any other failure of the Contractor to have access to this material for the execution of the work.
- F. The Owner shall determine the amount, quality and acceptability of the work and materials which are to be paid for under this contract. In the event any questions shall arise between the parties, relative to this contract or specifications, determination or decision of the Owner or the Construction Representative and the Designer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this contract affected in any manner or to any extent by such question.
- G. Payments Withheld: The Owner may withhold or nullify in whole or part any certificate to such extent as may be necessary to protect the Owner from loss on account of:
1. Defective work not remedied. When a notice of noncompliance is issued on an item or items, corrective action shall be undertaken immediately. Until corrective action is completed, no monies will be paid and no additional time will be allowed for the item or items. The cost of corrective action(s) shall be borne by the Contractor.
  2. A reasonable doubt that this contract can be completed for the unpaid balance.
3. Failure of the Contractor to update as-built drawings monthly for review by the Construction Representative.
  4. Failure of the Contractor to update the construction schedule.
- When the Construction Representative is satisfied the Contractor has remedied above deficiencies, payment shall be released.
- H. Final Payment: Upon receipt of written notice from the Contractor to the Designer and Project Representative that the work is ready for final inspection and acceptance, the Designer and Project Representative, with the Contractor, shall promptly make such inspection. If the work is acceptable and the contract fully performed, the Construction Representative shall complete a final acceptance report and the Contractor will be directed to submit a final Application and Certification for Payment. If the Owner approves the same, the entire balance shall be due and payable, with the exception of deductions as provided for under Article 5.4.
1. Where the specifications provide for the performance by the Contractor of (certain tests for the purpose of balancing and checking the air conditioning and heating equipment and the Contractor shall have furnished and installed all such equipment in accordance with the specifications, but said test cannot then be made because of climatic conditions, such test shall may be considered as required under the provisions of the specifications, Section 013300 and this contract may be substantial Full payment will not be made until the tests have been made and the equipment and system is finally accepted. If the tests are not completed when scheduled, the Owner may deduct 150% of the value of the tests from the final payment.
  2. The final payment shall not become due until the Contractor delivers to the Construction Representative:
    - a) A complete file of releases, on the standard form included in the contract documents as "Final Receipt of Payment and Release Form", from subcontractors and material suppliers evidencing payment in full for services, equipment and materials, as the case may require, if the Owner approves, or a consent from the Surety to final payment accepting liability for any unpaid amounts.

- b) An Affidavit of Compliance with Prevailing Wage Law, in the form as included in this contract specifications, properly executed by each subcontractor, and the Contractor
  - c) Certified copies of all payrolls
  - d) As-built drawings
3. If any claim remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such a claim including all costs and a reasonable attorney's fee.
  4. Missouri statute requires prompt payment from the Owner to the Contractor within thirty calendar days and from the Contractor to his subcontractors within fifteen calendar days. Failure to make payments within the required time frame entitles the receiving party to charge interest at the rate of one and one half percent per month calculated from the expiration of the statutory time period until paid.
  5. The value of all unused unit price allowances and/or 150% of the value of the outstanding work items, and/or liquidated damages may be deducted from the final pay request without executing a Contract Change. Any unit price items which exceed the number of units in the contract may be added by Contract Change.

**ARTICLE 6 -- INSURANCE AND BONDS**

**ARTICLE 6.1 -- BOND**

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

**ARTICLE 6.2 – INSURANCE**

- A. The successful Contractor shall procure and maintain for the duration of the contract issued a policy or policies of insurance for the protection of both the Contractor and the Owner and their respective officers, officials, agents, consultants and employees. The Owner requires certification of insurance coverage from the Contractor prior to commencing work.
- B. Minimum Scope and Extent of Coverage
  1. General Liability
 

Commercial General Liability, ISO coverage form number or equivalent CG 00 01 ("occurrence" basis), or I-SO coverage form number CG 00 02, or ISO equivalent.

If ISO equivalent or manuscript general liability coverage forms are used, minimum coverage will be as follows: Premises/Operations; Independent Contractors; Products/Completed Operations; personal Injury; Broad Form Property Damage including Completed Operations; Broad Form Contractual Liability Coverage to include Contractor's obligations under Article 1.11 Indemnification and any other Special Hazards required by the work of the contract.
  2. Automobile Liability
 

Business Automobile Liability Insurance, ISO Coverage form number or equivalent CA 00 01 covering automobile liability, code 1 "ANY AUTO".
  3. Workers' Compensation and Employer's Liability
 

Statutory Workers' Compensation Insurance for Missouri and standard Employer's Liability Insurance, or the authorization to self-insure for such liability from the Missouri Division of Workers' Compensation.
  4. Builder's Risk or Installation Floater Insurance
 

Insurance upon the work and all materials, equipment, supplies, temporary structures and similar items which may be incident to the performance of the work and located at or adjacent to the site, against loss or damage from fire and such other casualties as are included in extended coverage in broad "All Risk" form, including coverage for Flood and Earthquake, in an amount not less than the replacement cost of the work or this contract price, whichever is greater, with loss payable

to Contractor and Owner as their respective interests may appear.

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

C. Minimum Limits of Insurance

1. General Liability

Contractor

\$2,000,000 combined single limit per occurrence for bodily injury, personal injury, and property damage

\$2,000,000 annual aggregate

2. Automobile Liability

\$2,000,000 combined single limit per occurrence for bodily injury and property damage

3. Workers' Compensation and Employers Liability

Workers' Compensation limits as required by applicable State Statutes (generally unlimited) and minimum of \$1,000,000 limit per accident for Employer's Liability.

General Liability and Automobile Liability insurance may be arranged under individual policies for the full limits required or by a combination of underlying policies with the balance provided by a form-following Excess or Umbrella Liability policy.

D. Deductibles and Self-Insured Retentions

All deductibles, co-payment clauses, and self-insured retentions must be declared to and approved by the Owner. The Owner reserves the right to request the reduction or elimination of unacceptable deductibles or self-insured retentions,

as they would apply to the Owner, and their respective officers, officials, agents, consultants and employees. Alternatively, the Owner may request Contractor to procure a bond guaranteeing payment of losses and related investigations, claims administration, and defense expenses.

E. Other Insurance Provisions and Requirements

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

1. General Liability

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

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

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

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

2. Automobile Insurance

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

performance of services or the delivery of goods called for by the Contract.

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

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

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

3. Workers' Compensation/Employer's Liability

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

4. All Coverages

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

F. Insurer Qualifications and Acceptability

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

G. Verification of Insurance Coverage

Prior to Owner issuing a Notice to Proceed, the Contractor shall furnish the Owner with Certificate(s) of Insurance and with any applicable original endorsements evidencing the required insurance coverage. The insurance certificates and endorsements are to be signed by a person authorized by that insurer to bind coverage on its

behalf. All certificates and endorsements received by the Owner are subject to review and approval by the Owner. The Owner reserves the right to require certified copies of all required policies at any time. If the scope of this contract will exceed one (1) year - or, if any of Contractor's applicable insurance coverage expires prior to completion of the work or services required under this contract - the Contractor will provide a renewal or replacement certificate before continuing work or services hereunder. If the Contractor fails to provide documentation of required insurance coverage, the Owner may issue a stop work order and no additional contract completion time and/or compensation shall be granted as a result thereof.

## ARTICLE 7 – SUSPENSION OR TERMINATION OF CONTRACT

### ARTICLE 7.1 - FOR SITE CONDITIONS

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

### ARTICLE 7.2 - FOR CAUSE

A. Termination or Suspension for Cause:

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

2. In the event the Owner suspends Contractor's right to proceed with the work or terminates the contract, the Owner may demand that the Contractor's surety take over and complete the work on this contract, after the surety submits a written proposal to the Owner and receives written approval and upon the surety's failure or refusal to do so within ten (10) consecutive calendar days after demand therefore, the Owner may take over the work and prosecute the same to completion by bid or negotiated contract, or the Owner may elect to take possession of and utilize in completing the work such materials, supplies, appliances and plant as may be on the site of the work, and all subcontractors, if the Owner elects, shall be bound to perform their contracts.
- B. The Contractor and its surety shall be and remain liable to the Owner for any excess cost or damages occasioned to the Owner as a result of the actions above set forth.
- C. The Contractor in the event of such suspension or termination shall not be entitled to receive any further payments under this contract until the work is wholly finished. Then if the unpaid balance under this contract shall exceed all expenses of the Owner as certified by the Director, such excess shall be paid to the Contractor; but, if such expenses shall exceed the unpaid balance as certified by the Director, the Contractor and their surety shall be liable for and shall pay the difference and any damages to the Owner.
- D. In exercising Owner's right to secure completion of the work under any of the provisions hereof, the Director shall have the right to exercise Owner's sole discretion as to the manner, methods and reasonableness of costs of completing the work.
- E. The rights of the Owner to suspend or terminate as herein provided shall be cumulative and not exclusive and shall be in addition to any other remedy provided by law.
- F. The Contractor in the event of such suspension or termination may be declared ineligible for Owner contracts for a minimal period of twelve (12) months. Further, no contract will be awarded to any Contractor who lists in their bid form any subcontractor whose prior performance has contributed, as determined by the Owner, to a breach of a contract. In order to be considered for state-awarded contracts after this period, the Contractor/subcontractor will be required to forward acceptance reports to the Owner regarding successful completion of non-state projects during the intervening twelve (12) months from the date

of default. No contracts will be awarded to a subcontractor/Contractor until the ability to perform responsibly in the private sector has been proven to the Owner.

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

- A. The Owner may terminate or suspend the Contract or any portion of the Work without cause at any time, and at the Owner's convenience. Notification of a termination or suspension shall be in writing and shall be given to the Contractor and their surety. If the Contract is suspended, the notice will contain the anticipated duration of the suspension or the conditions under which work will be permitted to resume. If appropriate, the Contractor will be requested to demobilize and re-mobilize and will be reimbursed time and costs associated with the suspension.
- B. Upon receipt of notification, the Contractor shall:
  1. Cease operations when directed.
  2. Take actions to protect the work and any stored materials.
  3. Place no further subcontracts or orders for material, supplies, services or facilities except as may be necessary to complete the portion of the Contract that has not been terminated. No claim for payment of materials or supplies ordered after the termination date shall be considered.
  4. Terminate all existing subcontracts, rentals, material, and equipment orders.
  5. Settle all outstanding liabilities arising from termination with subcontractors and suppliers.
  6. Transfer title and deliver to the Owner, work in progress, completed work, supplies and other material produced or acquire for the work terminated, and completed or partially completed plans, drawings information and other property that, if the Contract had been completed, would be required to be furnished to the Owner.
- C. For termination without cause and at the Owner's convenience, in addition to payment for work completed prior to date of termination, the Contractor may be entitled to payment of other documented costs directly associated with the early termination of the contract. Payment for anticipated profit and unapplied overhead will not be allowed.

**SECTION 007300 - SUPPLEMENTARY CONDITIONS**

**1.0 GENERAL:**

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

**2.0 CONTACTS:**

Designer: Tom Hancock, PE  
Allgeier, Martin and Associates, Inc.  
7231 East 24th Street  
Joplin, Missouri 65804-3485  
Telephone: 417-862-3355  
Email: [Tom.Hancock@amce.com](mailto:Tom.Hancock@amce.com)

Construction Representative: Don Wagner  
Division of Facilities Management, Design and Construction  
301 West High Street Room 730  
Jefferson City  
Telephone: 417-895-5001  
Email: [Don.Wagner@oa.mo.gov](mailto:Don.Wagner@oa.mo.gov)

Project Manager: Eric Hibdon, PE  
Division of Facilities Management, Design and Construction  
301 West High Street, Room 730  
Jefferson City, Missouri 65101  
Telephone: 573-522-0322  
Email: [Eric.Hibdon@oa.mo.gov](mailto:Eric.Hibdon@oa.mo.gov)

Contract Specialist: Mandy Roberson  
Division of Facilities Management, Design and Construction  
301 West High Street, Room 730  
Jefferson City, Missouri 65101  
Telephone: 573-522-0074  
Email: [Mandy.Roberson@oa.mo.gov](mailto:Mandy.Roberson@oa.mo.gov)

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

**4.0 FURNISHING CONSTRUCTION DOCUMENTS:**

- A. The Owner will furnish the Contractor with approximately 3 complete sets of drawings and specifications at no charge.
- B. The Owner will furnish the Contractor with approximately 3 sets of explanatory or change drawings at no charge.
- C. The Contractor may make copies of the documents as needed with no additional cost to the Owner.

**5.0 SAFETY REQUIREMENTS**

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



**SECTION 007333 - SUPPLEMENTARY GENERAL CONDITIONS  
FOR FEDERALLY FUNDED/ASSISTED CONSTRUCTION PROJECTS**

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

**1.0 Notice of Federal Funding**

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

**2.0 Definitions**

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

**3.0 Conflicting Terms or Conditions**

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

**4.0 No Obligation by Federal Government**

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

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

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

**6.0 Compliance with Civil Rights Provisions**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

<b>Time-tables</b>	<b>Goals for minority participation for each trade</b>	<b>Goals for female participation in each trade</b>
108	2.3	6.9%

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

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

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

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

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

(1) As used in these specifications:

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

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

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

d. "Minority" includes:

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

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

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

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

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

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

(4) The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in

geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the FEDERAL REGISTER in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

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

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

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

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

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

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

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

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by

the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(14) The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each



employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

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

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

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

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

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

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

more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis–Bacon poster (WH–1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

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

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis–Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

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

(3) Payrolls and basic records.

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

(ii)(A) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 C.F.R. 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available

for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime Contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime Contractor to require a subcontractor to provide addresses and social security numbers to the prime Contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

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

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

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

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

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

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

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

(4) Apprentices and trainees—

- (i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (ii) Trainees. Except as provided in 29 C.F.R. 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 C.F.R. pt. 30.
- (5) Compliance with Copeland Act requirements. The Contractor shall comply with the requirements of 29 C.F.R. pt. 3, which are incorporated by reference in this contract.
- (6) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 C.F.R. 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal Agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 C.F.R. 5.5.
- (7) Contract termination: debarment. A breach of the contract clauses in 29 C.F.R. 5.5 may be grounds for termination of the contract, and for debarment as a Contractor and a subcontractor as provided in 29 C.F.R. 5.12.
- (8) Compliance with Davis–Bacon and Related Act requirements. All rulings and interpretations of the Davis–Bacon and Related Acts contained in 29 C.F.R. pts. 1, 3, and 5 are herein incorporated by reference in this contract.
- (9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 C.F.R. pts. 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.
- (10) Certification of eligibility.
  - (i) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis–Bacon Act or 29 C.F.R. 5.12(a)(1).
  - (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis–Bacon Act or 29 C.F.R. 5.12(a)(1).
  - (iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. § 1001.

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

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

- (3) A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a Contractor and subcontractor as provided in 29 C.F.R. 5.12.

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

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

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

- (1) A contract award (see 2 C.F.R. 180.220) must not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 C.F.R. 180 that implement Executive Orders 12549 (3 C.F.R. pt. 1986 Comp., p. 189) and 12689 (3 C.F.R. pt. 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.
- (2) The contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. 180.995) or its affiliates (defined at 2 C.F.R. 180.905) are excluded (defined at 2 C.F.R. 180.940) or disqualified (defined at 2 C.F.R. 180.935).

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

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

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

#### **CERTIFICATION REGARDING LOBBYING**

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

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



(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

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

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

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

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

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

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

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

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

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

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 C.F.R. pt. 1910 with the same force and effect as if given in full text. The employer must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The employer retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (20 C.F.R.

pt. 1910). The employer must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

## **20.0 Rights to Inventions**

Contracts or agreements that include the performance of experimental, developmental, or research work must provide for the rights of the Federal Government and the Owner in any resulting invention as established by 37 C.F.R. pt. 401, Rights to Inventions Made by Non-profit Organizations and Small Business Firms under Government Grants, Contracts, and Cooperative Agreements. This contract incorporates by reference the patent and inventions rights as specified within 37 C.F.R. 401.14. Contractor must include this requirement in all sub-tier contracts involving experimental, developmental, or research work.

## **21.0 Energy Conservation**

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

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

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

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

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

## **24.0 Veteran's Preference**

In the employment of labor (excluding executive, administrative, and supervisory positions), the Contractor and all sub-tier contractors must give preference to covered veterans as defined within Title 49 United

States Code Section 47112. Covered veterans include Vietnam-era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns (as defined by 15 U.S.C. § 632) owned and controlled by disabled veterans. This preference only applies when there are covered veterans readily available and qualified to perform the work to which the employment relates.

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

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

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

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

### **27.0 Seismic Safety**

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

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

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

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

(1) all iron and steel used in the project are produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;

(2) all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation; and

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

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

#### *Waivers*

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

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

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

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

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

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

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

## *Definitions*

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

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

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

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

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

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

(1) Procure or obtain;

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

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

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

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

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

**SECTION 007334 - TERMS AND CONDITIONS FOR CONTRACTOR**  
**RECEIPT OF FEDERAL ARPA SFRF FUNDS**

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

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

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

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

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

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

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

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

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

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

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

iv. Generally applicable federal environmental laws and regulations.

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

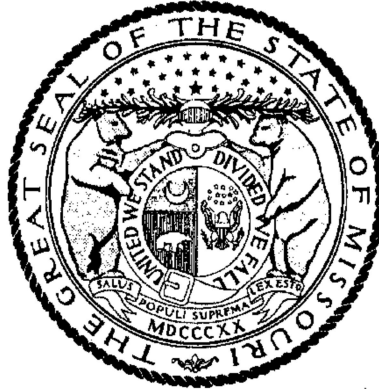
telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. For purposes of this prohibition, “covered telecommunications equipment or services” has the meaning as set forth at Sec. 889(f)(3) of Pub. L. No. 115-232.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

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

# Missouri

## Division of Labor Standards

### WAGE AND HOUR SECTION



MICHAEL L. PARSON, Governor

# Annual Wage Order No. 30

Section 116  
**WEBSTER 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	\$23.77*
Boilermaker	\$23.77*
Bricklayer	\$51.67
Carpenter	\$46.72
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	\$23.77*
Plasterer	
Communications Technician	\$23.77*
Electrician (Inside Wireman)	\$23.77*
Electrician Outside Lineman	\$23.77*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	\$23.77*
Glazier	\$23.77*
Ironworker	\$23.77*
Laborer	\$41.49
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	\$23.77*
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	\$23.77*
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	\$23.77*
Plumber	\$50.33
Pipe Fitter	
Roofer	\$23.77*
Sheet Metal Worker	\$23.77*
Sprinkler Fitter	\$23.77*
Truck Driver	\$23.77*
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  
WEBSTER County

Section 116

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	\$23.77*
Millwright	
Pile Driver	
Electrician (Outside Lineman)	\$23.77*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	\$43.28
General Laborer	
Skilled Laborer	
Operating Engineer	\$50.81
Group I	
Group II	
Group III	
Group IV	
Truck Driver	\$23.77*
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 wastewater treatment system improvements for the Ozark Correctional Center.
  - 1. Project Location: 929 Honor Camp Lane, Fordland, Missouri 65652
  - 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 January 6, 2023 were prepared for the Project by Allgeier, Martin and Associates, Inc., Inc., 7231 East 24<sup>th</sup> Street, Joplin, Missouri 65804-3485.
- C. The Work includes replacement of existing water mains, rehabilitation of existing sewer lines and manholes, wastewater treatment facility outfall sewer improvements, waste sludge dewatering system improvements, and chemical phosphorus removal improvements.
  - 1. The Work includes replacement of approximately 2,605 linear feet of existing water main, renovation of approximately 2,865 linear feet of gravity sewer and 17 manholes; a new outfall sewer and discharge structure; a geotextile sludge dewatering system including flocculant mixing/injection system, mixing manifold, and solid waste roll-off containers; sludge holding tank and dewatering building modifications; submersible sludge transfer pumping system; chemical phosphorus removal system modifications; precast and cast-in-place concrete structures, PVC and ductile iron piping systems, electrical system modifications, and related appurtenances.
- D. The Work will be constructed under a single prime contract.

#### **1.3 WORK UNDER OTHER CONTRACTS**

- A. Separate Contract: No work under separate contract is contemplated, although the Owner reserves the right to do Work within the project site.

#### **1.4 FUTURE WORK**

- A. Future Contract: No work under future contract is contemplated.

#### **1.5 WORK SEQUENCE**

- A. Work sequence shall be determined by the Contractor subject to the Owner's need to continue operations of existing wastewater treatment facilities. See Section 011423 – Work Restrictions.

- B. Where Work is on or adjacent to existing facilities, exercise caution and schedule operations to ensure that functions of operating facilities will not be endangered. Shutdown of Owner's operating facilities to perform Work shall be held to a minimum length of time and shall be coordinated with Owner who shall have control over the timing and schedules of such shutdowns.

## **1.6 CONTRACTOR USE OF PREMISES**

- A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the Owner's right to perform work or to retain other contractors on portions of the Project.
- B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
  - 1. Owner Occupancy: Allow for Owner use of the site.
  - 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.

## **1.7 CONSTRUCTION SURVEYS**

- A. Survey control and reference points which, in the Engineer's opinion, are necessary to enable Contractor to perform the Work are indicated on the drawings. Contractor shall locate and protect survey control and reference points and be responsible for laying out the Work. Elevations shown on the drawings and referenced in the specifications are based on the benchmarks shown.
- B. Contractor shall perform all construction staking and surveying he may find necessary or convenient to enable construction of each element of the Work in the correct position to correspond with the information shown on the drawings. All construction staking shall be done under the direct supervision of a Registered Land Surveyor with the State of Missouri.
- C. Contractor shall be responsible for the preservation of all benchmarks and control monuments, property corners, and public corners within, or adjacent to, the project limits. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by a Registered Land Surveyor with the State of Missouri.

## **1.8 INFORMATION AVAILABLE TO BIDDERS**

- A. A hazardous materials investigation has been performed for existing sludge dewatering building. This investigation did not identify the presence of any asbestos containing materials or lead-based paint. A copy of the Hazardous Materials Investigation Report is included in Appendix A to this Project Manual.

- B. An inspection of existing sanitary sewer manholes at the site has been performed. Inspection logs and photographs of the existing manholes that identify conditions and materials of construction are included in Appendix C.

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

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

**END OF SECTION 011000**

SECTION 011423  
WORK RESTRICTIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes requirements pertaining to existing site conditions and shutdown of existing potable water mains, sanitary sewers, and wastewater treatment process units in order to perform Work shown and specified.
  - 1. Existing site conditions are indicated on the Drawings. This depiction notes the locations of existing potable water, sanitary sewer, and service lines based the best information available. Contractor should assume there may be some variance and/or depth of the existing water, sewer, and service lines.
  - 2. Contractor shall locate all underground installations, including service connections, in advance of excavating or trenching, by providing and utilizing appropriate utility locating equipment, prospecting, or other appropriate locating techniques.
  - 3. Contractor shall verify horizontal and vertical location of existing underground utilities where interference or conflicts could affect proposed pipeline alignment or grade. Modifications to avoid unknown or mislocated facilities should be expected.
  
- B. Related Work:
  - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Sections apply to this Section.

1.02 DEFINITIONS

- A. Shutdown: A shutdown is defined as a portion of the normal operation of a pipeline or process unit that has to be taken out of service in order to perform the specified Work.

1.03 SUBMITTALS

- A. Shutdown Schedule: Contractor shall submit a detailed plan and time schedule for each treatment process unit shutdown. This plan and time schedule shall be coordinated with the construction schedule specified in Section 013200 and shall comply with the restrictions and constraints specified in this Section.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Water and sewer service to facility buildings shall remain in continuous satisfactory operation during the entire construction period. Any shutdowns shall be scheduled and coordinated with facility management and kept to an absolute minimum time frame.
- B. New water mains shall be tested and disinfected immediately following installation. Upon satisfactory completion of testing and disinfection, existing water service lines shall be connected to the new water mains.
- C. All sewer lines designated for renovation shall be cleaned and inspected by closed circuit television (CCTV) to identify any condition that may prevent proper installation of cured-in-place pipe (CIPP) liner. All necessary open excavation point repairs shall be made prior to CIPP liner installation.

- D. All manholes designated for renovation shall receive a new frame and cover and flexible chimney sealant. The finished rim elevation shall be adjusted as necessary to match existing finished grade.
- E. Contractor shall utilize methods, techniques, and equipment necessary to maintain unrestricted flow of wastewater during construction. Wastewater shall not be allowed to overflow from manholes or open excavations onto the ground surface. All wastewater shall be directed to downstream sewer line sections by bypass pumping.
- F. Regulatory discharge requirements for wastewater treatment plant effluent mandate continuous and adequate treatment of wastewater. Contractor's means and methods shall be implemented such that the existing plant shall remain in continuous satisfactory operation during the entire construction period.
- G. Contractor shall schedule and perform the Work in such a manner that results in the least possible disruption to existing treatment plant operations.
- H. Contractor will be responsible for dewatering and cleaning pipelines, process tanks, and basins as required to complete the Work specified and shown on the drawings. Contractor shall provide and maintain all pumps and piping necessary for dewatering, cleaning, and bypass operations during construction.

### 3.02 PIPELINE AND TREATMENT PROCESS UNIT SHUTDOWNS

- A. For each shutdown Contractor shall compile an inventory of labor and materials required to complete the proposed improvements and estimate of the shutdown duration. This documentation shall be submitted to the Owner and Engineer for approval at least 14 days prior to proposed shutdown start date.
- B. Prior to implementing each shutdown Contractor shall have on-site all tools, equipment, spare parts, and materials, both temporary and permanent, necessary to complete each Work category without interruption. Adequate numbers of Contractor personnel shall be scheduled for each shutdown so that Work can be accomplished within the scheduled time frame. Prefabrication of piping and other assemblies shall be completed to the greatest degree possible prior to any shutdown. Owner and Engineer shall be satisfied that Contractor has complied with these requirements to the fullest extent possible before shutdowns will be authorized.
- C. Contractor shall coordinate all shutdowns with Facility Management. All construction shall be coordinated with the Owner's designated representative at all times.

### 3.03 CONSTRUCTION CONSTRAINTS FOR TREATMENT FACILITY SHUTDOWNS

- A. Work will require shutdown of the existing sludge holding tank and the existing sludge dewatering system and building to construct proposed improvements. These shutdowns will impact normal sludge wasting operations which are critical to maintaining treatment plant performance. The following construction constraints should be used as a guideline in planning and scheduling shutdowns and completing the Work.
- B. Unless otherwise directed or specified herein, contents of tanks, basins, and pipelines undergoing modifications may be transferred to other treatment process units to the extent practicable as approved by the Owner, Engineer and operations staff.
- C. The wastewater treatment facility (WWTF) includes two (2) clarifier units which are currently operated as 1-duty and 1-standby. Each clarifier is 24-feet in diameter with a maximum water depth of 12-feet. Available storage volume at 6-inches of freeboard below the effluent weir trough is approximately 40,000 gallons.
- D. Sludge wasting from the clarifier to the sludge holding tank is currently performed twice per week, on Mondays and Thursdays, totaling approximately 10,000 gallons for the two days combined. Contractor can expect sludge wasting to remain at these levels during construction.
- E. Prior to shutdown of the sludge holding tank and existing sludge dewatering system, waste sludge stored in the sludge holding tank shall be processed through the existing sludge dewatering system to the maximum extent possible. Remaining tank contents may then be



transferred to the standby clarifier. Before transferring any material to the standby clarifier, Contractor shall install a temporary mechanical plug in the clarifier effluent pipe to ensure no discharge of sludge or untreated sewage from the clarifier will occur.

- F. During shutdown of the sludge holding tank and sludge dewatering system, Contractor shall work with plant operations staff to maintain normal sludge wasting operations by transferring waste sludge to the standby clarifier. Clear supernatant from the clarifier may be transferred back to the plant headworks to increase available sludge storage volume. If the shutdown duration causes available clarifier storage capacity to be exceeded, Contractor shall engage a waste hauler to remove and transport waste sludge to another wastewater treatment facility that accepts hauled waste. The existing clarifiers are provided with a 4-inch drainpipe extending from the clarifier hopper-bottom to above grade outside of the clarifier wall and terminating with a quick-coupling connection.
- G. After the sludge holding tank and sludge dewatering system improvements are completed and made operational, Contractor shall work with plant operations staff to transfer waste sludge stored in the standby clarifier to the sludge holding tank and processed through the new sludge dewatering system. Once the standby clarifier is emptied, Contractor shall clean and ready the clarifier for normal operation.
- H. Contractor shall make no claims for extra compensation as a result of the Work Restrictions set forth herein, including any necessary waste hauling.

END OF SECTION

## **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. If necessary, additional requirements will be issued by Contract Change.
- B. Types of allowances include the following:
  - 1. Weather allowances.
- C. Related Sections include the following:
  - 1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Contract Changes for allowances.

#### **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.

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

**PART 3 - EXECUTION**

**3.1 SCHEDULE OF ALLOWANCES**

- A. Weather Allowance: Included within the completion period of one hundred eighty (180) working days for this Project are twenty (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 Change Orders.

#### **1.3 DEFINITIONS**

- A. Unit Price is 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: Removal and Disposal of Asbestos Cement (AC) Pipe:

1. Description: Removal and disposal of AC pipe disturbed or dislodged during trenching operations for utilities according to Division 2 Section 028233.
  2. Unit of Measurement: Length of AC pipe removed and disposed of measured to the nearest linear foot.
  3. Base Bid Quantity: Ten (10) linear feet.
- B. Unit Price No. 2 – Manhole Renovation:
1. Description: Renovate existing Manhole No. 4 using Cementitious Liner with Antimicrobial Additive in lieu of Fused Aluminate Clinker according to Division 33 Section 330130.62.
  2. Unit of Measurement: Complete product in-place per each.
  3. Base Bid Quantity: One (1) each.
- C. Unit Price No. 3 – Open Trench Sewer Lateral Connection Repair:
1. Description: Open trench sanitary sewer lateral to main line connection repair according to Division 33 Section 330130.75 & Section 333113.
  2. Unit of Measurement: Complete product in-place per each.
  3. Base Bid Quantity: Two (2) each.
- D. Unit Price No. 4 – Trenchless Sewer Lateral Connection Repair (LCR):
1. Description: Trenchless sanitary sewer lateral to main line connection repair using a cured-in-place liner according to Division 33 Section 330130.75.
  2. Unit of Measurement: Complete product in-place per each.
  3. Base Bid Quantity: Eleven (11) each.
- E. Unit Price No. 5 – Water Service Connections:
1. Description: Reconnection of existing water service connections to new water main according to Division 33 Section 331200.
  2. Unit of Measurement: Complete product in-place per each.
  3. Base Bid Quantity: Seventeen (17) each.
- F. Unit Price No. 6 – Open Trench Sewer Main Repair/Replacement:
1. Description: Open trench sewer main repair/replacement according to Division 33 Section 333113.
  2. Unit of Measurement: Length of sewer pipe installed measured to the nearest linear foot.
  3. Base Bid Quantity: Twenty (20) linear feet.

**END OF SECTION 012200**

## **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 0, Section 007213, Article 3.1 "Acceptable Substitutions" for administrative procedures for handling Requests for Substitutions made after Contract award.
  - 3. Division 0, Section 007213, Article 4.0 "Changes in the Work" for Contract Change 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 Contract Change 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 Contract Change Detailed Breakdown form. Subcontractors may use the appropriate Contract Change 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 CONTRACT CHANGE PROCEDURES**

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

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

## **PART 3 - EXECUTION**

### **3.1 REFERENCED FORMS**

- A. The following forms can be found on our website at <https://oa.mo.gov/facilities/vendor-links/architectengineering-forms> or <https://oa.mo.gov/facilities/vendor-links/contractor-forms>:
  - 1. Request for Information
  - 2. Designer's Supplemental Instructions
  - 3. Request for Proposal
  - 4. Contract Change
  - 5. Contract Change Detailed Breakdown – SAMPLES

6. Contract Change Detailed Breakdown – General Contractor (GC)
7. Contract Change Detailed Breakdown – Subcontractor (SUB)

**END OF SECTION 012600**



## **SECTION 013100 – COORDINATION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes administrative provisions for coordinating construction operations on Projects including, but not limited to, the following:
  - 1. Coordination Drawings.
  - 2. Administrative and supervisory personnel.
  - 3. Project meetings.
- B. Each Contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific Contractor.
- C. Related Sections include the following:
  - 1. Division 1, Section 013200 "Schedules" for preparing and submitting Contractor's Construction Schedule.
  - 2. Articles 1.8.B and 1.8.C of Section 007213 "General Conditions" for coordinating meetings onsite.
  - 3. Article 5.4.H of Section 007213 "General Conditions" for coordinating Closeout of the Contract.

#### **1.3 COORDINATION**

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections, which depend on each other for proper installation, connection, and operation.
- B. Coordination: Each Contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each Contractor shall coordinate its operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components with other Contractors to ensure maximum accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
  - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required

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

- C. Prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate Contractors if coordination of their Work is required.
  
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other Contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's Construction Schedule.
  - 2. Preparation of the Schedule of Values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Startup and adjustment of systems.
  - 8. Project Closeout activities.
  
- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
  - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

#### **1.4 SUBMITTALS**

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
  
- B. Key Personnel Names: Within fifteen (15) workdays 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.

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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.

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



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

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

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

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

### **PART 3 - EXECUTION**

#### **3.1 SUBMITTAL PROCEDURES**

- A. The Contractor shall submit to the Designer, within ten (10) working days following the Notice to Proceed, a Progress Schedule including Schedule of Values showing the rate of progress the Contractor agrees to maintain and the order in which he proposed to carry out the various phases of Work. No payments shall be made to the Contractor until the Progress Schedule has been approved by the Owner.
  - 1. The Schedule of Values must have the following line items included with the value of the item as indicated below:
    - a. O&M's (Owner's Manual)
      - 1) \$1,000,000.00 (One million) and under – 2% of the total contract amount
      - 2) Over \$1,000,000.00 (One million) – 1% of the total contract amount
    - b. Close Out Documents
      - 1) \$1,000,000.00 (One million) and under – 2% of the total contract amount
      - 2) Over \$1,000,000.00 (One million) – 1% of the total contract amount
    - c. General Conditions
      - 1) No more than 10%
- B. The Contractor shall submit an updated Schedule for presentation at each Monthly Progress Meeting. The Schedule shall be updated by the Contractor as necessary to reflect the current Schedule and its relationship to the original Schedule. The updated Schedule shall reflect any changes in the logic, sequence, durations, or completion date. Payments to the Contractor shall be suspended if the Progress Schedule is not adequately updated to reflect actual conditions.

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

### 3.2 CONSTRUCTION PROGRESS SCHEDULE – BAR CHART SCHEDULE

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

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

### **3.3 SCHEDULE OF SUBMITTALS**

- A. Upon acceptance of the Construction Progress Schedule, prepare and submit a complete schedule of submittals. Coordinate the submittal schedule with Section 013300 SUBMITTALS, the approved Construction Progress Schedule, list of subcontracts, Schedule of Values and the list of products.
- B. Prepare the schedule in chronological order. Provide the following information

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

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

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

**END OF SECTION 013200**

## **SECTION 013300 – SUBMITTALS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

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

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

### **1.3 SUBMITTAL PROCEDURES**

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

### **1.4 SHOP DRAWINGS**

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

4. Notation of coordination requirements
5. Notation of dimensions established by field measurement
6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8½"x11" but no larger than 36"x48".

## 1.5 PRODUCT DATA

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

## 1.6 SAMPLES

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

comparison of these characteristics between the final submittal and the actual component as delivered and installed.

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

## **1.7 QUALITY ASSURANCE DOCUMENTS**

- A. The Contractor shall comply with the General Conditions, Article 3.2
- B. The Contractor shall submit quality control submittals including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.
- C. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the Manufacturer certifying compliance with specified requirements.
  1. Signature: Certification shall be signed by an officer of the Manufacturer or other individual authorized to contractually bind the Company.
- D. Inspection and Test Reports: The Contractor shall submit the required inspection and test reports from independent testing agencies as specified in this Section and in other Sections of the Contract Documents.
- E. Construction Photographs: The Contractor shall submit record construction photographs as specified in this Section and in other Sections of the Contract Documents.
  1. The Contractor shall submit digital photographs. The Construction Administrator shall determine the quantity and naming convention at the preconstruction meeting.
  2. The Contractor shall identify each photograph with project name, location, number, date, time, and orientation.
  3. The Contractor shall submit progress photographs monthly unless specified otherwise. Photographs shall be taken one (1) week prior to submitting.



4. The Contractor shall take four (4) site photographs from differing directions and a minimum of five (5) interior photographs indicating the relative progress of the Work.

**1.8 OPERATING AND MAINTENANCE MANUALS AND WARRANTIES**

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

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

**PART 3 - EXECUTION**

**3.1 REQUIRED SUBMITTALS**

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

<b>SPEC SECTION</b>	<b>TITLE</b>	<b>CATEGORY</b>
011423	Work Restrictions	Utility Shutdowns
013100	Key Personnel Names & Assignments	Information Submittal
013200	Schedules	Construction Schedule
013200	Schedules	Schedule of Values
013200	Schedules	List of Subcontractors
013200	Schedules	Major Material Suppliers
013513.16	Employee Information - Background Check	Information Submittal
015723	Stormwater Pollution Prevention Plan	Information Submittal
024119	Demolition Work	Schedule
028233	Asbestos Cement (AC) Pipe	Removal/Disposal Plan
031000	Concrete Formwork Accessories	Product Data
031000	Concrete Reinforcing	Shop Drawings
033000	Concrete Materials and Proportioning	Shop Drawings
033500	Concrete Cure-Densifier-Hardener	Product Data
079213	Sealants and Caulking Materials	Product Data
081113	Steel Doors and Frames	Shop Drawings
083113.13	Vault Access Doors	Shop Drawings
087100	Door Hardware & Schedule	Shop Drawings
089100	Louvers	Shop Drawings
099100	Painting Products & Materials	Product Data
220700	Plumbing Products & Materials	Product Data
238239.19	Unit Heater	Product Data
238239.19	Unit Heater	Operation / Maintenance Manual
260500	Electrical Materials	Product Data
262816	Electrical Equipment	Shop Drawings

312300	Fill and Backfill Material	Test Report
312316	Granular Materials	Test Report
312333	Granular Embedment Material	Test Report
313700	Bedding Aggregate	Test Report
313700	Riprap	Sample
320117	Pavement Repair Products & Materials	Shop Drawings
321540	Aggregate Surfacing Products & Materials	Shop Drawings
329200	Seed, Fertilizer & Soil Analysis	Information Submittal
330130.16	CCTV Visual and Audio Recordings	Information Submittal
330130.41	Sewer & Manhole Cleaning Documentation	Information Submittal
330130.62	Manhole Repair and Lining Materials	Shop Drawings
330130.62	Manhole Lining Applicator Qualifications	Information Submittal
330130.72	CIPP Lining Materials	Shop Drawings
330130.72	CIPP Inspection Reports	Information Submittal
330130.75	Service Connection Repair Materials	Shop Drawings
330130.75	Service Connection Inspection Reports	Information Submittal
330130.81	Flow Diversion & Notification Plan	Information Submittal
330516	Manholes, Vaults and Appurtenances	Shop Drawings
330517	Pipe and Fittings	Product Data
330518	Pipe and Fittings	Product Data
330526	Marking Tape, Trace Wire & Appurtenances	Product Data
330529	Utility Valves and Accessories	Shop Drawings
331200	Hydrants, Valves, Fittings & Appurtenances	Shop Drawings
331300	Disinfection Report & Bacteriological Tests	Information Submittal
334100	Pipe, Fittings, & Precast Concrete Sections	Shop Drawings
400559.13	Flow Control Stop Gates	Shop Drawings
407113	Flow Meter	Product Data
407113	Flow Meter	Operation / Maintenance Manual
412223.16	Portable Davit Crane	Product Data
412223.16	Portable Davit Crane	Operation / Maintenance Manual
444413	Chemical Metering Pump & Appurtenances	Product Data
444413	Chemical Metering Pump & Appurtenances	Operation / Maintenance Manual
444616	Dewater System Materials and Equipment	Shop Drawings
444616	Dewater System Materials and Equipment	Operation / Maintenance Manual
444629.13	Pumps, Controls and Appurtenances	Shop Drawings
444629.13	Pumps, Controls and Appurtenances	Operation / Maintenance Manual
445126.13	Materials, Fabrication & Appurtenances	Shop Drawings
445126.13	Welders	Certification

**END OF SECTION 013300**

## **SECTION 013513.16 - SITE SECURITY AND HEALTH REQUIREMENTS (DOC)**

### **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. Revise list to include all required submittals.
  - 4. 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.
  - 5. Tuberculin skin test results for all employees required to be tested as set forth below.

### **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. The Contractor shall provide Facility Representatives notice twenty-four (24) hours prior to any possible vehicle entry and/or required escort. The Contractor shall maintain a time log of any delays in gaining entrance to the Facility due to lack of an escort, which is to be submitted monthly with the Contractor's pay request materials. The purpose of this log is to establish a basis for a contract change, if required. The log shall contain the date and time of delay, date and time of request of entry, workers delayed (name and occupation), and name of the Facility Representative to whom the request was made, if possible. Any delay in entry must be

validated by sallyport and pass office personnel at the Facility. Only delays greater than thirty (30) minutes will be considered for a contract change. A 30-minute delay upon arrival with a vehicle to enter the sallyport should be expected.

### 3.2 RULES OF THE FACILITY

- A. The Contractor and its workers shall observe the following rules:
1. There shall be no fraternization with inmates.
  2. No intoxicating beverages or illegal drugs shall be brought onto Facility grounds.
  3. No firearms, other weapons, or explosives shall be carried onto Facility grounds.
  4. No prescription drugs above one day's dosage shall be carried on Facility grounds.
  5. Any vehicle or individual is subject to search at any time while on Facility grounds.
  6. The vehicles of the Contractor and its workers shall be locked whenever unattended.
  7. All tools and equipment shall be tightly secured during non-working hours in the Contractor's storage trailer or assigned area.
  8. The Facility will not be responsible for the Contractor's tools, equipment, or materials. The Contractor shall keep and maintain a current tool inventory. The tool inventory shall be made available to Facility Representatives and the Owner upon request.
  9. The Contractor shall report any missing tools to Facility Representatives immediately.
  10. Smoking shall be permitted only in accordance with the regulations of the Facility.
  11. Possession or use of smokeless tobacco or smokeless non-tobacco alternatives is strictly prohibited.
- B. All workers shall be required to sign an acknowledgement of receipt of these rules.

### 3.3 SECURITY CLEARANCES AND RESTRICTIONS

- A. DOC SECURITY CLEARANCE REQUIREMENTS
1. **[Security restrictions may vary between different Facilities. Verify and revise paragraph below if Facility requirement for construction personnel differ.]** Prior to the commencement of any onsite work, the Contractor shall submit a list containing the name, date of birth, and Missouri driver's license number or social security number of all construction personnel to the Missouri Department of Corrections for the purpose of obtaining security clearances. The required information shall be submitted at the pre-construction meeting, or as otherwise directed by Department of Corrections' personnel. Any construction personnel with pending warrants or felony convictions within the last five (5) years or other offenses deemed to create a security risk by Department of Corrections shall not be allowed onsite. The Department of Corrections reserves the right to refuse admission to any individual they feel may be detrimental to the security of the Facility.

### 3.4 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. The Contractor's workers shall not be under the influence of any intoxicating substances while on the Facility premises.

### **3.5 TUBERCULOSIS TESTING REQUIREMENTS**

- A. All workers who will be in the confines of the Facility for more than ten (10) consecutive working days must provide proof of a negative tuberculin skin test. The test results must be no more than six (6) months old at the commencement of construction. The Contractor or the worker, not the Owner, shall pay the cost of the test.
- B. The Contractor shall submit to Facility Representatives current tuberculin skin test results for all workers who are required to have such a test in accordance with paragraph A above. If the contract period extends for more than twelve (12) months, the Contractor must provide new test results for all workers prior to the anniversary of the contract commencement date.
- C. Any worker required to have a tuberculin skin test under paragraph A above who fails or refuses to do so will be denied admission to the facility until such time as proof of the test results are provided.

- D. If any worker has a tuberculin skin test with positive results, the worker shall be denied access to the facility until the worker produces a certification from a physician licensed to practice in the State of Missouri that the worker does not have infectious tuberculosis.
- E. The Contractor shall not be entitled to any additional time or compensation if any of its workers are denied access to the facility because of failure to produce negative tuberculin skin test results.
- F. Failure or refusal of the Contractor to maintain and produce the required tuberculin skin test records shall be a material breach of this contract, which shall subject the Contractor to a declaration of default.

### **3.6 PREA FOR CONTRACTORS AND EMPLOYEES**

- A. The contractor and all of the contractor's employees and agents providing services in any Department of Corrections institution must be at least 18 years of age. A Missouri Uniform Law Enforcement System (MULES) check or other background investigation may be required on the contractor, the contractor's employees and agents before they are allowed entry into the institution. The contractor, its employees and agents understand and agree that the Department may complete criminal background records checks annually for the contractor and the contractor's employees and agents that have the potential to have contact with inmates.
- B. The institution shall have the right to deny access into the institution for the contractor and any of the contractor's employees and agents for any reason, at the discretion of the institution.
- C. The contractor, its employees and agents under active federal or state felony or misdemeanor supervision must receive written division director approval prior to providing services pursuant to a Department contract. Similarly, contractors/employees/agents with prior felony convictions and not under active supervision must receive written division director approval in advance.
- D. The contractor, its employees and agents shall at all times observe and comply with all applicable state statutes, Department rules, regulations, guidelines, internal management policies and procedures, and general orders of the Department that are applicable, regarding operations and activities in and about all Department property. Furthermore, the contractor, its employees and agents, shall not obstruct the Department or any of its designated officials from performing their duties in response to court orders or in the maintenance of a secure and safe correctional environment. The contractor shall comply with the Department's policies and procedures relating to employee conduct.
  - 1. The Department has a zero tolerance policy for any form of sexual misconduct to include staff/contractor/volunteer on offender, or offender on offender, sexual harassment, sexual assault, sexual abuse and consensual sex.
    - a. Any contractor or contractor's employee or agent who witnesses any form of sexual misconduct must immediately report it to the warden of the institution. If a contractor or contractor's employee or agent fails to report or knowingly condones sexual harassment or sexual contact with or between offenders, the Department may cancel the contract, or at the Department's sole discretion, require the contractor to remove the employee/agent from providing services under the contract.

- b. Any contractor or contractor's employee or agent who engages in sexual abuse shall be prohibited from entering the institution and shall be reported to law enforcement agencies and licensing bodies, as appropriate.
- E. The contractor, its employees and agents shall not interact with the offenders except as is necessary to perform the requirements of the contract. The contractor, its employees and agents shall not give anything to nor accept anything from the offenders except in the normal performance of the contract.
- F. If any contractor or contractor's employee or agent is denied access into the institution for any reason or is denied approval to provide service to the Department for any reason stated herein, it shall not relieve the contractor of any requirements of the contract. If the contractor is unable to perform the requirements of the contract for any reason, the contractor shall be considered in breach.

### **3.7 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

### **3.8 CELL PHONES AND ELECTRONIC DEVICES**

- A. Cell Phones, pagers, smart watches (that can send/receive messages), fitness wrist bands (that can send/receive messages) or other electronic devices are not permitted.
  - 1. Contractors, repairpersons, or information technology services department staff may be permitted to bring in a cell phone and portable wireless router (Wi-Fi, MiFi, etc.) if approved by the Chief Administrative Officer (CAO) when the phone is necessary to complete job duties relating to repairs on a case by case basis.
  - 2. Tablets (iPad, etc.) are not allowed with the exception of for re-entry purposes approved via the division of adult institutions (DAI) director and the re-entry manager.
  - 3. Laptop computers may be permitted by the CAO on a case by case basis.

### **3.9 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 013513.16**

SECTION 014200  
DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes definitions of terms and symbols used in the Contract Documents, explanation of specification format and content, and establishes edition dates for standards referenced elsewhere in the specifications.
- B. Related Requirements:
  - 1. DOCUMENT 00700 - General Conditions

1.02 DEFINITIONS

- A. General Explanation: A substantial amount of specification language constitutes definitions for terms found in other contract documents, including drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in the Contract Documents are defined generally in this section. Definitions and explanations of this section are not necessarily complete or exclusive but are general for the Work to the extent not stated more explicitly in another provision of the Contract Documents.
  - 1. "General Requirements" are the provisions or requirements of the DIVISION 1 - Sections, and which apply to the entire work of the Contract.
  - 2. The term "indicated" is a cross-reference to graphics, notes or schedules on drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated", it is for purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.
  - 3. Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and permitted", mean "directed by Engineer", "requested by Engineer", etc. However, no such implied meaning will be interpreted to extend Engineer's responsibility into Contractor's area of construction supervision.
  - 4. Where used in conjunction with Engineer's response to submittals, requests, applications, inquiries, reports and claims by Contractor, the meaning of the term "approved" will be held to limitations of Engineer's responsibilities and duties as specified in the General Conditions and Supplemental General Conditions. In no case will "approval" by Engineer be interpreted as a release of Contractor from responsibilities to fulfill requirements of Contract Documents.
  - 5. "Project Site" is the area available to the Contractor for performance of the Work, either exclusively or in conjunction with others performing other work as part of the project. The extent of the project site is shown on the drawings and may or may not be identical with description of land upon which project is to be built.
  - 6. When applied to equipment and materials, the words "furnish", "install" and "provide" shall mean the following:

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- a. The word “furnish” shall mean to supply, pay for, and deliver to project site, ready for assembly, installation, etc., as applicable in each instance.
  - b. The word “install” shall mean to assemble, erect, place into position, incorporate into the Work, adjust, clean and make fit for intended use, as applicable in each instance.
  - c. The word “provide” shall mean to furnish and install, complete and ready for intended use, as applicable in each instance.
7. “Installer” shall mean the entity (person or firm) engaged by Contractor or its subcontractor (at any lower tier) for performance of a particular unit of work at project site, including installation, erection, application, and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.
8. “Testing Laboratory” shall mean an independent entity engaged to perform specific inspections or tests of the Work, either at the project site or elsewhere; and to report and (if required) interpret results of those inspections or tests.
- B. Basic contract terms used in the Contract Documents are defined in the GENERAL CONDITIONS.

### 1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATIONS

- A. Specification Format: These specifications are organized into Divisions and Sections based on the Construction Specifications Institute’s MasterFormat® numbers and titles. Some portions may not fully comply, and no particular significance will be attached to such compliance or non-compliance.
- 1. Divisions and Sections: For convenience, basic unit of specification text is a “section”, each unit of which is numbered and named. These are organized into related families of sections, and various families of sections are organized into “divisions”, which are recognized as the present industry consensus on uniform organization and sequencing of specifications. The section title is not intended to limit meaning or content of section, nor to be fully descriptive of requirements specified therein, nor to be an integral part of text.
  - 2. Section Numbering: Used to facilitate cross-references in Contract Documents. Sections are organized in numerical sequence; however, numbering sequence is not complete, and listing of sections in Index at beginning of Contract Documents must be consulted to determine numbers and names of specification sections in Contract Documents.
  - 3. Page Numbering: Numbered independently for each section. Section number is shown with page number at bottom of each page, to facilitate location of text.
  - 4. Parts: Each section of specifications generally has been subdivided into three basic “parts” for uniformity and convenience (Part 1 - General, Part 2 - Products and Part 3 - Execution). These titles do not limit the meaning of text within. Some sections may not contain all three parts when not applicable.
- B. Specification Content: These specifications use certain general characteristics of content and conventions in the use of language which are explained as follows:
- 1. Imperative Language: These specifications are written in imperative and abbreviated form. Unless specifically stated otherwise, this imperative language is directed at the Contractor.

Incomplete sentences shall be completed by inserting “shall”, “the Contractor shall”, “shall be”, and similar mandatory phrases by inference in the same manner as they are applied to notes on the drawings.

2. Specifying Methods: The techniques or methods of specifying to record requirements varies throughout text, and may include “prescriptive”, “compliance with standards”, “performance”, “proprietary”, or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.
  3. Abbreviations: The language of these specifications and other Contract Documents is of the abbreviated type in certain instances and implies words and meanings which will be appropriately interpreted. Specific abbreviations are frequently used for trade association names and titles of general standards.
- C. Assignment of Specialists: In certain instances, specification text requires that specific work be assigned to specialists or expert entities, who must be engaged for performance of those units of work. These must be recognized as special requirements over which Contractor has no choice or option. These assignments must not be confused with, and are not intended to interfere with, normal application of regulations, union jurisdictions and similar conventions. One purpose of such assignments is to establish which party or entity involved in a specific unit of work is recognized as “expert” for indicated construction processes or operations. Nevertheless, final responsibility for fulfillment of contract requirements remains with the Contractor.
- D. Trades: Except as otherwise indicated, the use of titles such as “carpentry” in specification text implies neither that the work must be performed by an accredited or unionized tradesperson of corresponding generic name (such as “carpenter”), nor that specified requirements apply exclusively to work by tradespersons of that corresponding generic name.

#### 1.04 DRAWING SYMBOLS

- A. Except as otherwise indicated, graphics symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Refer instances of uncertainty to Engineer for clarification.

#### 1.05 INDUSTRY STANDARDS

- A. General Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable standards of the construction industry have the same force and affect and are made a part of the Contract Documents by reference as if copied directly into the Contract Documents, or as if published copies were bound herewith.
1. Referenced standards, referenced directly in Contract Documents or by governing regulations, have precedence over non-referenced standards which are recognized in industry for applicability to work.
  2. Where compliance with an industry standard is required, comply with standard in effect as of the date of the Contract Documents.
  3. Where compliance with two or more industry standards or sets of requirements is specified and overlapping of these different standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement will be enforced. Refer apparently equal but different requirements, and uncertainties as to which level of

quality is more stringent to Engineer for a decision before proceeding.

4. In every instance, quality level or quantity shown or specified is intended as minimum for the work to be performed or provided. Except as otherwise specifically indicated, actual work may either comply exactly with that minimum, within specified tolerances, or may exceed that minimum within reasonable limits. In complying with requirements, indicated numeric values are either minimums or maximums as noted or as appropriate for context of requirements. Refer instances of uncertainty to Engineer for decision before proceeding.
5. Each entity engaged in construction activities on the Project shall be familiar with the industry standards applicable to their work. Where copies of standards are needed for proper performance of the work, the Contractor shall obtain copies directly from the publication source.

- B. Abbreviations and Names: Trade association names and titles of general standards are generally abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they are defined to mean the industry recognized name of trade association, standards generating organization, governing authority or other entity applicable to context of text provision.

PART 2 - PRODUCTS - Not Applicable

PART 3 - EXECUTION - Not Applicable

END OF SECTION

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

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes requirements for construction facilities and temporary controls including temporary utilities, support facilities, security, and protection.
- B. Temporary utilities include, but are not limited to, the following:
  - 1. Temporary electric power
  - 2. Temporary heat
  - 3. Ventilation
  - 4. Sanitary facilities, including drinking water
- C. Support facilities include, but are not limited to, the following:
  - 1. Storage sheds
  - 2. Dewatering facilities and drains
  - 3. Temporary enclosures
  - 4. Waste disposal services
  - 5. Construction aids and miscellaneous services and facilities
- D. Security and protection facilities include, but are not limited to, to following:
  - 1. Barricades, warning signs, and lights
  - 2. 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. 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.

### **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. 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.
- F. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers, or a combination of extinguishers of NFPA-recommended classes for the exposures.
  - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

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

### **3.2 TEMPORARY UTILITY INSTALLATION**

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
  - 1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.
  - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
  - 3. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Designer. Neither the Owner nor Designer will accept cost or use charges as a basis of claims for Contract Change.
- B. Temporary Water Service: The Owner will provide water for construction purposes from the existing distribution system. All required temporary extensions shall be provided and removed by the Contractor. Connection points and methods of connection shall be designated and approved by the Construction Representative.



- C. Temporary Electric Power Service: The Owner will provide electric power for construction lighting and power tools. Contractors using such services shall pay all costs of temporary services, circuits, outlet, extensions, etc.
- D. Temporary 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.
- E. Temporary Toilets: Install self-contained toilet units. Use of pit-type privies will not be permitted. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
  - 1. Shield toilets to ensure privacy.
  - 2. Provide separate facilities for male and female personnel.
  - 3. Provide toilet tissue materials for each facility.
- F. Wash Facilities: The Owner will provide wash facilities within the existing maintenance building. All construction personnel will be allowed access only to those specific facilities designated by the Construction Representative.
- G. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking water units, including paper supply.
  - 1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45°F to 55°F (7°C to 13°C).
- H. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

### **3.3 SUPPORT FACILITIES INSTALLATION**

- A. General: Locate 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. Storage facilities: Install storage sheds sized, furnished, and equipped to accommodate materials and equipment involved. Sheds may be open shelters or fully enclosed spaces as appropriate.
- C. Storage Facilities: No areas for storage of building materials can be made available onsite. The Contractor shall provide for all storage offsite. All off-site storage locations shall be

approved by the Construction Representative. The Contractor shall provide his own security as he finds necessary. The Construction Representative shall have access to the off-site storage at all times.

- D. Construction Parking: Parking at the site will be provided in the areas designated at the Pre-Construction Meeting.
- E. 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 31 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.
- F. 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 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 loadbearing, 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.
- G. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80°F (27°C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

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

- A. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting including flashing red or amber lights.
- B. Security Storage Enclosure: 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.
- C. 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.
  - 2. At Substantial Completion, clean and renovate permanent facilities used during the construction period.
    - a. Replace significantly worn parts and parts subject to unusual operating conditions.

**END OF SECTION 015000**

## SECTION 015723 – TEMPORARY STORMWATER POLLUTION CONTROL

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes stormwater pollution control requirements including, but not limited to, the following:
1. Erosion and sediment control measures that are required during the construction process to prevent erosion and sediment transport from the construction site into natural drainage channels, streams and creeks.
  2. Pollution prevention standards pertaining to other potential sources of pollution including, but not limited to:
    - a. Spill prevention and response.
    - b. Fueling, maintenance, and washing of equipment and vehicles.
    - c. Storage, handling, and disposal of construction products, materials, and debris.
    - d. Storage, handling, and disposal of petroleum products and other chemicals.
    - e. Sanitary waste.
- B. References:
1. Clean Water Act (33 U.S.C. 1.334), Section 404
  2. Code of State Regulations, 10 CSR 20-6.200 Storm Water Regulations
  3. Missouri Department of Transportation (MoDOT) Standard Specifications for Highway Construction
  4. *Protecting Water Quality – A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri and Kansas – Revised January 2011* – Prepared by Missouri Department of Natural Resources, ABC’s of BMP’s LLC, and Shockey Consulting Services
- C. Related Work.
1. Division 31 – Earthwork
  2. Section 329100 – Turf and Grasses

#### 1.2 DEFINITIONS

- A. General Permit: The General Permit for storm water discharges associated with construction activity (Land Disturbance General Permit No. MO-R100038) issued to FMDC as a blanket permit by the Missouri Department of Natural Resources, Water Pollution Program.
- B. Storm Water Pollution Prevention Plan (SWPPP): A plan required by the General Permit that includes site map(s), an identification of construction/contractor activities that could cause pollutants in the storm water, and a description of measures or practices to control these pollutants.
- C. Best Management Practice (BMP): Any program, technology, process, siting criteria, operating method, measure, or device that controls, prevents, removes, or reduces pollution.
- D. Temporary Berm: A temporary ridge of compacted soil, with or without a shallow ditch, constructed at the top of slopes or transverse to the centerline of a slope. The berm diverts storm runoff to temporary outlets to discharge water with minimal erosion.

- E. Temporary Slope Drain: A temporary facility used to carry water down a slope.
- F. Ditch Check: An obstruction placed at frequent intervals across ditches, creating small ponds to cause sediment to settle and be contained.
- G. Sediment Basin: An excavated or dammed storage area to trap and store sediment and prevent the discharge of silt.
- H. Temporary Seeding and Mulching: Placement of a quick ground cover to reduce erosion in areas expected to be re-disturbed.
- I. Compost Filter Sock: A tubular mesh device filled with biodegradable media, used to filter the flow of water, trap and deposit sediment, and/or divert water.
- J. Silt Fence: A geotextile barrier fence to contain sediment by removing suspended particles from water passing through the fence.
- K. Temporary Pipe: Conduit utilized to carry water under haul roads, silt fences, etc., and prevent equipment from direct contact with water when crossing an active or intermittent stream.
- L. Sediment Removal: Removal of accumulated sediment to restore the efficiency of sediment control features.

### **1.3 EROSION AND SEDIMENT CONTROL PLAN**

- A. An Erosion and Sediment Control Plan has been prepared for this project and is incorporated in the Contract Drawings. The purpose of the Erosion and Sediment Control Plan is to control erosion of surface soils throughout the life of the project and should be considered as the minimum requirements which will be required. See Project Plan Sheet Nos. G-001, C-101 thru C-106 and C-509 and the SWPPP template.
- B. Contractor is responsible for installing and maintaining erosion and sediment control measures using Best Management Practices (BMPs) specified herein, on the Project Plans, or by authorities having jurisdiction. Temporary structural and non-structural BMPs to be implemented on this Project include, but are not necessarily limited to, perimeter controls, dewatering operations, and concrete wash-out pit.

### **1.4 STORM WATER POLLUTION PREVENTION PLAN**

- A. Contractor is responsible for preparing, implementing, and maintaining a Storm Water Pollution Prevention Plan (SWPPP) at all times during the course of construction through project closeout. At a minimum, the SWPPP must address the requirements stated in Part 1.1 A above. A SWPPP template is included in Appendix B of the Project Manual. An electronic copy of the template in editable format is available from the Designer:
- B. The purpose of the SWPPP is:
  1. To identify potential sources of pollution that may reasonably be expected to affect the quality of storm water discharges from the project construction site, and,
  2. To describe and ensure implementation of Best Management Practices (BMPs) that will be used to reduce pollutants in storm water discharges from the project construction site.

- C. Contractor is responsible for identifying potential sources of pollution resulting from construction activities at the site of the work and implementing appropriate pollution prevention measures.

## **1.5 SUBMITTALS**

- A. The Contractor shall review the Erosion and Sediment Control Plan provided by the Designer and submit any proposed revisions for review and approval by the Owner's Representative. Approval of the plan does not relieve the Contractor of his contractual responsibility to prevent the discharge of pollutants into the receiving drainage ways.
- B. The Contractor shall complete and submit the applicable portions of the Storm Water Pollution Prevention Plan (SWPPP) Template provided by the Designer, make appropriate field corrections to the document throughout the course of the project, and submit final corrected copies of the SWPPP to the Owner and facility.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. All materials required for the installation and maintenance of required stabilization, erosion and sediment control measures shall comply with the erosion and sediment control plan, applicable references, and details indicated on the Drawings.
- B. Temporary slope drains: Stone, concrete or asphalt gutters, half-round pipe, metal pipe, plastic pipe or flexible rubber pipe.
- C. Ditch Checks:
  - 1. Rock ditch checks: 2" to 3" clean gravel or limestone.
  - 2. Compost Filter Socks: Reference Drawing Detail I/C509.
  - 3. Silt fence ditch checks: Geotextile meeting the requirements of this specification.
- D. Riprap for Temporary Erosion Control: Type 1 Rock Blanket conforming to MoDOT Standard Specifications for Highway Construction Section 611.30.2.
- E. Temporary Pipe: Corrugated metal (16 Ga.) or ADS N12 Corrugated Plastic.
- F. Temporary Seeding:
  - 1. December 1 to March 1: 90 lbs. cereal rye or wheat/acre.
  - 2. March 1 to December 1: 80 lbs. oats/acre.
  - 3. Mulch shall be wheat straw.
- G. Compost Filter Sock: Compost or non-treated wood filter media encased within a three-dimensional fabric tube, designed to filter sediment from rainfall induced runoff. Product shall be biodegradable, have a minimum functional longevity of six-months, and meet or exceed specifications in MoDOT Engineering Policy Guide Section 806.8.6.4.8. Unless otherwise indicated, provide 12-inch diameter compost filter socks.
- H. Wire Supported and Self-Supporting Silt Fence:
  - 1. Geotextile Fabric
    - a. Fibers used in geotextiles shall consist of long-chain synthetic polymers, composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages.

- b. The geotextile shall be free of any treatment or coating which might adversely alter its physical properties after installation.
- c. Geotextile shall be furnished in 36" width rolls.
- d. Geotextile rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure.
- e. Each roll shall be labeled or tagged to provide product identification sufficient for inventory.
- f. Rolls shall be stored in a manner, which protects them from the elements.
- g. Geotextile shall conform to the following:

**TABLE 1**  
**PHYSICAL REQUIREMENTS<sup>1</sup> FOR**  
**TEMPORARY SILT FENCE GEOTEXTILES**

<u>Property</u>	<u>Test Method</u>	<u>Wire Fence Supported Requirements<sup>1</sup></u>	<u>Self Supported Requirements<sup>1</sup></u>
Tensile Strength, Lbs.	ASTM D4632	90 Minimum <sup>2</sup>	90 Minimum <sup>2</sup>
Elongation at 50% Minimum			
Tensile Strength (45 Lbs.)	ASTM D4632	N/A	50 Maximum
Filtering Efficiency, %	VTM-51 <sup>3</sup>	75	75
Flow Rate gal/ft/min	VTM-51 <sup>3</sup>	0.3	0.3
Ultraviolet Degradation at 500 hrs.	ASTM D4355	Minimum 70% Strength Retained	Minimum 70% Strength Retained

- Notes:
- 1. All numerical values represent minimum average roll value.
  - 2. When tested in any principal direction.
  - 3. Virginia DOT test method.

- 4. Posts: Wood, steel or synthetic posts may be used. Posts shall have a minimum length of 36" plus embedment depth (24" min.). Posts shall have sufficient strength to resist damage during installation and to support applied loads.
- 5. Support Fence: Wire or other support fence shall be at least 24" high and strong enough to support applied loads.
- 6. Prefabricated Fence: Prefabricated fence systems may be used provided they meet all of the above material requirements.

**2.2 CERTIFICATION AND SAMPLING:**

- A. The Contractor shall furnish a manufacturer's certification, stating the material conforms to the requirements of these specifications.
- B. The certification shall include, or have attached, typical results of tests for the specified properties, representative of the materials supplied.
- C. The Owner's Representative reserves the right to sample and test any material offered for use.

## **PART 3 - EXECUTION**

### **3.1 GENERAL REQUIREMENTS**

- A.** The Contractor shall manage his operations to control water pollution in accordance with this specification and applicable State regulations. Construction of permanent drainage facilities and other contract work, contributing to control of erosion, shall be scheduled at the earliest practicable time.
- B.** The Contractor shall furnish, install, maintain, and remove temporary erosion control measures. The Contractor shall prevent silt or polluted storm water discharge from the site.
- C.** The Owner's Representative may limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, or fill operations.
- D.** The Owner's Representative may direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams, other watercourses, lakes, ponds, or other areas of water impoundment. Work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, use of temporary mulches, seeding or other control devices or methods to control erosion.
- E.** The Contractor shall provide temporary pollution control measures needed to control erosion during normal construction practices at no additional cost to the Owner.
- F.** The Contractor shall incorporate permanent erosion control features at the earliest practicable time.
- G.** Contractor shall designate trained and knowledgeable personnel to coordinate all SWPPP activities and identify these personnel to the Owner's Representative during construction.
- H.** The SWPPP is a living document. As the conditions of the site changes, the SWPPP should be updated by the Contractor.
- I.** The SWPPP is subject to random inspection by the Owner. The SWPPP should be kept up to date by the Contractor and available for inspection at any time.
- J.** If Contractor determines that any BMP should need modification, the changes shall be dated and documented, and all necessary field changes performed.
- K.** The Owner's Representative may require installation of additional erosion control facilities, by the Contractor, if in the sole opinion of the Owner's Representative, the Contractor's efforts are deemed inadequate.

### **3.2 LIMITATION OF AREA DISTURBED:**

- A.** The Contractor's operations shall be scheduled to install permanent erosion control features immediately after clearing and grubbing, and before grading operations begin.
- B.** The surface area of erodible earth material exposed at one time by clearing and grubbing, excavating, fill, or borrow shall not exceed 200,000 square feet without written approval of the Owner's Representative.
- C.** The Owner's Representative may limit the area of clearing and grubbing, excavation, borrow, and embankment operations commensurate with the Contractor's capability and progress in completing the finish grading, mulching, seeding, and other such permanent pollution control measures current.



- D. The Contractor shall respond to seasonal variations. If required by weather, temporary erosion control measures shall be taken immediately.

**3.3 RIVERS, STREAMS, AND IMPOUNDMENTS:**

- A. Construction operations in rivers, streams, and impoundments shall be restricted to areas, which must be entered for the construction of temporary or permanent structures.
- B. Rivers, streams, and impoundments shall be promptly cleared of falsework, piling, debris, or other obstructions as soon as practical.
- C. Frequent fording of live streams with construction equipment will not be permitted.
- D. Temporary bridges or other structures shall be used when the Contractor's operations include cycling of equipment across streams, rivers, or impoundments.
- E. Mechanized equipment shall not be operated in flowing streams except as required to construct channel changes and temporary or permanent structures.

**3.4 BORROW AND WASTE AREAS**

- A. Material pits other than commercially operated sources and material spoil areas shall be subject to pollution control measures of this specification. An offsite location does not relieve the Contractor of his contractual obligation to prevent the introduction of silt or other pollutants into receiving waterways.

**3.5 CONFLICT WITH FEDERAL, STATE OR LOCAL LAWS, RULES OR REGULATIONS**

- A. In case of conflict between these requirements and pollution control laws, rules, or regulations or other Federal, State or local agencies, the more restrictive laws, rules, or regulations shall apply.

**3.6 TEMPORARY BERMS**

- A. Not Used.

**3.7 TEMPORARY SLOPE DRAINS**

- A. Not Used.

**3.8 DITCH CHECKS**

- A. General:
  - 1. Rock ditch checks may be used on ditches with grades of 4 percent or less.
  - 2. Compost filter sock ditch checks may be used for flows less than 1.0 cubic feet per second.
  - 3. Silt fence shall not be used for ditch checks.
- B. Construction Requirements:
  - 1. Construct rock ditch checks in accordance with SWPPP Appendix M – Drawing Detail A/37.
    - a. Achieve complete coverage of the ditch or swale and ensure the center of the check is lower than the edges.

2. Construct compost filter sock ditch checks in accordance with Drawing Detail I/C509. Follow sock manufacturer's recommendations for selecting sock diameter.
- C. Maintenance:**
1. Inspect ditch checks for sediment accumulation after each rainfall.
  2. Sediment shall be removed when it reaches one-half of the original height.
    - a. Regular inspections shall insure that the center of a ditch check is lower than the edges. Correct erosion caused by high flows around the edges of the check immediately.

### **3.9 SEDIMENT BASIN**

- A. Not Used.**

### **3.10 TEMPORARY SEEDING AND MULCHING**

- A. General**

1. This item is applicable to all projects.
2. Seeding and/or mulching shall be a continuous operation on all cut slopes, fill slopes, and borrow pits during the construction process. All disturbed areas shall be seeded and mulched within five (5) working days after the last construction activity in all locations where necessary to eliminate erosion.

- B. Construction Requirements:**

1. Permanent seeding and mulching following temporary seeding will be performed during the favorable seeding seasons only.
2. Temporary seeding mixtures and planting season:
  - a. December 1 to March 1: 90 lbs. cereal rye or wheat per acre
  - b. March 1 to December 1: 80 lbs. oat grain per acre
3. Temporary mulch, fertilizer, and lime for seeding:
  - a. Fertilizer and mulch for temporary seed mixtures shall be applied in accordance with Section 329200.
  - b. Fertilizer shall be applied at the rate specified for permanent seeding.
  - c. Lime will not be required for temporary seeding.

### **3.11 COMPOST FILTER SOCKS**

General:

1. Compost filter socks may be used to control erosion, trap sediment, and divert runoff.
2. Compost filter socks may be used at the bottom of embankment slopes less than 10' high to divert runoff from sheet flow and intercept some of the sediment in the sheet flow, as ditch checks in small ditches and drainage areas, and on the lower side of cleared areas to catch sediment from sheet flow.

- B. Construction Requirements:**

1. The Contractor shall install compost filter socks in locations shown on the drawings and as directed by the Owner's representative.
2. Place compost filter socks at downslope limit of area to be graded.

3. Place compost filter socks along a level contour with an allowance of  $\pm 4$ ". At each end, turn compost filter sock upslope and extend until ground surface rises 18".
4. Compost Filter Socks must be adequately braced from behind with wood, steel, or synthetic posts having sufficient strength to support applied loads. Brace post spacing shall not exceed 10' on center for perimeter control and 5' on center for ditch check control.
5. Maintenance:
  - a. The Contractor shall maintain the integrity of silt socks as long as they are necessary to contain sediment runoff.
  - b. The Contractor shall inspect all temporary silt socks immediately after each rainfall and at least daily, during prolonged rainfall.
  - c. The Contractor shall immediately correct deficiencies.
  - d. The Contractor shall remove and dispose of sediment deposits when the deposit approaches one-half the height of the silt sock.
  - e. Silt socks shall remain in place until the upstream surface is stabilized. Upon removal, the Contractor shall remove and dispose of excess silt. The mesh material can be cut open and removed, and the compost material dispersed on-site as directed by the Owner's Representative.

### **3.12 SILT FENCE**

#### **A. General:**

1. The Contractor shall install a temporary silt fence in locations shown on the drawings, around inlets that accept flows containing silt, and other locations necessary to prevent the discharge of silt from the site.
2. Install along the toe of fills over 10' in height, along the right-of-way line, parallel to streams or around an inlet to prevent sediment from entering the pipe system.
3. Fence construction shall be adequate to handle the stress from hydraulic and sediment loading.

#### **B. Installation:**

1. Installation shall conform to the detail in SWPPP Appendix M page 37.
2. Geotextile at the bottom of the fence shall be buried as indicated on the detail.
3. The trench shall be backfilled, and the soil compacted over the geotextile. The geotextile shall be spliced together as indicated on the detail.
4. Post Installation
  - a. Post spacing shall not exceed 8' for wire support fence installation or 5' for self-supported installations.
  - b. Posts shall be driven a minimum of 24" into the ground. Where rock is encountered, posts shall be installed in a manner approved by the Owner's Representative.
  - c. Closer spacing, greater embedment depth and/or wider posts shall be used in low areas, soft, or swampy ground to ensure adequate resistance to applied loads.
5. When support fence is used, the mesh shall be fastened securely to the upstream side of the post.
  - a. The mesh shall extend into the trench a minimum of 2" and extend a maximum of 36" above the original ground surface.

6. When self-supported fence is used, the geotextile shall be securely fastened to fence posts.
7. Maintenance:
  - a. The Contractor shall maintain the integrity of silt fences as long as they are necessary to contain sediment runoff.
  - b. The Contractor shall inspect all temporary silt fences immediately after each rainfall and at least daily, during prolonged rainfall.
  - c. The Contractor shall immediately correct deficiencies.
  - d. The Contractor shall make a daily review of the location of silt fences in areas where construction activities have changed the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness.
  - e. Where a single fence is not adequate to handle the volume of silt or flows are not completely intercepted, additional silt fences shall be installed.
8. The Contractor shall remove and dispose of sediment deposits when the deposit approaches one-half the height of the fence.
9. The silt fence shall remain in place until the upstream surface is stabilized. Upon removal, the Contractor shall remove the silt fence, dispose of excess silt, and restore the disturbed area in accordance with Section 329200.

### **3.13 TEMPORARY PIPE**

#### **A. General:**

1. The Contractor shall install temporary pipes and fill at locations, to be crossed by the Contractor's equipment, which carry a concentrated flow during rain events.

#### **B. Construction Requirements:**

1. All temporary pipes shall be installed in the same manner as permanent pipe is installed on the project to assure that the water does not cause erosion around the pipe.
2. Material to backfill the pipe should be placed in 6" lifts and mechanically compacted. Compaction testing will not be required.

### **3.14 SEDIMENT REMOVAL**

#### **A. General**

1. Sediment deposits shall be removed when:
  - a. The deposits reach approximately one-half the height of a ditch check, compost filter sock barrier or silt fence.
  - b. The sediments have reduced the ponded volume of sediment basins to one-third of the original volume.
  - c. Requested by the Owner's Representative.

- B.** Sediment removed from erosion control features shall be deposited in a location where it will not erode into construction areas or watercourses.

**END OF SECTION 015723**

## **SECTION 017400 – CLEANING AND WASTE MANAGEMENT**

### **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 and waste management 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. 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 hard surface 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 building.
  6. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances.
  7. Remove debris and surface dust from limited access spaces, including equipment vaults, manholes, and similar spaces.
  8. Broom clean concrete floors in unoccupied spaces.
  9. Remove labels that are not permanent labels.
  10. 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.
  11. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint droppings, and other foreign substances.
  12. Clean plumbing fixtures to a sanitary condition free of stains, including stains resulting from water exposure.
  13. Clean HVAC equipment to remove all debris and surface dust.
  14. Clean light fixtures and reflectors to function with full efficiency.
  15. Leave the Project clean and ready for occupancy.
- B. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.
- C. 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 024119  
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Demolition and removal of selected portions of existing structure.
2. Demolition and removal of selected electrical, HVAC, plumbing and process equipment.

B. Related Work:

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

C. References:

1. American National Standard Institute (ANSI):
  - a. ANSI A10.6 - Safety and Health Program Requirements for Demolition Operations.
2. National Fire Protection Association (NFPA):
  - a. NFPA 241 - Standard for Safeguarding Construction, Alteration, Demolition Operations.

1.02 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.03 MATERIAL OWNERSHIP

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

1.04 INFORMATIONAL SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Schedule of Selective Demolition activities. Indicate the following:
  1. Detailed sequence of selective demolition and removal work with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  2. Coordination for shut-off, capping, and continuation of process piping and equipment.
  3. Coordination of Owner's continuing occupancy of portions of existing process structures, building, and of Owner's partial occupancy of completed Work.



- C. Pre-demolition Photographs or Video: Submit before Work begins.

#### 1.05 PROJECT CONDITIONS

- A. Existing Conditions: Accept the Project site in the condition which it exists at the time of the award of the contract.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Owner will maintain operation of portions of process structures adjacent to selective demolition areas. Conduct selective demolition so Owner's operations will not be disrupted.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Owner.
- E. Contractor shall verify all demolition dimensions shown prior to commencing demolition.

#### 1.06 BASIS OF PAYMENT

- A. Measurement: No measurements will be made for demolition work. Payment will be made on a lump sum basis.
- B. Items included: As indicated and required to complete the work.

### PART 2 - PRODUCTS

#### 2.01 PERFORMANCE REQUIREMENTS

- A. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Comply with ANSI A10.6 and NFPA 241.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- B. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Verify that utilities have been disconnected and capped before starting selective demolition.

#### 3.02 PREPARATION

- A. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent structures and facilities to remain.
  - 1. Provide protection to insure safe passage of people around selective demolition areas.
  - 2. Comply with requirements for temporary controls specified in Section 015000.
- B. Provide and maintain temporary shoring, bracing, and structural supports as required to preserve stability and prevent movement or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

#### 3.03 MECHANICAL/ELECTRICAL SYSTEMS AND EQUIPMENT

- A. Existing Systems to Remain: Maintain systems indicated to remain and protect them against damage.
- B. Existing Systems to be Removed or Abandoned: Locate, identify, disconnect, and seal or cap

off indicated mechanical/electrical systems serving items to be selectively demolished.

1. Owner will arrange to shut-off indicated systems when requested by Contractor.
2. If systems are required to be removed or abandoned, provide temporary systems that bypass area of selective demolition and that maintain continuity of system operation.
3. Piping to be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
4. Equipment to be Removed: Disconnect and cap services and remove equipment.
5. Equipment to be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment. When appropriate, reinstall, reconnect, and make equipment operational.

### 3.04 SELECTIVE DEMOLITION, GENERAL

- A. Conduct selective demolition and debris removal operations to ensure minimum interference with adjacent facilities.
- B. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
  2. Where existing equipment, piping, appurtenances, supports, brackets, clamps, etc. are removed, grind all anchor bolts and fasteners to 1½-inches below surface and patch with non-shrink grout.
  3. Dispose of demolished items and materials promptly.
- C. Removed and Reinstalled Items:
  1. Clean and repair items to functional condition adequate for intended reuse.
  2. Protect items from damage during transport and storage.
  3. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make them functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Owner or Owner's Representative, items may be removed to a suitable, protected storage area during selective demolition then cleaned and reinstalled after selective demolition operations are complete.

### 3.05 DISPOSAL OF DEMOLISHED MATERIALS

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them.
  1. Do not allow demolished materials to accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning of demolished materials is prohibited.

### 3.06 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolitions operations began.

END OF SECTION

SECTION 028233  
REMOVAL AND DISPOSAL OF ASBESTOS CEMENT (AC) PIPE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes requirements for removal and disposal of asbestos containing materials.
  - 1. During trenching operations for installation of underground utilities, Contractor may encounter Asbestos Cement (AC) Pipe that is abandoned or may be abandoned with this project.
  - 2. Any AC pipe that is disturbed or dislodged must be removed from the trench and properly disposed of in accordance with governing regulations.
  
- B. Related Documents and Work:
  - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Sections apply to this Section.
  - 2. Section 312333 – Excavation and Backfilling for Utilities
  - 3. Section 331200 – Water Distribution Systems
  
- C. References:
  - 1. Environmental Protection Agency (EPA):
    - a. EPA National Emission Standards for Hazardous Air Pollutants (NESHAP)
    - b. EPA Government Employee Worker Protection Rule
  - 2. Missouri Department of Natural Resources (MDNR):
    - a. MDNR Air Asbestos Rule
  - 3. Occupational Safety and Health Administration (OSHA).

1.02 INFORMATIONAL SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. AC pipe removal and disposal plan. Include the following:
  - 1. Identify “Competent Person” as defined by OSHA that will oversee the work and OSHA trained personnel that will perform the work.
  - 2. Proposed waste hauler and copies of applicable hazardous waste transportation licenses, registration, or certification from authorities having jurisdiction.
  - 3. Proposed landfill for disposal of waste materials and written authorization from landfill for hauler to dispose there.
  
- C. Pre- and post-removal photographs or video.

1.03 BASIS OF PAYMENT

- A. AC Pipe Removal and Disposal:
  - 1. Measurement: Linear feet of AC pipe removed and properly disposed of.
  - 2. Items Included: Excavation, removal of pipe sections and fragments, wrapping and bagging, tools and equipment, storage, hauling, landfill disposal, and compliance with requirements and regulations of all authorities having jurisdiction.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Plastic Sheetting: Fire retardant polyethylene. Minimum thickness shall be that which prevents release of asbestos through tearing, separation, or other reasonably foreseeable means, but in no case less than 6-mil thick.
- B. Plastic Bags: Bags shall be 6-mil (0.55 mm) minimum polyethylene, or sufficiently thicker for large bags so as to prevent release of asbestos through tearing, separation, or other reasonably foreseeable means and shall be labeled with OSHA asbestos warning or capable of being so labeled.
- C. Tape: Tape shall be capable of sealing joints of adjacent sheets of plastic and capable of adhering under dry and wet conditions, including wetting by amended water.
- D. Asbestos Disposal Packaging: Packaging shall be suitable to receive and retain any asbestos containing materials until disposal at an approved landfill. Packaging shall be both air and watertight.
  - 1. Packaging shall be labeled in accordance with applicable regulations of EPA, OSHA, DOT (except for limited quantity shipments), and State or local agencies.
  - 2. Marking: Packaging of asbestos containing material shall be marked in accordance with DOT regulations (except for limited quantity shipments).
- E. Surfactants (Wetting Agents): Surfactants mixed with water shall be used to produce a material that result in wetting of the asbestos containing material and retardation of fiber release during disturbance of the material. Surfactants shall be certified by their manufacturer as complying with EPA regulations controlling the use of volatile organic compounds.

### 2.02 TOOLS AND EQUIPMENT

- A. Airless Sprayer: Wetting agents shall be applied with an airless or other low-pressure sprayer such as a Hudson type sprayer.
- B. HEPA-Filtered Exhausts: Tools used to cut or abrade AC pipe shall be equipped with a HEPA vacuum attachment.

## PART 3 – EXECUTION

### 3.01 GENERAL

- A. Work on asbestos cement (AC) pipe is governed by OSHA regulations and compliance with said regulations is the sole responsibility of the Contractor.
- B. Work on AC pipe shall only be performed by OSHA trained personnel overseen by a "Competent Person" as defined by OSHA.
- C. Contractor shall be or retain a Registered Asbestos Contractor with the Missouri Department of Natural Resources.
- D. All work shall be in accordance with EPA's *National Emission Standards for Hazardous Air Pollutants (NESHAP)*, EPA's *Governmental Employee Worker Protection Rule*, and Missouri DNR's *Air Asbestos Rule*

### 3.02 EXCAVATION

- A. When excavating an AC water main, take precautions to prevent the backhoe teeth from scraping or gouging the pipe. Use a spotter to warn when the pipe is first exposed.
- B. Use heavy equipment to excavate laterally down to and around the pipe, and then complete the job by hand. This is especially important if the pipe is to be retired and removed.

### 3.03 PIPE PREPARATION

- A. AC pipe must be kept wet at all times while cutting, scraping, chipping, or otherwise abrading the pipe. Water mixed with a surfactant (soap, detergent, or other agent, designed to reduce surface tension of the water) must be used to wet the pipe. Apply the solution with a Hudson type sprayer or other airless or low-pressure type sprayer. Apply the solution frequently to areas of the pipe being abraded.
- B. Cutting Pipe: AC pipe shall **never** be cut with a high-speed mechanical saw. Pipe shall be severed with a hand-operated pipe cutter or uncoupled and removed in entire joint lengths.
- C. Coring (Tapping) Pipe: When tapping into an AC pipe, do not use high-speed mechanical boring equipment. Minimize dust by using a hand-operated drill or auger. If the tapping hole is too large for a hand drill, use an electric drill specially equipped with a HEPA vacuum attachment. Treat all collected dust, crumbs, coupons, etc. as asbestos waste by collecting in and/or on plastic bags and sheeting.

#### 3.04 PIPE RETIREMENT/REMOVAL

- A. Unless otherwise indicated or directed, all existing AC pipe shall be abandoned in place. Abandoned in place pertains only to those sections of pipe that have not been moved from their location of original installation.
- B. Pipe sections that have been moved or disconnected from their installed position must be removed from the trench and properly disposed of. Pipe sections and fragments removed from the trench must be immediately packaged for disposal and moved to a secure location. This may entail placing directly into a lined roll-off container and/or double wrapping or bagging individual pieces of pipe and/or pipe fragments in 6-mil plastic bags or sheeting.
- C. A locator marker ball shall be placed at all locations where asbestos pipe has been exposed.

#### 3.05 DECONTAMINATION OF TOOLS AND EQUIPMENT

- A. All tools and equipment used during the maintenance of the AC pipe shall be thoroughly cleaned with soap, water, and disposable towels. All materials such as towels used for cleaning, gloves, or plastic sheeting that becomes contaminated with asbestos containing material shall be packaged and disposed of properly.

#### 3.06 DISPOSAL OF AC PIPE

- A. Contractor is responsible for ensuring all sections and pieces of AC pipe and materials that cannot be abandoned in place are properly packaged and disposed of at a licensed solid waste landfill.
- B. All costs for disposal are borne by the Contractor, unless otherwise indicated on the Drawings or in these Specifications. Contractor shall document disposal by providing to the Owner the waste manifest(s) signed and returned to the Contractor by the landfill representative.

END OF SECTION

SECTION 031000  
CONCRETE FORMWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers formwork for cast-in-place concrete including:
  - 1. Form materials.
  - 2. Form accessories.
  - 3. Form construction and removal.
  
- B. Related Work:
  - 1. Section 032000 - Concrete Reinforcement
  - 2. Section 033000 - Cast-in-Place Concrete
  
- C. References:
  - 1. American Concrete Institute (ACI):
    - a. ACI 318 - Building Code Requirements for Reinforced Concrete.
    - b. ACI 347 - Recommended Practice for Concrete Form Work.
  
  - 2. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM C31 - Making and Curing Concrete Test Specimens in the Field.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Include manufacturer's product data for form accessories.

1.03 BASIS OF PAYMENT

- A. All Work under this Section shall be considered incidental to other related Work and no measurement or direct payment will be made.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

- A. Forms for concrete exposed to view after construction:
  - 1. Smooth finish exterior grade plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces.
  - 2. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
  - 3. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

B. Forms for concrete not exposed to view after construction:

1. Exterior grade plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Form Coatings:

1. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

D. Clean forms of sawdust, dust, dirt, and other foreign materials.

## 2.02 FORM ACCESSORIES

A. Form Ties:

1. Break-back, coil, or screw-type, except where otherwise specified.
2. Water-seal coil type or break-back water-seal type in walls below grade and walls of water-containing structures.
3. All types shall leave conical depression in concrete.
4. Space as required against pressure of newly-placed concrete.

B. Chamfer Strips:

1. 3/4 x 3/4 inch size except where otherwise indicated, maximum possible lengths.
2. Place in all forms to provide chamfer where concrete will have exposed projecting corners.

## PART 3 - EXECUTION

### 3.01 FORM CONSTRUCTION:

- A. Design, erect, support, brace and maintain formwork to conform to ACI 318 and ACI 347.
- B. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.
- C. Adequately brace, stiffen and support forms to prevent perceptible deflection or settlement, and to hold plumb, level and true to line.
- D. Construct sufficiently tight to prevent mortar leakage.
- E. Space studs and stringers as required to support form facing against pressure of newly placed concrete. Use walls, strongbacks, shores and bracing as required.
- F. Provide for offsets, sinkages, keyways, recesses, chamfers, blocking, screeds, bulkheads and other features required in the Work.
- G. Coordinate with Work of other Sections in forming and placing openings, slots, sleeves, bolts, anchors and inserts, and components of other Work. Accurately place and support items built into forms.
- H. Design, fabricate and construct formwork for easy removal without marring concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, recesses and the like, to prevent swelling and for easy removal.
- I. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Locate temporary



openings on forms at inconspicuous locations.

- J. Chamfer all exposed corners and edges of concrete structures using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- K. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

### 3.02 PREPARATION OF FORM SURFACES

- A. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
  - 1. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions.
  - 2. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed.
  - 3. Apply in compliance with manufacturer's instructions.
- B. Coat steel forms with a non-staining, rust preventive form-oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

### 3.03 FORM REMOVAL

- A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of work, may be removed after cumulatively curing at not less than 50 degrees F (10 degrees C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joints, slabs and other structural elements, may not be removed in less than 14 days and until concrete has attained at least 85% of design compressive strength at 28 days.
  - 1. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or member.
  - 2. Test specimens shall be made, field-cured and tested as specified in ASTM C31.
  - 3. All costs in connection with strength tests shall be Contractor's responsibility.
- C. Remove forms in a manner to avoid damage to the structure, with particular care for corners and edges.

### 3.04 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used in the Work.
- B. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for concrete surfaces exposed to view after construction.
- C. Apply new form coating compound as specified in Part 3.02.

END OF SECTION

SECTION 032000  
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers reinforcement for cast-in-place concrete including:
1. Steel reinforcing bars.
  2. Welded wire fabric.
  3. Bolsters, chairs and accessories.
- B. Related Work:
1. Section 031000 - Concrete Formwork
  2. Section 033000 - Cast-in-Place Concrete
- C. References:
1. American Concrete Institute (ACI):
    - a. ACI 301 - Specifications for Structural Concrete for Buildings.
    - b. ACI SP-66 - Detailing Manual.
    - c. ACI 318 - Building Code Requirements for Reinforced Concrete.
  2. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM A82 - Steel Wire, Plain, for Concrete Reinforcement.
    - b. ASTM A185 - Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
    - c. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  3. Concrete Reinforcing Steel Institute (CRSI):
    - a. Manual of Standard Practice.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Furnish certification that products conform to the applicable requirements of the specified standards.
- C. Submit drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI SP-66 showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete structures.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Store steel reinforcement blocked-up off the ground and in orderly stacks.
- B. Store only bars with the same identifying label in the same stack.

1.04 BASIS OF PAYMENT

- A. All Work under this Section shall be considered incidental to other related Work and no measurement or direct payment will be made.

## PART 2 - PRODUCTS

### 2.01 REINFORCEMENT BARS, TIES AND STIRRUPS

#### A. Materials:

1. Conform to ASTM A615, Grade 60, deformed.

#### B. Fabrication:

1. Fabricate with cold bends conforming to the recommended dimensions shown in ACI 318.
2. Fabricate bars according to the tolerances given in ACI 301, Chapter 5.
3. Field fabrication will be allowed only if Contractor has equipment to properly fabricate steel.
4. Attach metal or plastic tags with identifying mark or length corresponding with mark or length on drawing. Straight bars shall have mark number or size and length. Bent bars shall have mark number.
5. Contractor may, at his option, continue steel reinforcing through openings in walls and slabs, then field-cut the openings to achieve the required concrete cover between ends of bars and edge of opening.

### 2.02 WELDED WIRE FABRIC

- A. Conform to ASTM A185 using bright basic wire conforming to ASTM A82.
- B. Wire sizes W1.4 and smaller shall be galvanized.

### 2.03 SUPPORTS FOR REINFORCEMENT

- A. Conform to ACI SP-66 and the CRSI Manual of Standard Practice.
- B. Provide all bolsters, chairs, spacers and other devices necessary to properly space, support and fasten reinforcing bars and welded wire fabric in place.
- C. Use wire bar type supports complying with CRSI recommendations, unless otherwise permitted. Do not use rocks, broken bricks, wood blocks, or concrete fragments for support of reinforcement.
  1. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
  2. For exposed to view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

## PART 3 - EXECUTION

### 3.01 PLACEMENT OF STEEL REINFORCEMENT

- A. Place in accordance with Chapter 5 of ACI 301, Chapter 7 and 12 of ACI 318, and the CRSI Manual of Standard Practice.
- B. Clean reinforcement of loose rust and mill scale, dirt, ice, and other materials which reduce or destroy bond with concrete.
- C. Accurately position, support and secure reinforcement against displacement by formwork,

construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as required.

- D. Place reinforcement to obtain at least minimum coverages for concrete coverage. Minimum coverage shall conform to Chapter 5 of ACI 301 and Chapter 7 of ACI 318, unless otherwise indicated.
- E. Arrange, space and securely tie bars and bar supports with 16-gauge or larger annealed iron wire. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- F. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

END OF SECTION

SECTION 033000  
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers cast-in-place concrete work including:
1. Concrete materials.
  2. Proportioning and mix design.
  3. Placement, finishing, curing and protection.
  4. Quality control testing.
- B. Related Work:
1. Section 031000 - Concrete Formwork
  2. Section 032000 - Concrete Reinforcement
- C. References:
1. American Association of State Highway and Transportation Officials (AASHTO):
    - a. AASHTO T26 - Method of Test for Quality of Water to be Used in Concrete.
  2. American Concrete Institute (ACI):
    - a. ACI 301 - Specifications for Structural Concrete for Buildings.
    - b. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
    - c. ACI 305 - Committee Report on Hot-Weather Concreting.
    - d. ACI 306 - Committee Report on Cold-Weather Concreting.
    - e. ACI 308 - Standard Practice for Curing Concrete.
    - f. ACI 309 - Recommended Practice for Consolidation of Concrete.
    - g. ACI 318 - Building Code Requirements for Reinforced Concrete.
  3. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM C31 - Standard Practice for Making and Testing Concrete Test Specimens in the Field.
    - b. ASTM C33 - Standard Specification for Concrete Aggregates.
    - c. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
    - d. ASTM C40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
    - e. ASTM C87 - Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
    - f. ASTM C88 - Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
    - g. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
    - h. ASTM C131 - Standard Test Method for Resistance to Degredation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

- i. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate.
- j. ASTM C142 - Standard Test Method for Clay Lumps and Friable Particles in Aggregates.
- k. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
- l. ASTM C150 - Standard Specification for Portland Cement.
- m. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
- n. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
- o. ASTM C192 - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
- p. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- q. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- r. ASTM C289 - Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
- s. ASTM C295 - Standard Guide for Petrographic Examination of Aggregates for Concrete.
- t. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- u. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
- v. ASTM C566 - Standard Test Method for Total Moisture Content of Aggregate by Drying.
- w. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use a Mineral Admixture in Portland Cement Concrete.
- x. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
- y. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Type).
- z. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.
- aa. ASTM E154 - Standard Test Method for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

4. Corps of Engineers:

- a. CRD-C572 - Specification for Polyvinylchloride Waterstop.
- b. CRD-C621 - Specification for Nonshrink Grout.

5. Federal Specification (FS):

- a. FS SS-S-210 - Sealing Compound for Expansion Joints.
- b. FS TT-S-227E - Sealing Compound: Elastomeric Type, Multicomponent (for Caulking, Sealing and Glazing in Buildings and Other Structures).

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Include manufacturer's product data with application and installation instructions for proprietary materials and items including admixtures, patching compounds, waterstops, joint systems, curing compounds and others as requested.
- C. Furnish certification that products conform to the applicable requirements of the specified standards.
- D. Furnish laboratory test reports for concrete materials and mix design test as specified.

- E. Furnish samples of materials as specified and as otherwise required, including names, sources and descriptions.

### 1.03 QUALITY ASSURANCE

- A. Employ, at Contractor's expense, an independent testing laboratory acceptable to Engineer to perform material evaluation tests.
- B. Materials and installed work may require testing and retesting, as directed by Engineer, at any time during progress of Work. Allow free access to material stockpiles and facilities. Tests not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed Work, shall be done at Contractor's expense.

### 1.04 BASIS OF PAYMENT

- A. Measurement: No measurements will be made for work under this Section. Payment will be made on a lump sum basis.
- B. Items included: As indicated and required to complete the work.

## PART 2 - PRODUCTS

### 2.01 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type I or II.
  - 1. Type I may be used only if proposed aggregates have a history of not being chemically reactive, determined in accordance with ASTM C289 and C295.
  - 2. Use one brand of cement throughout project, unless otherwise acceptable to Engineer.
- B. Fine Aggregate: Natural sand conforming to ASTM C33. Manufactured sand will not be acceptable.
  - 1. Limits for deleterious substances shall conform to Table 1 of ASTM C33.
  - 2. Free of injurious amounts of organic impurities determined in accordance with ASTM C40 and ASTM C87.
- C. Coarse Aggregate: Crushed limestone conforming to ASTM C33, Size #57 (1" to #4) for sections having a minimum dimension less than 8", and Size #467 (1-1/2" to #4) for sections having a minimum dimension of 8" or greater.
  - 1. Limits for deleterious substances and physical property requirements shall conform to Table 3, Class Designation 4S of ASTM C33.
- D. Mixing Water: Fresh, clean and free of alkali or organic matter conforming to AASHTO T26.
- E. Admixtures: Use in strict compliance with manufacturer's directions.
  - 1. Mineral: Flyash conforming to ASTM C618.
  - 2. Air-Entraining: ASTM C260.
  - 3. Water Reducing: ASTM C494, Type A, and contain not more than 1.0% chloride ions.
  - 4. High Range Water Reducing (Super Plasticizer): ASTM C494, Type F or G and contain not more than 1.0% chloride ions.
  - 5. Water Reducing, Accelerator: ASTM C494, Type C or E, and contain not more than 0.5% chloride ions.

6. Water Reducing, Retarding: ASTM C494, Type D or G, and contain not more than 0.5% chloride ions.
7. Prohibited Admixtures: Calcium chloride, thiocyanates, admixtures containing more than 1.0% chloride ions, or other equally corrosive materials.

F. Laboratory Testing of Concrete Materials

1. Contractor shall deliver representative samples of proposed concrete materials to testing laboratory for the following material evaluation testing. Reports on materials shall include the following information:
  - a. Cement:
    - 1) Manufacturer's Certificate of Compliance.
  - b. Fine aggregate:
    - 1) Source and type.
    - 2) Gradation and fineness modulus, ASTM C136.
    - 3) Deleterious substances test results, ASTM C142.
    - 4) Organic impurities test results, ASTM C40.
    - 5) Results of sodium or magnesium sulfate soundness test, ASTM C88.
  - c. Coarse Aggregate:
    - 1) Source and type.
    - 2) Gradation, ASTM C136.
    - 3) Abrasion loss, ASTM C131.
    - 4) Deleterious substances test results, ASTM C142.
    - 5) Results of sodium or magnesium sulfate soundness test, ASTM C88.
  - d. Mixing Water: AASHTO T26, if other than potable water is proposed for use.
  - e. Air-entraining admixture: ASTM C231.
2. Submit test reports for concrete materials with design mix reports specified in Part 2.02, this Section.

2.02 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. Field experience shall be documented by not less than 10 consecutive strength test reports over past 60 days reporting similar materials and conditions.
- B. Submit written reports to Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Engineer.
- C. Normal weight concrete mix design criteria:
  1. Minimum compressive strength at 28 days of 4000 psi for all construction unless otherwise indicated.
  2. Minimum 564 pounds of cement per cubic yard of concrete.
  3. Maximum water-cement ratio of 0.45.



4. Entrained air content of  $6\% \pm 1\%$  by volume for coarse aggregate Size #57 (1" to No. 4) and  $4\text{-}1/2\% \pm 1\text{-}1/2\%$  by volume for coarse aggregate Size #467 (1-1/2" to No. 4), tested in accordance with ASTM C231.
5. Slump of concrete shall be 3 inches  $\pm$  1 inch, tested in accordance with ASTM C143. Slump of concrete containing high range water-reducing admixture (super plasticizer) shall not exceed 8".

D. Admixtures:

1. Partial replacement of Portland cement with flyash will be allowed subject to the following restrictions:
  - a. No flyash replacement will be allowed when placement temperatures are below 50° F.
  - b. Between 50° F and 70° F, 10% replacement will be allowed.
  - c. Above 70° F, up to 20% replacement will be allowed.
  - d. Replacement of Portland cement with flyash shall be at the rate of 1.25- parts flyash for 1.00-part Portland cement replaced.
2. May use water-reducing admixture or high range water-reducing admixture (super plasticizer) in all concrete.
3. May use accelerating admixture in concrete slabs placed at ambient temperatures below 50° F (10° C). Use of accelerating admixture will not relax cold weather concreting requirements.
4. Do not use other set control admixtures without Engineer's approval.

- E. Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted and accepted by Engineer before using in Work.

### 2.03 CONCRETE MIXING AND DELIVERY

- A. Conform to ACI 304.
- B. Adjust the amount of mix water to compensate for the moisture content of the aggregate.
- C. Ready-Mix Concrete:
  1. Comply with requirements of ASTM C94, and as herein specified.
    - a. Water added at job site to concrete having a slump below the specified minimum shall be at Contractor's risk. If the water added produces a water-cement ratio or slump greater than the specified maximum, the concrete will be rejected. If water is added the concrete shall be remixed for a minimum of 25 revolutions.
  2. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.
    - a. When air temperature is between 85° F (30° C) and 90° F (32° C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90° F (32° C), reduce mixing and delivery time to 60 minutes.
  3. Furnish concrete delivery ticket for each load of concrete delivered to job site with the following information recorded:

- a. Ticket number.
- b. Time batched.
- c. Time arrived on job site.
- d. Amount of concrete (by volume).
- e. Amount of water added at job site by Contractor.

## 2.04 RELATED MATERIALS

### A. Waterstops:

1. Virgin polyvinyl chloride complying with CRD-C572.
2. Selection criteria:
  - a. Overall width of waterstop not greater than thickness of concrete.
  - b. Distance from face of concrete to waterstop not less than half of waterstop width.
  - c. Width of waterstop at least 6 times largest aggregate size.
3. Profiles:
  - a. Horizontal construction joints: Flat, ribbed type without center bulb. Greenstreak Style 783, Southern Metal & Plastic Products Style 15FR, or approved equal.
  - b. Vertical construction joints: Split, ribbed type with center bulb. Greenstreak Style 724, Southern Metal & Plastic Products Style 15SR, or approved equal.
  - c. Expansion joints: Ribbed type with center bulb. Greenstreak Style 705, Southern Metal & Plastic Products Style 15RCB, or approved equal.
4. Provide preformed plastic adhesive type waterstop equal to SYNKO-FLEX for non-working construction joints where indicated. Such preformed plastic adhesive waterstop shall meet or exceed all requirements of FS SS-S-210.

### B. Expansion Joints:

1. Expansion Joint Filler: Preformed asphalt-impregnated fiber conforming to ASTM D1751, 1/2" thick.
2. Bond Breaker: Polyethylene strip.
3. Joint Sealant: Two-component, self-leveling urethane conforming to FS TT-S-227E. Traffic grade.

### C. Moisture Barrier:

1. Required under all concrete slabs in contact with grade.
2. Use only materials which are resistant to decay when tested in accordance with ASTM E154.
  - a. Reinforced polyethylene vapor retarders complying with ASTM D4397, consisting of two layers of polyethylene film reinforced with an inner layer of nylon cord reinforcing, and laminated together with a rubber adhesive to produce a finished product in roll form, with a minimum thickness of 10.0 mils.

### D. Plain Grout:

1. Compressive Strength: 4000 psi at 28 days.
2. Cement: Minimum 564 pounds per cubic yard.
3. Coarse Aggregate: ASTM C33 Size No. 89.
4. Fiber Reinforcing: ASTM C1116 Type III @ 1½ pounds per cubic yard.
5. Cement Ratio: 0.46, maximum.
6. Entrained Air Content: 6% ± 1% by volume.
7. Slump: 4 inches maximum.

E. Non-shrink Grout:

1. Factory pre-mixed, non-metallic grout complying with CRD-C621.
2. Acceptable manufacturers:
  - a. Master Builders - "Masterflow 713".
  - b. U.S. Grout Co. "Five Star Grout"
  - c. Approved equal

F. Grout for Bonding and Finishing:

1. One part cement to 1-1/2 parts sand. Sand and cement as specified for concrete.
2. Keep water to a minimum.

G. Bonding Agent:

1. Two component modified epoxy-resin, moisture-insensitive
2. Acceptable manufacturers:
  - a. Euclid Chemical Company - "Euco Epoxy"
  - b. Sika Chemical Corporation - "Sikadur Hi-Mod"
  - d. Approved equal

H. Moisture Retaining Cover: Waterproof paper, polyethylene film or polyethylene-coated burlap complying with ASTM C171.

I. Curing Agent:

1. Liquid membrane-forming curing compound conforming to ASTM C309, Type 1, except Type 2 shall be used for Hot Weather Concreting.
2. Curing compound used on floors to be painted, tiled or covered with resilient covering shall be guaranteed not to interfere with application of paint, tile mortar, or tile adhesive after a 28-day curing period.

J. Concrete Floor Sealer:

1. Water-based acrylic curing, sealing and dustproofing compound, VOC compliant, meeting ASTM C309 specifications.
2. Acceptable manufacturers:
  - a. Conspec Marketing and Manufacturing Company - "Cure and Seal VOC"
  - b. Sonneborn Building Products - "Kure-N-Seal W"
  - c. Approved equal

K. Concrete Anchor Bolts:

1. All anchor bolts not cast-in-place shall be amine epoxy adhesive type.
  - a. Epoxy anchoring adhesive: Simpson Set-XP® or approved equal.
2. Type 304 stainless steel including bolt, flat washer, lock washer and nut.
3. Furnish sizes and embedments as indicated or directed.
4. Install in strict conformance with manufacturer's printed instructions. Coat all stainless steel bolt and nut threads with a nickel based anti-seize thread lubricant prior to assembly.
5. Adhesive type anchor bolts shall not be substituted for indicated cast-in-place anchor bolts without written consent of Engineer for each specific anchor group or location.

### PART 3 - EXECUTION

#### 3.01 PREPARATION FOR CONCRETE PLACEMENT

- A. Openings Through Concrete: Provide openings through concrete as indicated and required for the proper installation of all equipment, piping, wiring, ductwork and similar items.
- B. Installation of Embedded Items:
  1. Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete.
  2. Provide for accurate installation of embedded items. Use setting drawings, diagrams, instructions and directions provided by suppliers of embedded items.
  3. Anchor bolts and other items to be embedded shall be securely held in place while the concrete is being placed. Support so that movement of persons or equipment on adjacent bar steel will not create movement of embedded items.
  4. Accurately set anchor bolts for alignment, elevation and plumbness. Grease or tape anchor bolt threads to protect from concrete splatter.
- C. Joints: Coordinate the installation of joint materials with placement of forms and reinforcing steel.
  1. Construction joints:
    - a. Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure, as acceptable to Engineer.
    - b. Provide shear keys at least 1-1/2" deep in construction joints in walls, slabs, and between walls and slabs or footings.
    - c. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.
    - d. Water stops: Provide as indicated.
      - 1) Install to form continuous diaphragm in each joint.
      - 2) Support and protect exposed water stops during progress of work.
      - 3) Fabricate field joints in accordance with manufacturer's printed instructions. Lapping of waterstops will not be permitted.
  2. Isolation Joints in Slabs on Grade: Isolate slabs on grade at points of contact with vertical surfaces such as column pedestals, foundation walls, grade beams and elsewhere with expansion joint filler.
  3. Contraction (Control) Joints: Maintain true alignment with straightedge and locate as

indicated. Joints shall be grooved except where sawed joints are indicated.

- a. Install grooved joints during finishing process. Width of groove shall not exceed 1/4" and depth shall be at least 1".
- b. Sawed joints shall be installed as soon after finishing without dislodging aggregate and before random shrinkage cracks can occur. Make joints approximately 1/8" wide by 1/4 slab thickness.
- c. Seal with expansion joint sealant.

D. Moisture Barriers: Coordinate with placement of forms and reinforcing steel.

1. Place moisture barrier over crushed stone fill after stone fill has been leveled and tamped.
2. Lap joints a minimum of 6" with sheet in direction of pour overlapping adjacent sheet. Seal joints with an adhesive or tape as recommended by moisture barrier manufacturer.
3. Exercise care to avoid puncturing or tearing the material during installation. Patch punctures and tears as they occur.

E. Cutting and Bonding to Existing Concrete:

1. Cutting existing concrete:

- a. Use methods and equipment that will avoid damage to adjacent parts of structure.
- b. Cut existing concrete with power concrete saw where possible to prevent spalling and chipping and to form neat, straight edge.
- c. Remove all loose or cracked pieces resulting from cutting operation, leaving only sound, undamaged concrete adjacent to new work.
- d. Install adhesive grouted dowels for lapping into new construction as indicated.

2. Bonding to Existing Concrete:

- a. Roughen concrete by use of a pneumatic chipping hammer or other approved means.
- b. Thoroughly clean the concrete surface and apply bonding agent. Place fresh concrete after the bonding agent becomes tacky.

### 3.02 CONCRETE PLACEMENT

A. General Requirements:

1. Conform with ACI 304 and as herein specified.
2. Bonding surfaces shall be clean, free of laitance and foreign materials.
3. Face horizontal bonding surfaces with 1" thick coat of fresh "grout for bonding". Wet all other surfaces.
4. Place concrete on properly prepared and unfrozen subgrade and only in dewatered excavation and forms.
5. Use forms for all concrete unless otherwise indicated or permitted.
6. Prevent foreign materials from entering the concrete forms during placing.
7. Maintain reinforcing in proper position during placement.

B. Conveying Concrete:

8. Convey concrete from the mixer and deposit in place as nearby as practicable to its final position in a manner which will prevent segregation and loss of materials.

9. Conveying equipment shall be of such size and design to provide essentially a continuous flow of concrete at the delivery end.
10. Aluminum conveying equipment is prohibited.

B. Placing Concrete in Forms:

1. Deposit concrete in forms in horizontal layers not deeper than 24" and place against bulkheads and keyways at vertical joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
2. Maximum free drop of concrete shall be 5'. Use tremies for all drops exceeding 5'.

C. Consolidating Placed Concrete:

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding or tamping. Use equipment and procedures for consolidation of concrete conforming to ACI 309 recommended practices.
2. Do not use vibrators to transport concrete inside forms. Insert vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate layer and least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
3. Provide an adequate number of vibrators of sufficient capacity to keep up with the maximum rate of concrete placement. Keep adequate standby equipment on hand and in good operating condition.

D. Placing Concrete Slabs:

1. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
2. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners. Perform as specified in Part 3.02 D.
3. Bring slab surfaces to correct level with straightedge and strikeoff. Do not disturb slab surfaces prior to beginning finishing operations.

### 3.03 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas:

1. Repair and patch defective areas with cement mortar immediately after removal of forms.
2. Chip out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by form ties, to a minimum depth of 1/2". Chip edges perpendicular to concrete surface. Thoroughly clean, dampen with water and brush with bonding agent.
3. Patch prepared surfaces using stiff mortar with same sand-cement ratio as original concrete and with minimum water for placing. Blend with white cement to match concrete color.
4. Thoroughly compact mortar into depressions so that after curing, patched area is flush with surrounding surface.
5. Moist cure for 3 days or apply curing compound.
6. Notify Engineer of areas containing defects or where reinforcing steel is exposed, prior to determining repair method.

### 3.04 FINISHING OF UNFORMED SURFACES

#### A. Screed Finish:

1. Use as first stage for all concrete finishes.
2. Use as final finish on surfaces that are to receive grout placement and as otherwise indicated.
3. Immediately after screeding, use a wood float, darby, or bullfloat to eliminate high and low spots and to embed large aggregate.
4. When used as final finish surface irregularities shall not exceed 3/8" in 10'.

#### B. Float Finish:

1. Use as second stage for surfaces that are to receive broom on trowel finish.
2. Use mechanical float. Use hand float only in areas not accessible to mechanical float.
3. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats.
4. On surfaces not to receive broom or trowel finish, finish with wood or cork float after mechanical floating to a true uniform surface so that surface irregularities do not exceed 1/8" in 10', except at floor drains.

#### C. Broom Finish:

1. Use as final finish on all outdoor slabs including pavements, walks, steps, ramps, etc.
2. Immediately after float finishing, slightly roughen surface by brooming with fiber bristle broom perpendicular to direction of traffic.

#### D. Trowel Finish:

1. Use as final finish for interior floor slabs.
2. After floating, begin first trowel finish operation using a power driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand troweling operation, free of trowel marks, uniform in texture and appearance.
3. Finish so that surface irregularities do not exceed 1/8" in 10', except at floor drains.

#### E. Floor Sealer:

1. Apply to all interior floor slabs.
2. Apply two coats at 300 square feet per gallon per coat in accordance with manufacturer's printed instructions.
  - a. Apply in an even uniform coat.
  - b. Apply first coat immediately after final finishing operations after the bleed water has receded.
  - c. Apply second coat after first coat has fully cured. Apply before concrete gets soiled or dirty.

### 3.05 FINISHING OF FORMED SURFACES

A. Rough Form Finish:

1. Use for formed concrete surfaces not exposed-to-view in the finished work.
2. This is concrete surface having texture impacted by form facing material used, with all tie holes and defective areas repaired and patched, with fins and other projections exceeding 1/4" in height rubbed down or chipped off.

B. Smooth Form Finish:

1. Use for formed surfaces exposed-to-view, or that are to be covered with a covering or coating material applied directly to the concrete such as waterproofing, damp-proofing, painting, or other similar system.
2. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch all tie holes and defective areas with fins and other projections completely removed and smoothed.

C. Grout Clean Finish:

1. Use for all concrete surfaces exposed-to-view which have received smooth form finish but are not scheduled to receive a covering or coating material.
2. Mix grout and sand with water to consistency of thick paint. Blend standard Portland cement with white portland cement, amounts determined by trial patches, so that final color of dry grout will closely match adjacent surfaces.
3. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with burlap. Keep surface damp by fog spray for at least 36 hours after rubbing.

D. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets and surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated or directed.

### 3.06 CONCRETE CURING AND PROTECTION

A. General:

1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
2. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
3. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 14 days in accordance with ACI 301 recommended procedures. Avoid rapid drying at end of final curing period.

B. Cure all concrete by one of the following methods in accordance with ACI 308.

1. Leave forms in place for a minimum of 14 days. Keep formwork wet to prevent drying of concrete surfaces.
2. Use of saturated bats, soaker hoses, or sprinkler for a minimum of 14 days. Keep



concrete continuously wet.

3. Using one coat of a liquid membrane forming compound conforming to ASTM C309, Type 1. Apply immediately after removal of forms that have been kept continuously wet; or in case of a slab, after the concrete has been finished and is hardened sufficiently to walk on.
  4. Using moisture retaining cover applied in full contact with surfaces.
  5. Curing of concrete during hot or cold weather shall conform to Parts 3.07 and 3.08.
- C. During the curing period, the concrete shall be protected from damaging mechanical disturbances such as load stresses, heavy shock and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials or methods, by curing procedures and rain or running water.

### 3.07 HOT WEATHER CONCRETING

- A. When the ambient air temperature is 90° F or above, or when the temperature is likely to rise above 90° F within the 24-hour period after concrete placement, or when there is any combination of high air temperatures, low relative humidity, and wind velocity which would impair either concrete strength or quality, follow the recommendations of ACI 305 to prevent loss of concrete strength or quality.
- B. Cool materials before mixing to maintain a concrete temperature at time of placement below 90° F. Mixing water may be chilled or chopped ice may be used to control temperature provided water equivalent of ice is included in total amount of mixing water.
- C. Thoroughly wet subgrade and forms with cool water immediately prior to placement of concrete.
- D. Cover reinforcing steel with water-soaked burlap, so that steel temperature does not exceed the ambient air temperature immediately before embedment in concrete.
- E. Protect freshly placed concrete immediately after placement to limit the rate of evaporation as recommended by ACI 305.
- F. Protect concrete with suitable insulation if rapidly decreasing nighttime temperatures occur, which would cause thermal shock to concrete placed during warm daytime temperatures.
- G. Protect the concrete with temporary wet covering during any appreciable delay between placement and finishing.
- H. Begin curing unformed surfaces immediately after finishing and continue for 24 hours. Curing shall consist of application and maintenance of water-saturated material to all exposed surfaces. After the 24-hour period, continue curing using one of the following methods:
  1. Moist curing for 12 days.
  2. Application of one coat of curing compound conforming to ASTM C309, Type 2.
  3. Application and maintenance of moisture retaining cover for 12 days.
- I. Begin curing formed concrete immediately after placing. Curing shall consist of keeping the forms continuously wet for 24 hours. Thereafter, continue curing using one of the following methods:
  1. Loosen forms and position soaker hose so that water runs down along concrete surfaces. Continue for 12 days.
  2. Strip forms and apply curing compound conforming to ASTM C309, Type 2. Do not allow concrete surfaces to dry prior to applying curing compound.

### 3.08 COLD WEATHER CONCRETING

- A. When the air temperature has fallen to or is likely to fall below 40° F during the 24-hour period after concrete placement, follow the recommendations of ACI 306 to prevent loss of concrete

strength or quality.

- B. If mixing water or aggregates are heated, cement shall not be mixed with mixing water or with mixtures of mixing water and aggregates having a temperature greater than 100° F.
- C. Minimum temperature for concrete as mixed shall be as indicated in Table 3.2.1 of ACI 306. Maximum temperature for concrete as mixed shall not exceed those shown in Table 3.2.1 by more than 10° F.
- D. Place and maintain concrete so that its temperature is never less than the temperature indicated in Table 3.2.1.

- 1. 55° F for sections having a minimum dimension less than 12"
- 2. 50° F for sections having a minimum dimension of 12" - 36".

- E. Protect the concrete to maintain the required temperature for the duration indicated in Table 3.2.2 of ACI 306.
- F. Monitor temperature of concrete in place at corners or edges of formwork to evaluate and verify the protection provided.
- G. When heated enclosures are used to maintain required temperature, monitor and regulate humidity above the minimum limit recommended in ACI 306.
- H. Heating units shall be vented and not permitted to heat or dry the concrete locally. Do not expose concrete to carbon dioxide fumes from heaters. Oil or coke burning salamanders will not be permitted. Personnel shall be present at all times to maintain safe, continuous operation of heating system.
- I. Calcium chloride will not be permitted as a concrete accelerator or to thaw frozen subgrade prior to concrete placement.
- J. The maximum allowable gradual temperature drop in the first 24-hour period after protection is ended shall be as indicated in Table 3.2.1 of ACI 306.
- K. Cure unformed surfaces by one of the following methods:

- 1. Application and maintenance of moisture retaining cover for a period of 7 days.
- 2. Application of one coat of curing compound conforming to ASTM C309, Type 1.

- L. Cure formed surfaces by one of the following methods:

- 1. Leave forms in place for 7 days.
- 2. Strip forms after 24 hours and apply curing compound conforming to ASTM C309, Type 1.

### 3.09 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. Field Testing of Concrete and Making of Concrete Test Cylinders:

- 1. Contractor shall employ and pay to retain the services of a qualified Testing Agency to furnish test equipment, test cylinder molds, and trained personnel to perform all required field tests, make the required concrete test cylinders, and deliver test cylinders to the testing laboratory.
- 2. Concrete sampling for tests and cylinder making shall be done conforming to ASTM C172. Samples shall be taken at random as directed and at the point of truck discharge.
- 3. Perform the following tests:
  - a. Prepare test cylinders conforming to ASTM C31, with not less than one set of cylinders (four cylinders) from each day's placement for each 25 cubic yards or fraction thereof.
  - b. Slump test conforming to ASTM C143. Perform tests on the first batch produced each day, for every 25 cubic yards or fraction thereof, and with every set of test cylinders.

- Perform additional tests as directed.
- c. Air content test conforming to ASTM C231. Perform for first batch each day and with each set of test cylinders.
  - d. Perform concrete and air temperature tests for first batch of day and with each set of cylinders. Take additional temperature readings as directed.
  - e. Furnish slump, air content and temperature test results to the testing laboratory for inclusion in the test cylinder reports.
4. Do not place batch of concrete being tested for slump or air content until acceptable results are obtained.
  5. Any batch of concrete with slump or air content not in conformance with specifications shall be rejected.

B. Laboratory Testing of Concrete During Construction:

1. Contractor shall employ and pay to retain the services of an engineering testing laboratory to perform required laboratory testing. Testing laboratory shall not be the same one used for proportioning and design of mixes unless otherwise acceptable to Engineer.
2. Laboratory shall cure and test concrete cylinders conforming to ASTM C192 and C39, testing two cylinders at 7-days of age and two cylinders at 28-days of age.
  - a. Low-strength concrete is defined as either:
    - 1) Concrete whose average, of any sets of three consecutive 28-day strength tests, is below the required 28-day strength.
    - 2) Concrete whose individual 28-day strength tests (average of two cylinders) is more than 500 psi below the required 28-day strength.
  - b. Potentially low-strength concrete is defined as concrete whose 7-day strength tests (average of two cylinders) is less than 70% of the specified 28-day strength.
3. Should test results indicate low strength concrete, contractor shall take immediate corrective action, as approved by Engineer.
4. Remove and replace with acceptable concrete when the quality and location of the low-strength concrete is such that Engineer considers the strength or durability of the structure is impaired and so orders.

END OF SECTION

SECTION 033500  
CONCRETE CURE-DENSIFIER-HARDENER

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Single application cure-densifier-hardener for new concrete slabs.
2. Precautions for avoiding staining concrete before and after application.

B. Related Work:

1. Section 033000 - Cast-In-Place Concrete

C. References:

1. American National Standards Institute (ANSI):
  - a. ANSI B101.1 - Test Method for Measuring Wet SCOF of Common Hard-Surface Floors.
  - b. ANSI B101.3 - Test Method for Measuring Wet DCOF of Common Hard-Surface Floors.
2. ASTM International (ASTM):
  - a. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  - b. ASTM C779 - Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
  - c. ASTM C805 - Standard Test Method for Rebound Number of Hardened Concrete.
  - d. ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
  - e. ASTM D3359 - Standard Test Methods for Measuring Adhesion by Tape Test.
  - f. ASTM F150-06 (2018) - Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring.
  - g. ASTM G23 - Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials (Withdrawn 2000).
3. National Floor Safety Institute (NFSI):
  - a. Certified as High Traction by the National Floor Safety Institute (NFSI), Phase 2 testing.
4. USGBC LEED Version 4
  - a. Indoor VOC Emission Test; California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017.
5. Health Product Declaration Collaborative (HPD)
  - a. HPD v1.0.
  - b. HPD v2.1.

## 1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Submit manufacturer's product data, including installation instructions and technical bulletins for specified products.
- C. Certificates: Manufacturer's certification that the installer is acceptable.
- D. Maintenance Data: Maintenance instructions, including precautions for avoiding staining after application.

## 1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Acceptable to the manufacturer.

## 1.04 DELIVERY, STORAGE & HANDLING

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
- C. Handling: Protect materials from dirt, corrosion, oil, grease, and other contaminants.

## 1.05 BASIS OF PAYMENT

- A. All Work under this Section shall be considered incidental to other related Work and no measurement or direct payment will be made.

## PART 2 - PRODUCTS

### 2.01 MATERIAL

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide concrete cure-densifier-hardener as marketed by one of the following:
  - 1. Curecrete Distribution, Inc. (Ashford Formula)
  - 2. Approved equal.
- B. Cure-Densifier-Hardener: A transparent, chemically reactive, water-based treatment that penetrates into the concrete surface, forming a chemical reaction of crystalline growth that fills in the natural pores and voids in the concrete surface.
- C. Performance Requirements:
  - 1. Abrasion Resistance to Revolving Disks: At least a 32.5% improvement over untreated samples when tested in accordance with ASTM C779.
  - 2. Surface Adhesion: At least a 22% increase in adhesion for epoxy when tested in accordance with ASTM D3359.
  - 3. Hardening: As follows when tested in accordance with ASTM C39:
    - a. After 7 Days: An increase of at least 40% over untreated samples.
    - b. After 28 Days: An increase of at least 38% over untreated samples.
  - 4. Coefficient of Friction: 0.86 dry, 0.69 wet when tested in accordance with ASTM C1028.
  - 5. Rebound Number: An increase of at least 13.3% over untreated samples when tested in accordance with ASTM C805.
  - 6. Electrical Resistance: To ASTM F150.
  - 7. Light Exposure Degradation: No evidence of adverse effects on treated samples when

- tested in accordance with ASTM G23.
8. Test Method for Measuring Wet SCOF of Common Hard-Surface Floors in accordance with ANSI B101.1.
  9. Test Method for Measuring Wet DCOF of Common Hard-Surface Floors in accordance with ANSI B101.3.
  10. Certified as High Traction by the National Floor Safety Institute (NFSI), Phase 2 testing.
  11. Certified Compliant according to California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017.

### PART 3 - EXECUTION

#### 3.01 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

#### 3.02 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared and are suitable for application of product.
- B. If substrate preparation is the responsibility of another installer, notify Owner's Representative of unsatisfactory preparation before proceeding.

#### 3.03 PREPARATION

- A. Clean concrete surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Do not use frozen material. Thaw and agitate prior to use.
- D. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid or other liquids.

#### 3.04 INSTALLATION

- A. New Concrete: Apply cure-densifier-hardener to new concrete as soon as the concrete is firm enough to work on after troweling.
  1. Spray on at rate of 200 ft<sup>2</sup>/gal.
  2. Keep surface wet with cure-densifier-hardener for a minimum soak-in period of 30 minutes without allowing it to dry or become slippery. If slipperiness occurs before the 30-minute time period has elapsed, apply additional cure-densifier-hardener, as needed, to keep the entire surface in a non-slippery state for the first 15 minutes; for the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state. In hot weather conditions, follow manufacturer's special application procedures.
  3. When the treated surface becomes slippery after this period, lightly mist with water until slipperiness disappears.
  4. Wait for surface to become slippery again, and then flush entire surface with water to remove all cure-densifier-hardener residue.
  5. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
  6. Wet vacuum or scrubbing machines can be used in accordance with manufacturer's instructions to remove residue.

#### 3.05 PROTECTION

- A. Protect installed surfaces for at least 3 months until chemical reaction process is complete.
1. Do not allow traffic on installed surfaces for 3 hours after application.
  2. Do not allow parking of vehicles on concrete slab.
  3. If vehicles must be temporarily parked on slab, place drop cloths under vehicles during entire time parked.
  4. Do not allow pipe cutting using pipe cutting machinery on concrete slab.
  5. Do not allow temporary placement and storage of steel members on concrete slabs.
  6. Clean up spills immediately and spot-treat stains with degreaser or oil emulsifier.
  7. Clean concrete slabs regularly in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 079213  
SEALANTS AND CAULKING

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes furnishing and installing construction sealants, backers and related materials, as scheduled and/or as called for on Contract documents. It does not include sealants for roof systems.
- B. Related Sections: Refer to the following sections for related work:
  - 1. Section 081113 - Steel Doors and Frames
  - 2. Section 089100 - Louvers
- C. References:
  - 1. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM C792 - Standard Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants
    - b. ASTM C834 - Standard Specification for Latex Sealing Compounds
    - c. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications
    - d. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
    - e. ASTM C1193 - Standard Guide for Use of Joint Sealants
    - f. ASTM D217 - Standard Test Method for Cone Penetration of Lubricating Grease
    - g. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber

1.02 DEFINITIONS

- A. Sealant Products: Any material with adhesive properties that is used to fill, seal, waterproof gaps or joints between two surfaces. Sealant products include sealant, primers and caulk.
- B. Type: Defines whether products are premixed or require mixing at job site.
  - 1. Type S: Products furnished in prepackaged cartridges or other forms in which no job-site mixing is required.
- C. Grade: Defines the flow characteristics of the sealant.
  - 1. Grade P: Products having sufficient flow to fill joints in horizontal surfaces and remain level and smooth at temperatures as low as 40° F.
  - 2. Grade NS: Nonsag or gunnable sealant that permits application in joints on vertical surfaces without sagging or slumping when applied at temperatures between 40° F and 122° F.
- D. Class: Identifies sealants according to their tested capabilities.
  - 1. Use T: Classifies sealants designed for joints in surfaces subject to pedestrian and vehicular traffic.
  - 2. Use NT: Classifies sealants designed for nontraffic exposure.
  - 3. Use M, G, A: Refers to sealants which remain adhered, within given parameters, to various standard specimens.
  - 4. Use O: Refers to substrate materials other than M, G, and A.



### 1.03 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data Sheet: Submit manufacturer's catalog data and application instructions for each material proposed for use.
- C. Manufacturer's Certifications: Submit manufacturer's certification that the proposed products are recommended and compatible with each other and substrates for the intended applications.
- D. Material Safety Data Sheets (MSDS): Submit MSDS for joint sealant products.
- E. Sealant Schedule: List type, grade, class, use classification and joint sealant backing for each proposed sealant system in project.

### 1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed joint sealant applications similar in material, design and extent to that indicated for project that have resulted in construction with a record of successful in-service performance.
- B. Single Source Responsibility: Obtain joint sealant materials from a single manufacturer for each different product required.

### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in manufacturer's original unopened containers with seals unbroken and labels intact until time of use. Store materials off ground and under cover to prevent damage or contamination to materials by water, freezing, foreign matter or other causes. Promptly remove from site any materials which show evidence of damage and immediately make all replacements necessary.

### 1.06 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40° F.
  - 2. When joint substrates are wet due to rain, frost, condensation, or other causes.
  - 3. When cementitious substrates are not thoroughly cured and dry.
  - 4. When joint substrates contain contaminants or other material which may interfere with adhesion
  - 5. When joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

### 1.07 BASIS OF PAYMENT

- A. All Work under this Section shall be considered incidental to other related Work and no measurement or direct payment will be made.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, products made by the following manufacturers will be among those considered acceptable. However, it is the contractor's responsibility to provide only products compatible with adjacent materials and substrate.

1. Dow Corning Corporation.
2. General Electric Co., GE Silicones.
3. Pecora Corporation.
4. Sonneborn Building Products Division/Chemrex, Inc.
5. Tremco, Inc.
6. Approved equal.

## 2.02 MATERIALS

- A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application.
- B. Colors: If not otherwise indicated, or chosen at time of submittals, provide color of exposed joint sealers to closely match finish color of adjacent surfaces.
- C. Sealant Type: Provide type S sealants.
- D. Elastomeric Joint Sealants: Type S; Grade NS; Class 25; Uses T, NT, M, G, A, and as applicable to uses indicated, and O. Elastomeric joint sealers shall be used for interior surfaces where noted and at all non-protected exterior applications. Provide manufacturer's standard chemically curing, elastomeric silicone sealant, which complies with ASTM C920 requirements, including those for type, grade, class and uses, and as recommended by the manufacturer for the intended use.
- E. Latex Joint Sealants: Type S; Grade NS; Class 12 1/2; Uses per ASTM C834. Latex joint sealers may be used for interior and protected exterior applications only. Provide manufacturer's standard one-part, non-sag, mildew-resistant, paintable latex sealant that is recommended for exposed applications on interior and protected exterior locations and that accommodates indicated percentage change in joint width existing at time of installation without failing either adhesively or cohesively.
  1. Acrylic-Emulsion Sealant: Provide product complying with ASTM C834 that accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.
  2. Silicone Emulsion Sealant: Provide product complying with ASTM C834 and, except for weight loss measured per ASTM C792, with ASTM C920 that accommodates joint movement of not more than 25 percent in both extension and compression for a total of 50 percent.
- F. Acoustical Joint Sealant:
  1. Acoustical Sealant: Type S; Grade NS. Provide manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C834 that is effective in reducing airborne sound transmission through perimeter joints and openings in building construction.
  2. Acoustical Sealant for Concealed Joints: Type S; Grade NS. Provide manufacturer's standard, non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic rubber sealant complying with ASTM D217 (290-310) recommended for sealing interior concealed joints.
- G. Tape Sealants: Provide manufacturer's standard, solvent-free, butyl-based tape sealant with a solid content of 100 percent formulated to be non-staining, paintable and non-migrating in contact with nonporous surfaces with or without reinforcement thread to prevent stretch and packaged on rolls with a release paper on one side.
- H. Preformed Foam Sealants: Provide manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a non-drying, water repellent agent, factory-produced in precompressed sizes

and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer and complying with the following requirements:

1. Sealant shall be permanently elastic, mildew-resistant, non-migratory, non-staining and compatible with joint substrates and other joint sealants.
- I. Joint Sealant Backing: Provide sealant backings of material and type that are non-staining, are compatible with joint substrates, sealants, primers and other joint fillers, and are approved for applications indicated by sealant manufacturer. Only elastomeric joint fillers may be used on exterior applications.
1. Plastic Foam Joint Fillers: Provide preformed, compressible, resilient, non-staining, non-waxing, non-extruding strips of open cell flexible plastic foam of size, shape and density to control sealant depth and otherwise contribute to optimum sealant performance. Provide products compatible with sealant and recommended by sealant manufacturer for the intended use.
  2. Elastomeric Tubing Joint Fillers: Neoprene, butyl or silicone tubing complying with ASTM D1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to 26 degrees F (-3 degrees C). Provide products compatible with sealant and recommended by sealant manufacturer for the intended use, with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
  3. Bond-Breaker Tape: Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## 2.03 MISCELLANEOUS MATERIALS

- A. Primer: Provide material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealants backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. General: Comply with manufacturer's recommendations and with the following:
  1. Remove all foreign materials from joint substrates which could interfere with adhesion of joint sealer, including oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  2. Clean concrete, masonry, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, acid washing, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers.
  3. Remove laitance and form release agents from concrete prior to installation of sealants.
  4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile and other nonporous

surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

5. Prime or seal joint surfaces where recommended by the sealant manufacturer. Confine primer/sealer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.

### 3.02 INSTALLATION OF JOINT SEALERS

- A. General: Comply with joint sealer manufacturer's printed installation instructions applicable to products and applications indicated, and with ASTM C1193 and ASTM C919.
- B. Backing: Provide backing material in the joint recess whenever necessary to control the depth of the sealant. One backer rod shall be a minimum of 33% oversized for closed cell and a minimum of 50% oversized for open cell backer rod.
- C. Set joint filler units at depth or position in joint as indicated to coordinate with other work, including installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between ends of joint filler units.
- D. Install sealant backer rod for liquid-applied sealants, except where shown to be omitted by the sealant manufacturer for application indicated.
- E. Install bond breaker tape where indicated or where required by manufacturer's recommendations to ensure that liquid-applied sealants will perform as intended.
- F. Employ only proven installation techniques, which will ensure that sealants are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces equally on opposite sides. Fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and vertical surfaces, fill joint to form a slight cove, so that joint will not trap moisture and dirt.
- G. Install liquid-applied sealant to depths shown or, if not shown, as recommended by the sealant manufacturer but within the following general limitations, measured at center (thin) section of beads (not applicable to sealants in lapped joints):
  1. For normal moving joints sealed with elastomeric sealants but not subject to traffic, fill joints to a depth equal to 50% of joint width, but neither more than 1/2 inch (12.7 mm) deep nor less than 1/4 inch (6.35 mm) deep.
  2. For joints sealed with non-elastomeric sealants and caulking compounds, fill joints to a depth in range of 75% to 125% of joint width.
- H. Spillage: Do not allow sealants to overflow from confines of joints, or to spill onto adjoining work. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.
- I. Do not overheat or reheat hot-applied sealants; discard and do not use this material.
- J. Recess exposed edges of gaskets and exposed joint fillers slightly behind adjoining surfaces, except as otherwise shown or specified so that compressed units will not protrude from joints.

### 3.03 CURING AND PROTECTION

- A. Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability. Cure and protect sealants in a manner which will minimize increases in modulus of elasticity and other accelerated aging effects. Replace or restore sealants which are damaged or deteriorated during the construction period.

END OF SECTION

SECTION 081113  
STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers standard steel doors and frames. See Door Schedule in Contract Drawings for types and sizes of steel doors and frames.
- B. Related sections:
  - 1. Section 079213 - Sealants and Caulking
  - 2. Section 087100 - Door Hardware
  - 3. Section 099100 - Painting
- C. References:
  - 1. American National Standards Institute (ANSI):
    - a. ANSI A250.8 - Recommended Specification for Standard Steel Doors and Frames.
    - b. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
    - c. ANSI A250.11 - Recommended Erection Instructions for Steel Frames.
  - 2. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM A153 - Zinc-Coating (Hot-Dip) on Iron and Steel Hardware.
    - b. ASTM A366/A366M - Standard Specification for Commercial Steel (CS) Sheet, Carbon, (0.15 Maximum Percent) Cold-Rolled.
    - c. ASTM A569 - Standard Specification for Steel, Carbon (0.15 Percent Maximum), Hot-Rolled Sheet and Strip, Commercial Quality.
    - d. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - e. ASTM A780 - Standard Practice for Repair of Damaged & Uncoated Areas of Hot-Dip Galvanized Coatings.
    - f. ASTM A924 - General Requirements for Sheet Steel, Metallic Coated by the Hot-Dip Process.
    - g. ASTM C578 - Specification for Rigid, Cellular Polystyrene Thermal Insulation.
  - 3. Door Hardware Institute (DHI):
    - a. DHI A115 - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.
  - 4. Military Standardization Documents (MIL):
    - a. MIL-DTL-P24441/20A Paint, Epoxy-Polyamide, Green Primer, Formula 150, Type III.
  - 5. Steel Door Institute (SDI):
    - a. SDI 100 - Recommended Specifications for Standard Steel Doors and Frames.
    - b. SDI 105 - Recommended Erection Instructions for Steel Frames.
    - c. SDI 106 - Recommended Standard Door Type Nomenclature.

- d. SDI 107 - Hardware on Steel Doors (Reinforcement-Application).
- e. SDI 111 Series - Recommended Details, Steel Doors and Frames.
- f. SDI 112 - Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames
- g. SDI 117 - Manufacturing Tolerances Standard Steel Doors and Frames.

6. Steel Structures Painting Council (SSPC):

- a. SSPC SP 1 Solvent Cleaning
- b. SSPC SP 5/NACE No 1 White Metal Blast Cleaning.
- c. SSPC Paint 20 Zinc-Rich Primers (Type I-Inorganic, and Type II-Organic).

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Submit manufacturer's data sheets and specifications for each type of door and frame specified.
- C. Shop Drawings: Submit shop drawings indicating door and frame elevations, dimensions, frame configurations and profiles, cutouts for hardware, reinforcement, anchors, and details for fabrication, glazing, and installation. Include schedule identifying each unit, with door marks or numbers referencing Contract Drawings.
- D. Certificates: Product certificates signed by the manufacturer certifying material compliance with ANSI A250.8/SDI 100, specified performance characteristics and criteria, and physical requirements.
- E. Installation Instructions: Manufacturer's printed installation instructions or copy of SDI 105.

1.03 QUALITY ASSURANCE

- A. All products shall conform to the requirements of the referenced standards and as specified herein.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Frame Spreaders: Before shipment, install temporary spreaders at bottom of frames; do not remove until frames are in place.
- B. Protection: During shipping and storage protect doors with cardboard or other resilient packaging. Immediately remove wrappings that become wet.
- C. Inspection: Upon delivery, inspect units. When approved by Owner's Representative, minor damage may be repaired such that repaired item matches undamaged items. Remove and replace all other damaged units.
- D. Storage: Store under cover in dry, vented, humidity free, protected space. Place units on 4-inch-high blocking with 1/4-inch air circulation spaces between units.

1.05 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum
- B. Items included: As indicated and required for a complete installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide steel doors and frames as manufactured by one of the following:

1. Curries Manufacturing Company.
2. Pioneer Industries.
3. Republic Builders Products.
4. The Ceco Corporation.
5. Approved equal.

## 2.02 MATERIALS

### A. Steel:

1. Uncoated Steel Sheet: Commercial quality, stretcher leveled for flatness, complying with ASTM A366 or ASTM A569.
2. Galvanized Steel Sheet: Zinc-Coated carbon steel, commercial quality, complying with ASTM A924 and ASTM A653/A653M, with A60 or G60 coating designation, mill phosphatized.

### B. Door Core:

1. Honeycomb: Resin-impregnated cardboard honeycomb with 1-inch maximum cells.
2. Polystyrene: Rigid, expanded, fire retardant, closed cell board complying with ASTM C578.

### C. Galvanizing Repair Paint: Comply with SSPC - Paint 20.

### D. Supports and Anchors: Fabricated from not less than 0.0478-inch thick steel sheet; 0.0516-inch thick galvanized steel where used with galvanized steel frames.

### E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A153, Class C or D as applicable.

### F. Shop-Applied Paint: Rust-inhibitive primer, either air-drying or baking, suitable as base for specified finish paints on steel surfaces.

1. Galvanized steel: Zinc-dust, Zinc Oxide, air-dried primer complying with MIL-DTL-P24441/20A and GS GC-03.
2. Cold rolled steel: Rust-inhibiting primer complying with ANSI A250.10 and GS GC-03 and compatible with specified field applied finish paint coats. Factory applied and either air-dried or thermoset.

## 2.03 STEEL DOORS

### A. Type: Hollow steel construction manufactured in compliance with ANSI A250.8/SDI 100.

### B. Thickness: 1-3/4 inches.

### C. Fabrication:

1. Edges: Smooth, seamless, unbroken edges with no visible seams along hinge, lock, and face surfaces. Interlocking joints shall be tack welded, filled, and ground smooth.
2. Exterior doors: Close top and bottom edges flush as integral part of door. Seal joints against water penetration.
3. Prepare doors to receive hardware in accordance with DHI A115 and SDI 107. Provide concealed hardware reinforcement plates welded in place. Coordinate with hardware supplier to ensure proper preparation of doors for mounting hardware items.
4. Manufacturing tolerances: Comply with SDI 117.

### D. Exterior Flush Panel Doors:

1. ANSI A250.8/SDI 100, Grade III, Extra Heavy-Duty, Model 1 (Level A, full flush design).

2. Face sheet: 16-gauge minimum, galvanized steel sheet, SDI 117.
3. Core: Polystyrene rigid insulation.

E. Interior Flush Panel Doors:

1. ANSI A250.8/SDI 100, Grade II, Heavy-Duty, Model 1 (Level B, full flush design).
2. Face sheet: 18-gauge minimum, galvanized steel sheet, SDI 117.
3. Core: Polystyrene rigid insulation.

F. Exterior Steel Stiffened, Flush Panel Doors:

1. ANSI A250.8/SDI 100, Grade III, Extra Heavy-Duty, Model 3 or 4.
2. Face sheet: 14-gauge minimum, galvanized steel sheet, SDI 117.
3. Core: Doors reinforced with 20-gauge hat shaped steel stiffeners at 6 inches maximum welded to inside face sheet. Areas between stiffeners filled with mineral wool or fiberglass insulation.

## 2.04 FRAMES

A. Provide metal frames for doors according to ANSI A250.8/SDI 100 and of types and styles as shown on Contract Drawings. Conceal fastenings, unless otherwise indicated.

B. Fabrication:

1. Fabricate frames as welded units with mitered corners and reinforced. Welds shall be full length of joint and ground smooth. Face joints shall be seamless.
2. Mortise, reinforce with plates, and drill frames to receive hardware in accordance with DHI A115 and SDI 107. Coordinate with hardware supplier to ensure proper preparation of frames for mounting hardware items.
3. Except on weather-stripped frames, prepare doorframes for 3 silencers.

C. Profile: Combination type with integral stop and trim of size and configuration shown on Drawings. Minor variations to accommodate manufacturer's standard fabrication are acceptable.

D. Exterior frames:

1. ANSI A250.8/SDI 100, Grade III, Extra Heavy-Duty.
2. Material: 14-gauge minimum, galvanized steel sheet, SDI 117.

E. Interior frames:

1. ANSI A250.8/SDI 100, Grade II, Heavy-Duty.
2. Material: 16-gauge minimum, galvanized steel sheet, SDI 117.

F. Provide anchors for mechanical attachment of frames to adjacent structure. Sizes and shapes as required for adjoining wall construction.

1. Masonry: Install at least three (3) wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb.
2. Anchors for galvanized frames shall have hot-dip galvanized finish.

## 2.05 FACTORY APPLIED FINISHES

A. Cold-Rolled Steel Sheet Finishes:



1. Preparation: In accordance with SSPC-SP 1, clean with non-petroleum solvent to remove oil, dirt, grease, and other contaminants. Remove mill scale and rust to comply with SSPC SP 5.
  2. Pretreatment: Immediately after preparation, apply conversion coating compatible with primer.
  3. Primer: Immediately after pretreatment, apply primer that complies with ANSI A250.10 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats.
- B. Galvanized Steel Sheet Finishes:
1. Preparation: Clean with non-petroleum solvent to remove oil, dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint in accordance with ASTM A780 and SSPC Paint 20.
  2. Pretreatment: Immediately after preparation, apply conversion coating compatible with primer.
  3. Primer: Zinc-Dust, Zinc-Oxide primer paint complying with performance requirements of MIL-DTL-P24441/20A.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install in accordance with approved shop drawings, manufacturer's instructions, and ANSI A250.11.
- B. Placing Frames: Comply with provisions of ANSI A250.11/SDI 105, unless otherwise indicated.
  1. For new construction, place frames before constructing enclosing walls, and ceilings.
  2. Backcoat frame with fibered-emulsion asphaltic coating immediately prior to erection.
  3. Center in opening, plumb, square and level.
  4. Door jamb anchors: Install three (3) minimum at each jamb, at hinge and at strike locations.
- C. Fully grout hollow metal frames in masonry construction.
- D. Seal joints around frames in accordance with Section 079213, "Joint Sealers".
- E. Hardware: Install door hardware in accordance with Section 087100, "Door Hardware". Ensure gaskets and weather-stripping are provided for all exterior frames. Locate hardware as indicated on approved shop drawings or, if not indicated, in accordance with DHI A115.
- F. Door Installation: Fit steel doors accurately in frames in accordance with ANSI A250.11 within these clearances:
  1. Head and Jamb: 1/8 inch.
  2. Bottom: 3/4 inch.
  3. Pair of Doors Meeting Edges: 1/8 inch.
  4. Door Face and Stop: 1/16 inch.

#### 3.02 ADJUST AND CLEAN

- A. Immediately after erection, sand smooth all rusted and damaged areas of prime coat. Touch-up with compatible, air-drying primer.
- B. Check and readjust hardware items, leaving doors and frames in proper operating condition.

END OF SECTION

SECTION 083113.13  
VAULT ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes materials and installation requirements for factory fabricated floor access doors and frames.
- B. Related Work:
  - 1. Section 330516 - Utility Structures

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide manufacturer's product data and specifications verifying compliance with specified requirements.
- C. Shop Drawings: Show profiles, accessories, location, and dimensions.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to site in manufacturer's original packaging with labels clearly indicating manufacturer and material.
- B. Store materials in a dry, protected, well-vented area, protected from damage and in accordance with manufacturer's instructions.
- C. Protect materials and finishes during handling and installation to prevent damage.

1.04 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum
- B. Items included: As indicated and required for a complete installation.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide vault access doors as manufactured by one of the following:
  - 1. Bilco Corporation.
  - 2. Halliday Products.
  - 3. U.S. Foundry and Manufacturing Corporation.
  - 4. Approved equal.

2.02 ACCESS DOORS

- A. Provide access doors of type and size indicated or required for the specific application.
- B. Design and Construction Materials:
  - 1. Frame shall be one-piece extruded aluminum incorporating a continuous concrete anchor.
  - 2. Door leaves shall be 1/4" aluminum diamond pattern plate, reinforced to support a

minimum live load of 300 psf.

3. Doors shall open to 90 degrees and automatically lock with an aluminum or stainless steel hold open arm with release handle. Doors shall close flush with frame.
4. Equip doors with a non-corrosive flush drop handle for lifting and a non-corrosive staple for padlocking.
5. Hinges and all fastening hardware shall be stainless steel.
6. Finishes: Factory finish shall be mill finish aluminum. An alkali resistant bitumastic coating shall be applied to the frame exterior where it will come in contact with concrete.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Verify manufacturer's access door and frame details for accuracy to fit the application prior to installation.
- B. Install access doors as indicated on the drawings and in accordance with the manufacturer's installation instructions.

END OF SECTION

SECTION 087100  
DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers finish hardware for doors as specified and as listed in "Hardware Schedule" and required by actual conditions.
- B. Related sections:
  - 1. Section 081113 - Steel Doors and Frames
- C. References:
  - 1. American National Standards Institute (ANSI):
    - a. A115 - Steel Door and Frame Preparation for Hardware
    - b. A156.1 - Butts and Hinges.
    - c. A156.3 - Exit Devices.
    - d. A156.4 - Door Controls - Closers.
    - e. A156.6 - Architectural Door Trim.
    - f. A156.7 - Template Hinge Dimensions.
    - g. A156.15 - Closer Holder Release Devices.
    - h. A156.16 - Auxiliary Hardware.
    - i. A156.21 - Thresholds.
    - j. A156.22 - Door Gasketing Systems.
  - 2. Builders Hardware Manufacturer's Association (BHMA):
    - a. 1301 - Materials and Finishes.
  - 3. Door and Hardware Institute (DHI):
    - a. Keying - Procedures, Systems and Nomenclature.
    - b. Architectural Hardware Scheduling Sequence and Schedule Format.
    - c. Abbreviations and Symbols.
    - d. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames.
    - e. Recommended Procedure for Processing Hardware Schedules and Templates.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Submit manufacturers' product data for each hardware item, installation instructions, and other information necessary to demonstrate compliance with requirements.
- C. Hardware Schedule: Submit hardware schedule coordinated with door, frame, and related work to ensure proper size, thickness, hand, function, and finish of door hardware. Check specified hardware for suitability and adaptability to details and surrounding conditions. Indicate unsuitable or incompatible items and proposed substitutions in hardware schedule.
  - 1. Hardware schedule content to include the following information:

- a. Type, style, function, size, and finish of each hardware item.
  - b. Name and manufacturer of each item.
  - c. Fastenings and other pertinent information.
  - d. Explanation of all abbreviations, symbols, and codes contained in schedule.
  - e. Mounting locations for hardware.
  - f. Door and frame size and materials.
2. Templates: Furnish copy of approved Hardware Schedule and necessary templates to manufacturers of doors, frames, and other work to be factory prepared for the installation of door hardware.

### 1.03 QUALITY ASSURANCE

- A. Industry Standards: Finish hardware for doors shall comply with applicable provisions of the Industry Standards referenced in Part 1.01 C.
- B. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.
- C. Supplier Qualifications: A recognized architectural finish hardware supplier who has a record of successful in-service performance for supplying door hardware of similar type and quality to that indicated, and employs an experience architectural hardware consultant (AHC) who is available to Owner, Engineer, and Contractor for consultation at reasonable times during the course of the Work.

### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Ship door hardware to site in unopened boxes, clearly labeled with identification related to approved hardware schedule.
- B. Store and protect hardware until needed for installation.

### 1.05 BASIS OF PAYMENT

- A. All Work under this Section shall be considered incidental to other related Work and no measurement or direct payment will be made.

## PART 2 - PRODUCTS

### 2.01 PRODUCT REQUIREMENTS

- A. Hardware shall comply with the respective applicable standards referenced in Part 1, this Section.
- B. Provide hardware complete with all fasteners, anchors, instructions, layout templates, and any specialized tools as required for satisfactory installation and adjustment.

### 2.02 MATERIALS AND FABRICATION

- A. General: Hardware shall be identified by ANSI as Grade 1 hardware where applicable. Where applicable, function shall be as indicated on drawings, noted in Hardware Schedule, or chosen at time of Submittals.
- B. Hand of Door: Refer to Drawings for swing of each door leaf. Furnish hardware items suitable for indicated door movement.
- C. Base Metals: Produce hardware units of basic metal using manufacturer's standard alloy, composition, temper, and hardness conforming with applicable provisions of BHMA 1301.

- D. Fasteners: Hardware to conform to templates prepared for screw installation.
- E. Furnish installation screws with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish of screws to match hardware finish.
- F. Where possible, provide concealed fasteners for hardware items, which are exposed when the door is closed. Do not use through bolts for installation where bolt head or nut is exposed on opposite face except where it is not feasible to reinforce the work.
- G. Finishes, unless otherwise specified or indicated, conform with the following:
  - 1. Butts: Out-Swinging Exterior Doors, US32D (BHMA 630) on Stainless Steel.
  - 2. Butts: Interior Doors and In-Swinging Exterior Doors, US26D (BHMA 652) on Steel.
  - 3. Flush Bolts: US26D (BHMA 626) on Brass or Bronze.
  - 4. Exit Devices: US32D (BHMA 630) on Stainless Steel.
  - 5. Locks and Latches: US26D (BHMA 626) on Brass or Bronze.
  - 6. Coordinators: USP (BHMA 600) on Steel.
  - 7. Kick Plates: US32D (BHMA 630) on Stainless Steel.
  - 8. Wall Stops: US26D (BHMA 626) on Brass or Bronze.
  - 9. Closers: Sprayed Aluminum Lacquer.
  - 10. Miscellaneous Hardware: US26D (BHMA 626) on Brass or Bronze.

### 2.03 HARDWARE SCHEDULE

- A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated in the "Hardware Schedule" at the end of this Section. Products are identified by using hardware designation numbers of the first named manufacturer listed in Parts 2.04 through 2.14, this Section, for the purpose of establishing minimum requirements. Equivalent products of other manufacturers will also be acceptable.

### 2.04 BUTTS AND HINGES

- A. Acceptable Manufacturers and Types:

	Hager	McKinney	Stanley
Type 1	BB1279	TA2714	FBB179
Type 2	BB1168	T4A3786	FBB168
Type 3	BB1199	T4A3386	FBB199

- B. Application: Provide full mortise, heavy weight and standard weight, 5-knuckle, ball-bearing type hinges.
  - 1. Exterior out-swinging doors: Use Type 3 x NRP.
  - 2. Exterior in-swinging doors: Use Type 3.
  - 3. Interior doors with closers: Use Type 1 or 2.
  - 4. Interior doors over 36 inches wide: Use Type 2.
  - 5. Interior doors 36 inches or less without closer: Use Type 1.
  - 6. Provide NRP (non-removable pins) at out-swinging lockable doors.
- C. Size:
  - 1. 2-1/4 inch thick doors: Use 5 inch by 5 inch.

2. 1-3/4 inch thick doors: Use 4-1/2 inch by 4-1/2 inch.
3. 1-3/8 inch thick doors: Use 3-1/3 inch by 3-1/2 inch.

D. Quantity:

1. 2 -hinges per leaf for openings through 60 inches high.
2. 1 -additional hinge per leaf for each additional 30 inches in height or fraction thereof.

2.05 FLUSH BOLTS AND STRIKES

A. Acceptable Manufacturers:

	Ives	Trimco
Flush Bolts	FB458N	3915
Strikes	DP2	3910

- B. Provide top and bottom flush bolts for inactive leaf of pairs of locked and latched doors. Locate centerline of top bolt not more than 78 inches from finished floor. Provide dust-proof strike for bottom bolt.

2.06 LOCKSETS - MORTISE

A. Acceptable Manufacturer and Series:

1. Corbin-Ruswin ML2000 Series
2. Sargent 8200 Series
3. Yale 8800 Series
4. Approved equal.

B. Provide lock functions specified in Hardware Schedule, with following provisions:

1. Cylinders: Manufacturer's high security removable core 6-pin, meeting the requirements of UL437.
2. Backsets: 2-3/4 inches.
3. Strikes: Provide wrought boxes and strikes with proper lip length to protect trim but not to project more than 1/8 inch beyond trim, frame, or inactive leaf. Where required, provide open back strike and protected to allow practical and secure operation.

2.07 EXIT DEVICES

A. Acceptable Manufacturers:

1. Corbin-Ruswin 3000 Series
2. Sargent 90 Series
3. Von Duprin 88 Series
4. Approved equal.

B. Provide panic-listed crossbar exit device type and functions as specified in Hardware Schedule.

C. Where lever trim is specified, provide lever design to match lockset levers.

D. Provide cylinders for exit devices with single-point, 1/4 turn hex key dogging.

## 2.08 KEYING

A. All new cylinder locks shall be keyed to match the Owner's existing keying system. Coordinate with Owner accordingly.

## 2.09 DOOR TRIM

A. Acceptable Manufacturers and Types:

1. Trimco.
2. Burns.
3. Hiawatha.

B. Kick Plates and Armor Plates: Minimum of 0.050 inch thick, beveled 4 edges.

1. At single doors provide width 1-1/2 inch less than door width on stop side and one inch less than door width on face side.
2. At pairs of doors provide width one inch less than door width on both sides.
3. Height of 10 inches, unless otherwise indicated.

## 2.10 CLOSER/HOLDERS

A. Acceptable Manufacturers and Types of Exposed Closer/holders:

1. Corbin-Russwin DC6200 Series
2. Sargent 281 Series
3. LCN 4140 Series
4. Approved equal.

B. Provide sized closers, adjustable for indicated door width.

C. Provide drop plates, brackets, or adapters for arms as required to suit details.

D. Mount closers on push side of doors.

E. Provide back-check for closers.

F. Provide single-point or multi-point hold-open arms as specified.

## 2.11 HOLD-OPEN ARMS

A. Acceptable Manufacturers:

1. LCN PAH60
2. Sargent 590H Series
3. Approved equal.

B. Hold-open point adjustable.

C. Provide on inactive leaf of pairs of doors where active leaf has closer installed.

## 2.12 WALL STOPS

A. Acceptable Manufacturers and Types:



1. Trimco 1270WX, 1205 or 1207.
- B. Provide 1270WX Series wall stop as applicable, for each door leaf except where wall stops WB11X are specified in Hardware Schedule, or where conditions require the use of an overhead stop.
- C. Provide 1540 Series overhead stops for doors that swing more than 140 degrees before striking a wall.
- D. Floor or base stops shall be used only where definitely specified or absolutely unavoidable.

## 2.13 THRESHOLDS

- A. Acceptable Manufacturers:
  1. American Safety Tread Company.
  2. Wooster Products, Inc.
  3. Approved equal.
- B. Where thresholds are specified in Hardware Schedule, provide cast abrasive saddle type unless detailed otherwise. Provide accessories, shims, and fasteners.

## 2.14 WEATHERSTRIPPING

- A. Acceptable Manufacturers and Product:

	Pemko	Reese	National Guard
Sweeps	315CN	323A	200N
Head & Jambs	316AV	DS75A	156
Rain Drips	346C	R201A	16AD

- B. Where weatherstripping is specified in hardware groups, provide 316AV unless detailed otherwise. Provide self-tapping fasteners for weatherstripping being applied to hollow metal frames.
- C. Where sweeps are specified in Hardware Schedule, provide 315CN unless detailed otherwise.
- D. Where rain drips are specified in Hardware Schedule, provide 346C x full frame width, unless detailed otherwise.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine doors, frames, and related items for conditions that would prevent the proper application of finish hardware. Do not proceed until defects are corrected.

### 3.02 INSTALLATION

- A. Install finish hardware in accordance with approved hardware schedule and manufacturer's printed instructions. Pre-fit hardware before finish is applied, remove and reinstall after finish is completed. Install hardware so that parts operate smoothly, close tightly and do not rattle.
- B. Set units level, plumb and true to line and location. Adjust and reinforce attachment to substrate

- as necessary for proper installation and operation.
- C. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
  - D. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant, forming tight seal between threshold and surface to which set. Securely and permanently anchor thresholds, using countersunk non-ferrous screws to match color of thresholds (stainless steel screws at aluminum thresholds).

### 3.03 FIELD QUALITY CONTROL

- A. After installation has been completed, provide services of qualified hardware consultant to check Project to determine proper application of finish hardware according to schedule. Also check operation and adjustment of hardware items.
- B. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

### 3.04 ADJUSTING AND CLEANING

- A. At final completion, hardware shall be left clean and free from disfigurement. Make final adjustment to door closers and other items of hardware. Where hardware is found defective repair or replace or otherwise correct as directed.
- B. Adjust door closers to meet opening force requirements of Uniform Federal Accessibility Standards.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of space or area, return to work during week prior to acceptance or occupancy, and make final check and adjustment of hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors.
- D. Instruct Owner's personnel in proper adjustment and maintenance of door hardware and hardware finishes.
- E. Clean adjacent surfaces soiled by hardware installation.

### 3.05 PROTECTION

- A. Provide for proper protection of items of hardware until Owner accepts Project as complete.

### 3.06 HARDWARE SCHEDULE

- A. Requirements for design, grade, function, finish, size, and other distinctive qualities are indicated in the following Schedule. Products are identified by ANSI 156 reference numbers and using manufacturer's hardware model numbers.
- B. Manufacturer's product designation numbers are listed for hardware items to establish minimum requirements. Equivalent products of other manufacturers will be acceptable.
- C. The Hardware Schedule is intended as a guide only and it shall be the hardware supplier's responsibility to furnish all required hardware of proper type for attaching securely to specific project substrate.

1. Exterior Entrance Door: Out-swinging 6'-8" x 3'-8" steel door.
  - a. Butt Hinges: Comply with ANSI A156.1. Hager BB1189, 4-1/2" x 4-1/2" NRP, 1-1/2 pair.
  - b. Mortise Exit Device: Comply with ANSI A 156.3, Type 3, Grade 1, Function 03. Corbin-Russwin ED3655AT x 630 with heavy duty lever trim

- c. Combination Closer: Comply with ANSI A156.4, Grade 1. Corbin-Russwin DC6210-A2 x 689.
- e. Hold Open Arm: Comply with ANSI A156.8, Grade 1. LCN PAH60.
- f. Threshold: American Safety Tread Company Style 815, 4" x 1/2".
- g. Weatherstripping (Head and Jamb): Pemko 316V, finish selected by Owner at time of submittals.
- h. Sweep: Pemko 315V, finish selected by Owner at time of submittals.
- i. Kick Plate: Comply with ANSI A156.6. Trimco 1024- 12" x 2" LDW.

END OF SECTION

SECTION 089100  
LOUVERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes materials and installation requirements for combination louvers with fixed, drainable blades and integral control damper.
- B. Related Work:
  - 1. Section 079213 - Sealants and Caulking
- C. References:
  - 1. Aluminum Association (AA).
  - 2. Air Movement and Control Association (AMCA):
    - a. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.
    - b. AMCA 501 - Application Manual for Air Louvers.
  - 3. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings.
    - b. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
    - c. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
    - d. ASTM D1187 - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
  - 4. American Welding Society (AWS):
    - a. D1.2 - Structural Welding Code – Aluminum.
  - 5. National Association of Architectural Metal Manufacturers (NAAMM).
  - 6. National Electrical Manufacturers Association (NEMA).
  - 7. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Submit manufacturer's product data including performance data.
- C. Shop Drawings: Submit shop drawings indicating materials, construction, dimensions, accessories, and installation details.

1.03 QUALITY ASSURANCE

- A. Performance Requirements: Where louver is indicated to comply with specific performance requirements, provide unit whose performance ratings have been determined in compliance with AMCA Standard 500.
- B. Comply with SMACNA recommendations for fabrication, construction details, and installation

procedures, except as otherwise indicated.

- C. Welding: Qualify procedures and personnel according to AWS D1.2.

#### 1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- B. Storage: Store materials in a dry area indoors, protected from damage and in accordance with manufacturer's instructions.
- C. Handling: Protect materials and finishes during handling and installation to prevent damage.

#### 1.05 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum
- B. Items included: As indicated and required for a complete installation.

### PART 2 - PRODUCTS

#### 2.01 BASIC MATERIALS

- A. Aluminum Extrusions: ASTM B221, Alloy 6063-T5.
- B. Aluminum Sheet: ASTM B209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Aluminum Castings: ASTM B26/B26M, Alloy 319.
- D. Fasteners: Of same basic metal and alloy as fastened metal or 300 series stainless steel, unless otherwise indicated. Do not use metals that are incompatible with joined materials.
  - 1. Use types and sizes to suit unit installation conditions.
  - 2. Use Phillips flat-head screws for exposed fasteners, unless otherwise indicated.
- E. Post-Installed Fasteners Concrete and Masonry: Torque-controlled expansion anchors, made from stainless steel components.
- F. Bituminous Paint: Alkali resistant cold-applied asphalt emulsion complying with ASTM D1187.

#### 2.02 FABRICATION

- A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation.
- B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter joint sealants.
- D. Include drain gutter in head frame and down spouts in jambs to drain water from louver for minimum water cascade from blade to blade. Angle sill to eliminate areas of standing water or trapped moisture.
- E. Provide extended sills made of same material as louvers for recessed louvers.
- F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view.
- G. Include supports, anchorages and accessories required for a complete assembly.

#### 2.03 LOUVERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide combination blade louvers as manufactured by one of the following:
  - 1. Pottorff Model EXD-645.
  - 2. Vent Products Model 2000.
  - 3. Approved equal.
- B. Frame: 6" deep x 0.081" thick channel.
- C. Blades:
  - 1. Front blades 37½° x 0.081" thick horizontal fixed drainable style.
  - 2. Rear blades 0.125" thick horizontal operable airfoil style.
- D. Screen: Aluminum, ½" square mesh, 0.063 inch wire.
- E. Linkage: Concealed in frame.
- F. Bearings: Synthetic.
- G. Performance Requirements:
  - 1. Structural Performance: Provide louvers capable of withstanding the effects of gravity loads and wind loads based on a uniform pressure of 30 psf acting inward or outward.
  - 2. Air-Performance and Water-Penetration: Provide louvers complying with parameters indicated, as demonstrated by testing manufacturer's standard units identical to those provided, except for length and width according to AMCA 500-L.
    - a. Free Area: Not less than 7.1 square feet for 48" wide louver with air flow of 7455 cfm.
    - b. Air Performance: Not more than 0.19" wg static pressure drop at 1050 fpm free area velocity.
    - c. Water Penetration: Maximum of 0.01 ounces per square foot of free area at specified free area velocity when tested for 15 minutes.

## 2.04 ACCESSORIES

- A. Accessories:
  - 1. Sill Flashing: 20 ga. 5052-H32 aluminum. Finish to match louver.
  - 2. Electric Actuator: On/off, spring return, 120 vac, NEMA Type 2/IP54 housing. Belimo NF Series, factory mounted. Interlock with existing exhaust fan to open when fan is energized. See Electrical Detail 2/E501.

## 2.05 FINISHES

- A. Conform with NAAMM's "Metal Finishes Manual for Architectural and Metal Products".
- B. Finish louvers and accessories after assembly.
- C. Clear Anodize: Complying with AA-C22A41, Class-1, 0.7 mils minimum thickness.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Clean opening thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by louver manufacturer for achieving best result for the substrate under project conditions.

### 3.03 INSTALLATION

- A. Install louvers at locations indicated and in accordance with manufacturer's instructions.
- B. Install louvers level, plumb, in plane of wall, and in alignment with adjacent work.
- C. Use concealed anchorages. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- D. Form closely fitting joints with exposed connections accurately located and secured.
- E. Repair finishes damaged from installation so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
- F. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of alkali resistant bituminous paint on surfaces that will be in contact with concrete, masonry or dissimilar metals.
- G. Comply with Section 079213 - Sealants and Caulking for joint sealants applied during louver installation.
- H. Install sill flashing set in mastic.

### 3.04 CLEANING

- A. Clean exposed louver surfaces to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
- B. Prior to final inspection, clean exposed surfaces with a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Engineer, remove damaged units and replace with new units. Touch-up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION

SECTION 099100  
PAINTING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes painting and finishing of interior and exterior exposed items and surfaces throughout the project.
1. Work includes surface preparation, prime coat, intermediate coat, finish coat, inspection, cleaning, and touch-up of surfaces and equipment. Shop preparation and prime, intermediate or finish coats to be shop-applied, are specified elsewhere or referenced to this Section.
    - a. Where surface preparation and prime coat are specified in other Sections to be shop-applied, such as for structural steel, hollow metal doors or equipment, only touch-up, intermediate and finish coats are a part of field painting.
    - b. If materials are provided without shop primer, such as miscellaneous steel or sheet metal, then surface preparation, prime, intermediate and finish coats are a part of field painting.
    - c. Where equipment and materials are provided with shop-applied finished paint system, only touch-up is a part of field painting.
    - d. Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas.
    - e. Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting.
- B. Related Work:
1. Shop Surface Preparation and Painting: All applicable Divisions.
  2. Factory Prefinished Items: All applicable Divisions.
- C. References:
1. American National Standards Institute (ANSI):
    - a. ANSI Z53.1 - Safety Color Code for Marking Physical Hazards.
  2. Steel Structures Painting Council (SSPC):
    - a. SSPC SP1 - Solvent Cleaning: Removes oil, grease, soil, drawing and cutting compounds, and other soluble contaminants.
    - b. SSPC SP2 - Hand Tool Cleaning: Removes all loose scale, rust, paint and other loose detrimental foreign matter, but not adherent material.
    - c. SSPC SP3 - Power Tool Cleaning: Removes all loose scale, rust, paint and other loose detrimental foreign matter, but not adherent material. Provides slightly higher degree of cleanliness than Hand Tool Cleaning.
    - d. SSPC SP5 - White Metal Blast Cleaning: Removes all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter.
    - e. SSPC SP6 - Commercial Blast Cleaning: Removes all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter. Two-thirds of each square inch free of all visible residues; remainder only slight discoloration.
    - f. SSPC SP10 - Near-White Metal Blast Cleaning: Removes all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products and other foreign matter.



Ninety-five percent of each square inch free of all visible residues; remainder only slight discoloration.

- g. SSPC SP11 - Power Tool Cleaning To Bare Metal: Removes all loose scale, rust, paint and other loose detrimental foreign matter. Slight residues of rust and paint may be left in the lower portion of pits if the original surface is pitted. Differs from SSPC SP3 in that it requires more thorough cleaning and a surface profile not less than 1 mil.
  - h. SSPC SP12 - Surface Preparation By Water Jetting: Surface preparation and cleaning of steel and other hard materials by high- and ultra-high pressure water jetting to achieve various degrees of cleanliness prior to recoating. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.
3. NSF International (Formerly National Sanitation Foundation):
- a. NSF 61 - Drinking Water System Components - Health Effects.

#### 1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Furnish manufacturer's technical information, including paint label analysis and application instructions for each material proposed for use. Include Material Safety Data Sheets.
- C. Furnish color charts for selection and acceptance
- D. Furnish certification by paint manufacturer(s) that proposed products are suitable for the specific substrates and service intended.

#### 1.03 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide primers and other undercoat paint produced by the same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.
- B. Coordination of Work: Review other sections of these specifications in which prime coats are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.
- C. Furnish paints that have been recommended by the manufacturer for the substrate and service conditions specified.

#### 1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:
  - 1. Manufacturer's name, product name and number.
  - 2. Type of paint and generic name.
  - 3. Color name and number.
  - 4. Storage and temperature limits.
  - 5. Thinning, mixing and application instructions.
  - 6. Drying, recoat or curing time.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.
  - 1. Protect from freezing where necessary.
  - 2. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.
  - 3. Dispose of used or leftover containers, thinners, rags, brushes, and rollers in accordance with applicable regulations.

## 1.05 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum
- B. Items included: As indicated and required for a complete installation.

## PART 2 - PRODUCTS

### 2.01 COATING SYSTEMS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following:
  - 1. Tnemec Company, Inc.
  - 2. The Sherwin-Williams Company.
  - 3. Approved equal.
- B. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.
  - 1. Proprietary names used to designate colors or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.
  - 2. Furnish material data and manufacturer's certificate of performance to Engineer for any proposed substitutions.
- C. Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.
- D. Regulatory Requirements:
  - 1. Provide coating materials that conform to the restrictions of local and regional authorities having jurisdiction. Notify Engineer of any coating specified herein that is in non-conformance.
  - 2. Lead Content: In accordance with the Consumer Products Safety Act, Part 1303, use only products having a lead content less than 0.06% by weight.
  - 3. Chromate Content: Do not use coatings containing zinc-chromate or strontium chromate.
  - 4. Asbestos Content: Materials shall not contain asbestos.
  - 5. Mercury Content: Materials shall not contain mercury or mercury compounds.

### 2.02 COLOR CODING OF PIPING AND PHYSICAL HAZARDS

- A. Coat exposed exterior and interior piping with solid colors as specified below for entire length of pipe.

Pipe Contents	Pipe Color
Gas	Red
Potable Water	Dark Blue
Raw Sewage	Dark Grey
Sludge	Dark Brown

- B. Coat all other piping in colors matching adjacent surfaces.
- C. Coat physical hazards with safety yellow.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.
- B. Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, oil, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

### 3.02 SURFACE PREPARATION

- A. General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
  - 1. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Engineer in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
  - 2. Clean surfaces to be painted before applying paint or surface treatments. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.
- B. Prepare surfaces for each coating system conforming to SSPC surface preparation specifications listed in the coating schedules.
  - 1. If grease or oils are present, SSPC-SP1 must precede any other method specified.
  - 2. Remove surface irregularities such as weld spatter, burrs, or sharp edges, prior to specified surface preparation.
- C. Prepare only those areas which will receive prime coat on same day.
- D. Concrete and masonry surfaces shall be adequately cured prior to surface preparation.

### 3.03 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

### 3.04 APPLICATION

- A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
- B. Apply first-coat material to unprimed surfaces the same day as surface preparation.
- C. Recoat Time:
  - 1. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
  - 2. In the event a coating, such as an epoxy, has exceeded its recoat time limit, prepare the

undercoat in accordance with manufacturer's recommendations.

- D. Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.
- E. Environmental Conditions:
  - 1. Substrate and atmospheric temperatures must be above 50° F during application, unless otherwise permitted by paint manufacturer's printed instructions. Do not apply paint when inclement weather or freezing temperatures may occur within coating curing time.
  - 2. Wind velocities for exterior applications shall be at a minimum to prevent overspray or fallout and not greater than coating manufacturer's recommended limits.
  - 3. Relative humidity must be less than 85% and the substrate temperature must be at least 5 F above dew point.
  - 4. Adhere to health and safety precautions and practices identified in manufacturer's Material Safety Data Sheets.
- F. Protection:
  - 1. Cover or otherwise protect surfaces not to be painted.
  - 2. Mask, remove, or otherwise protect machined surfaces and prefinished items as necessary.
  - 3. Provide "Wet Paint" signs as required to indicate fresh paint areas.
  - 4. Do not paint over any code-required labels, such as Underwriter's Laboratories and Factory Mutual, or any equipment identification or data plates.
  - 5. At completion of work touch-up and restore all damaged or defaced painted surfaces.
- G. Clean-Up:
  - 1. During progress of work, remove from site discarded paint materials, rubbish, containers and rags at end of each work day.
  - 2. Dispose of leftover paint materials, containers, thinners, rags and applicators which are not reusable in accordance with governing regulations.
  - 3. Upon completion of painting work, clean paint-spattered surfaces by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces. Touch-up and restore damaged surfaces to original condition.

### 3.05 FIELD QUALITY CONTROL

- A. Contractor shall provide and use a wet-film gauge to monitor each application and correct wet-film thickness under or over specified limits.
- B. Contractor shall provide and use a dry-film gauge to verify dry-film thickness of each coat and total system thickness when complete. Perform in accordance with AWWA D102 and furnish written report.
- C. Provide and use holiday or pinhole detector on systems over metal substrates to detect and correct voids when specified or indicated.
- D. Furnish a sling psychrometer and perform periodic checks on both relative humidity and temperature limits.
- E. Check substrate temperature at regular intervals to insure surface is at least 5° F. above dew point.

### 3.06 COATING SCHEDULE

- A. Sludge Holding Tank Structure:
  - 1. Submerged or Intermittently Submerged Ductile Iron Piping and Fittings that have a Shop Applied Coating.

- a. System: Epoxy
  - b. Surface Preparation: SSPC-SP2 Hand Tool Cleaning or SSPC-SP3 Power Tool Cleaning to remove all contaminants.
  - c. First Coat: Polyamide Epoxy, 3 to 5 mils dry film thickness.
    - 1) Tnemec Series 66 High-Build Epoxoline
    - 2) Sherwin-Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series
  - d. Second Coat: Polyamide Epoxy, 4 to 6 mils dry film thickness.
    - 1) Tnemec Series 66 High-Build Epoxoline
    - 2) Sherwin Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series
- B. Sludge Dewatering System Structure:
- 1. Exposed Ductile Iron Piping, Fittings and Valves that have a Shop Applied Coating.
    - a. System: Epoxy/Polyurethane
    - b. Surface Preparation: SSPC-SP2 Hand Tool Cleaning or SSPC-SP3 Power Tool Cleaning to remove all contaminants.
    - c. Prime Coat: Polyamide Epoxy, 3 to 5 mils dry film thickness.
      - 1) Tnemec Series 66 High-Build Epoxoline
      - 2) Sherwin Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series
    - d. Finish Coat: Aliphatic Acrylic Polyurethane, 2 to 5 mils dry film thickness.
      - 1) Tnemec Series 73 Endura-Shield
      - 2) Sherwin Williams Hi-Solids Polyurethane, B65-300 Series
  - 2. Steel Pipe Bollards.
    - a. System: Epoxy/Polyurethane
    - b. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning to remove all contaminants and foreign matter.
    - c. Prime Coat: Polyamide Epoxy, 3 to 5 mils dry film thickness.
      - 1) Tnemec Series 66 High-Build Epoxoline
      - 2) Sherwin Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series
    - d. Finish Coat: Aliphatic Acrylic Polyurethane, 2 to 3 mils dry film thickness.
      - 1) Tnemec Series 73 Endura-Shield
      - 2) Sherwin Williams Hi-Solids Polyurethane, B65-300 Series
- C. Sludge Dewatering Building:
- 1. Exposed Interior Piping, Valves and Fittings that have a Shop Applied Asphaltic Varnish Coating.
    - a. System: Epoxy
    - b. Surface Preparation: SSPC-SP2 Hand Tool Cleaning or SSPC-SP3 Power Tool Cleaning to remove all contaminants.
    - c. First Coat: Polyamide Epoxy, 3 to 5 mils dry film thickness.

- 1) Tnemec Series 66 High-Build Epoxoline
  - 2) Sherwin-Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series
- d. Second Coat: Polyamide Epoxy, 4 to 6 mils dry film thickness.
- 1) Tnemec Series 66 High-Build Epoxoline
  - 2) Sherwin Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series
2. Steel Door and Frame - Exterior Door (Shop-Primed):
- a. System: Epoxy/Polyurethane
  - b. Surface Preparation: SSPC-SP1. Clean and dry.
  - c. Intermediate Coat: Polyamide Epoxy, 2 to 3 mils dry film thickness.
    - 1) Tnemec Series 66 High-Build Epoxoline
    - 2) Sherwin Williams Macropoxy 646 Fast Cure Epoxy, B58-600 Series
  - d. Finish Coat: Aliphatic Acrylic Polyurethane, 2 to 3 mils dry film thickness.
    - 1) Tnemec Series 73 Endura-Shield
    - 2) Sherwin Williams Hi-Solids Polyurethane, B65-300 Series
3. Concrete Masonry Units - Previously Painted Interior Surfaces (Walls):
- a. System: Waterborne Acrylic Epoxy
  - b. Surface Preparation: SSPC-SP12 Water Jetting. Clean, dry and free of oil, grease, and other contaminants.
  - c. Spot Prime: Water Borne Cementitious Acrylic, seal bare surfaces exposed by water jetting.
    - 1) Tnemec Series 130 Envirofill
    - 2) Sherwin-Williams Cement Plex 875
  - d. Intermediate Coat: Waterborne Acrylic Epoxy, 4 to 6 mils dry film thickness.
    - 1) Tnemec Series 113 Tneme-Tufcoat
    - 2) Sherwin-Williams Epo-Plex Multi Mill Epoxy, B71-100 Series (Low Luster)
  - e. Finish Coat: Same as intermediate coat.
4. Dry Wall - Previously Painted Interior Surfaces (Ceiling):
- a. System: Vinyl Acrylic/Waterborne Acrylic Epoxy.
  - b. Surface Preparation: SSPC-SP2 Hand Tool Cleaning. Clean, dry and free of oil, grease, loose mill scale, loose paint, contaminants, and other loose detrimental foreign matter. Fill cracks and nail holes with patching paste/spackle, sand smooth and remove all sanding dust.
  - c. Spot Prime: Vinyl Acrylic primer, 1.5 to 2 mils dry film thickness.
    - 1) Tnemec Series 51-792 PVA Sealer
    - 2) Sherwin-Williams PrepRite 200 Latex Primer, B28W200
  - d. Intermediate Coat: Waterborne Acrylic Epoxy, 2.5 to 3 mils dry film thickness.
    - 1) Tnemec Series 113 Tneme-Tufcoat
    - 2) Sherwin-Williams Water-Based Catalyzed Epoxy, B70 Series (Semi-Gloss)

- e. Finish Coat: Same as intermediate coat.
5. Wood - Previously Painted Interior Surfaces (Trim):
- a. System: Alkyd/Waterborne Acrylic Epoxy.
  - b. Surface Preparation: SSPC-SP2 Hand Tool Cleaning. Clean, dry and free of oil, grease, loose mill scale, loose paint, contaminants, and other loose detrimental foreign matter.
  - c. Spot Prime: Alkyd, high solids primer, 2 to 3.5 mils dry film thickness. Patch hole and imperfections with wood filler/putty and sand smooth. Remove all sanding dust.
    - 1) Tnemec Series 36 Undercoater
    - 2) Sherwin-Williams Multi-Purpose Water-Based Acrylic-Alkyd Interior Primer, B79W00450
  - d. Intermediate Coat: Waterborne Acrylic Epoxy, 2 to 3 mils dry film thickness.
    - 1). Tnemec Series 113 Tneme-Tufcoat
    - 2) Sherwin-Williams Water Based Catalyzed Epoxy, B70 Series (Semi-Gloss)
  - e. Finish Coat: Same as intermediate coat.

END OF SECTION

SECTION 220700  
PLUMBING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes materials, equipment and installation requirements for the following:
1. Potable and non-potable water piping.
  2. Valves.
  3. Hangers and supports.
  4. Plumbing specialties.
- B. Related Work:
1. Section 333416 - Pressure Pipe Installation
- C. References:
1. ASME International (Formerly American Society of Mechanical Engineers):
    - a. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings
    - b. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
    - c. ASME 31.3 - Process Piping
  2. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM B32 - Standard Specification for Solder Metal
    - b. ASTM B88 - Standard Specification for Copper Water Tube
    - c. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
  3. American Welding Society (AWS):
    - a. A5.8 Specification for Brazing Filler Metal
  4. American Water Works Association (AWWA):
    - a. AWWA C511 - Reduced-Pressure Principle Backflow Prevention Assembly
    - b. AWWA C800 - Underground Service Line Valves and Fittings
    - c. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. (19 mm) Through 3 In. (76 mm), for Water Service
  5. Federal Specification (FS):
    - a. FS O-F-506 - Flux Soldering: Paste and Liquid
  6. Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS):
    - a. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacture
    - b. MSS SP 69 - Pipe Hangers and Supports - Selection and Application
    - c. MSS SP 123 - Non-Ferrous Threaded and Solder-Joint Unions for Use with Copper



## Water Tube

### 7. NSF International (Formerly National Sanitation Foundation):

#### a. NSF 61 - Drinking Water System Components - Health Effects

### 1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's data sheets and specifications for piping materials, valves, fixtures, equipment, specialties and accessories demonstrating compliance with requirements.
- B. Installation Instructions: Submit manufacturer's printed installation instructions for fixtures and equipment where applicable.

### 1.03 QUALITY ASSURANCE

- A. Brazing: Certify brazing procedures, brazers, and operators in accordance with ASME B31.3, Process Piping, for shop and jobsite brazing of piping work.
- B. Soldering: Conform to ASME B31.3, Process Piping and Copper Development Association recommended practices.

### 1.04 DELIVERY, STORAGE AND HANDLING

- A. Inspect all plumbing materials, equipment and accessories delivered to job site for damage in transit. Do not unload damaged material except upon the instruction of the official freight agent. Promptly remove any damaged materials that are unloaded from the job site so that rejected material will not be mistakenly used in the Work.
- B. Handle plumbing materials, equipment and accessories in a manner to ensure installation in sound and undamaged condition.
- C. Store plumbing materials, equipment and accessories in suitable places as approved by the Resident Engineer.

### 1.05 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items included: As indicated and required for a complete installation.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Provide the following products and materials unless otherwise indicated on the drawings.

### 2.02 PIPING MATERIALS

#### A. Potable & Non-Potable Water Piping:

##### 1. Underground beyond building:

- a. Pipe: Polyethylene (PE) Tubing, DR 9, conforming to ASTM D3035 and AWWA C901, and suitable for working pressures up to 200 psig. NSF approved.
- b. Fittings: Wrought copper, cast bronze or brass with compression connections conforming to AWWA C800. Provide tubular stainless steel insert stiffeners for PE

- tubing, dimpled and flanged to retain placement within tubing.
  - c. All tubing, pipe and fittings marked according to the applicable standard under which it is manufactured.
2. Under building floor slab:
- a. Pipe: Copper, ASTM B88, Type K, soft, annealed.
  - b. Fittings: Not permitted under floor slab.
  - c. Joints: Not permitted under floor slab.
3. Inside building above floor slab:
- a. Pipe: Copper tube, ASTM B88, Type L, hard drawn, seamless.
  - b. Fittings: Wrought copper or bronze castings conforming to ASME B16.18 and B16.22.
  - c. Joints: Soldered joints with screwed joints and unions at valves, specialties and disconnect points. Unions shall be bronze, solder or braze joints.
    - (1) Solder: Solid wire, ASTM B32, Alloy Grade Sb5, (95-5).
    - (2) Soldering flux: Paste type, Fed. Spec. 0-F-506, Type 1, Form A.
4. Adapters: Provide adapters for joining threaded pipe to copper tubing.

## 2.03 VALVES

- A. Brass Ball Valves (2 Inch and Smaller): Brass 2-piece body, full port, blowout proof captive stem, PTFE seats, stainless steel or chrome plated brass ball, threaded or soldered ends, NFS approved. Nibco T-FP-600A or S-FP-600A, or equivalent.
- B. PVC Ball Valves (2 Inch and Smaller): One-piece, molded Schedule 40 PVC body, full port, ABS handle cap and handle, EPDM O-ring, PTFE or EPDM seat seal, PVC ball, threaded or socket ends, NFS approved. Nibco 4660-T or 4660-S, or equivalent.

## 2.04 HANGERS AND SUPPORTS

- A. Design and Construction Features:
  - 1. Hangers and supports shall comply with MSS SP-58 and MSS SP-69. Furnish complete with all necessary inserts, upper attachments, bolts, nuts, rods, washers and other accessories.
  - 2. Select size of hangers and supports to exactly fit pipe size for bare pipe, and to exactly fit around piping insulation with saddle or shield for insulated piping.
  - 3. Provide adjustable clevis or band type hangers for piping supported from ceilings.
  - 4. Provide offset pipe clamps or channel angle brackets and pipe clamps for piping supported along walls.
  - 5. Provide channels and pipe clamps for piping supported on top of walls.
  - 6. Materials of Construction: All hangers and supports including accessories shall be AISI Type 304 stainless steel. Stainless steel supports fabricated by welding shall be AISI Type 304L or 316L.
  - 7. Dissimilar Metal Isolation Material: Non-adhesive rubber tape, 1" wide x 0.02" thick, self-fusing, water resistant, -140° F to +395° F service temperature range, ISO-Tape™.

## 2.05 PLUMBING SPECIALTIES

- A. Backflow Preventer:

1. Reduced pressure principle type conforming to AWWA C511.
  2. Suitable for operating pressures up to 175 psi on the inlet side and water temperature range from 32° F to 140° F.
  3. Assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves. The assembly shall include two tightly closing shut-off valves, test cocks and a protective strainer upstream of the first shut-off valve.
  4. Check valve and relief valve components shall be constructed to permit servicing without removing the valve body from the line.
  5. All components bronze body construction.
  6. Cla-Val Model RP-1, Febco Model 825Y, Watts Series 909, or equivalent.
- B. Yard Hydrant: Freeze-proof, 1-inch NPT inlet, 3/4 inch hose nozzle with vacuum breaker. Woodford Model Y1 or equivalent.

### PART 3 - EXECUTION

#### 3.01 PIPING SYSTEMS INSTALLATION

- A. Install pipe, fittings, valves and appurtenances in accordance with recognized industry standards which will yield leakproof piping systems, capable of performing indicated service without failure.
- B. Locate piping runs as indicated or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing adjacent equipment.
- C. Install piping systems with a minimum of joints and couplings, but with adequate and accessible unions, adapters or sleeved couplings for disassembly and maintenance or replacement of valves and equipment.
- D. Provide all holes, sleeves, flashing and concrete inserts required for erection and installation of piping.
- E. Install valves at the locations shown on the drawings and where specified. Install all valves with their stems between the horizontal and the 90-degree vertical.
- F. Install plumbing specialties in accordance with manufacturer's instructions.
- G. Jointing:
  1. General Requirements:
    - a. Locate joints to provide for expansion and contraction as indicated or required.
    - b. Perform jointing in accordance with pipe manufacturer's recommendations.
    - c. Clean and lubricate all joint and gasket surfaces with lubricant recommended by pipe manufacturer. Joint lubricant shall be suitable for use with potable water, be stored in closed containers, and kept clean.
    - d. Utilize methods and equipment capable of fully homing or making up joints without damage.
  2. Threaded Joints:
    - a. Make threaded joints with teflon thread sealer and teflon thread tape applied to all male threads.
  3. Brazed/Soldered Joints:
    - a. Cut tube ends square. Ream, remove burrs, and size.

- b. All joints in piping systems with pressure above 100 psig or service temperatures above 200 °F shall be brazed.
  - c. Brazed copper-to-copper joints shall be made with a silver-brazing alloy conforming to AWS A5.8, BCuP-5 (15% silver). Joints shall comply with ASME B31.3 Process Piping.
  - d. Brazed copper to brass, or copper to stainless steel joints shall be made with a silver-brazing alloy conforming to AWS A5.8, BAg-5 (45% silver). Joints shall comply with ASME B31.3 Process Piping.
  - e. Solder joints for copper tubing shall be made with 95-5 tin-antimony solder.
4. Solvent-Cemented Joints: Specified in Section 333416.
- H. Equipment Connections: Pipe connections to equipment shall be made with unions installed in manner to prevent strain at the pipe connection to the equipment.
- I. Hangers and Supports: Install hangers, supports and accessories to properly support piping system without visible sagging. Comply with MSS SP-69.
- 1. Attach hangers and supports to existing concrete and masonry with expansion anchors.
  - 2. Install hangers and supports to allow controlled movement of piping system.
  - 3. Maximum spacing of hangers and supports as follows:
    - a. Copper piping 1/2" through 1 1/4", 5'-0"
  - 4. Additional supports may be required adjacent to expansion joints, couplings, or valves.
  - 5. Rods for trapeze hangers shall be a minimum of 3/8" diameter. The use of pipe hooks, chains, perforated iron strapping or wire for pipe supports will not be permitted.
  - 6. Hanger rods shall be installed vertically. No offset in hanger rods will be permitted.
  - 7. Use hangers which are vertically adjustable between 1-1/2" minimum and 2" maximum after piping is erected. Adjust hangers and supports so as to distribute loads equally on attachments.
  - 8. Use copper straps on copper pipe.
  - 9. Soft copper tubing, where permitted, shall be fastened to the building structure with Unistrut-type copper pipe clamps spaced not more than 4'-0" apart.
  - 10. Provide isolation material between dissimilar metals to prevent galvanic reaction.

### 3.02 VALVE INSTALLATION

- A. Install as indicated in accordance with applicable provisions of Part 3.01 above.
  - B. Thoroughly clean and remove all shipping materials prior to setting. Operate all valves from fully open to totally closed.

### 3.03 INSTALLATION OF PLUMBING SPECIALTIES

- A. All fixtures and equipment shall be installed complete with all accessories and trim required for proper installation.
- B. Fixtures and equipment shall be installed in accordance with the manufacturer's directions and shall be supported and fastened in a satisfactory manner.

### 3.04 ACCEPTANCE TESTS

- A. All plumbing, piping, equipment, and fixtures installed under this contract shall be inspected, tested, and approved by the Engineer before acceptance. The Contractor shall furnish all labor, material, and equipment required for testing.
- B. If required by local codes and regulations, tests must be performed in the presence of a local

Certified Plumbing Inspector.

- C. Each piping system shall be in accordance with local codes and regulations. In the absence of such local codes and regulations, test each piping system as follows:

Piping System	Test Pressure	Test Duration	Test Medium
Domestic Water	100 psig	1 hour	Water

- D. Repair piping systems sections which fail required piping test by disassembly and re-installation using new materials to extent required to eliminate leakage. Use of chemicals, stop-leak compounds, mastics or other temporary repair methods will not be permitted.
- E. All fixtures, devices, or accessories which are to be connected to the piping systems and would be damaged if subjected to the specified test pressure shall be disconnected and reconnected after testing is complete.

### 3.05 DISINFECTION

- A. Potable and non-potable water piping shall be disinfected in accordance with the requirements of the local authority having jurisdiction before the system is placed in operation. In the absence of local requirements, the following disinfection method shall be used:
1. Purge system with clean potable water until all dirt and other substances are flushed from the system.
  2. Inject sodium hypochlorite solution (bleach) containing 5-6 percent available chlorine, or 50,000 to 60,000 ppm, into the system with well pump running. After a chlorine residual of 25 ppm minimum is detected at each fixture (using a high-range chlorine test kit), shut-off the well pump and allow the chlorine solution to remain in the piping system for at least 24 hours.
  3. At the end of 24-hour period, treated water in all portions of piping shall have a free chlorine concentration of not less than 10 ppm. If the chlorine residual is less than 10 ppm, repeat the entire procedure. After residual free chlorine concentration test has been successfully completed, flush the entire system with potable water until total chlorine concentration at all fixtures is less than 1 ppm.

END OF SECTION

SECTION 238239.19  
UNIT HEATER

PART 1 - GENERAL

1.01 GENERAL

- A. Section covers equipment and installation requirements for unit heaters.
- B. Related Work:

- 1. Division 26 - Electrical

- C. References:

- 1. National Electric Code (NEC)
  - 2. Occupational Safety and Health Administration (OSHA)
  - 3. Underwriters Laboratories (UL)

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Submit manufacturer's product data and specifications covering unit size, finish, and performance data.
- C. Installation Instructions: Submit manufacturer's printed installation instructions.
- D. Operation and Maintenance Instructions: Include instructions for safe operating procedures; replacement parts list and troubleshooting diagnostics; and recommended cleaning methods and materials for interior parts and external finishes.

1.03 QUALITY ASSURANCE

- A. Unit heaters shall be UL listed and meet NEC and OSHA requirements.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver equipment to site in manufacturer's original, unopened packaging.
- B. Storage: Store heater in a dry area indoors, protected from damage and in accordance with manufacturer's instructions.
- C. Handling: Protect heater and finishes during handling and installation to prevent damage.

1.05 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum
- B. Items included: As indicated and required for a complete installation.

PART 2 - PRODUCTS

2.01 WALL MOUNTED UNIT HEATER

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide explosion-proof, wall-mounted heater as manufactured by one of the following:
  - 1. Berko® HUHAA Series.

2. Qmark® Type MUH.
2. Approved equal.

B. Performance Requirements:

1. Horizontal air delivery electric unit heater rated 5000 watts @ 208 volt, 60 hz, 1-phase.

C. Design and Construction Features:

1. Unit heaters shall be of the draw-through air flow design.
2. Cabinet: Fabricated from 18-gauge die-formed furniture grade steel, phosphate coated to resist corrosion and finished in a durable polyester powder coat finish.
3. Heating Elements: Aluminum-finned, copper clad steel.
4. Motor and Propeller Fan:
  - a. Motor: Ball bearing, permanently lubricated, totally enclosed, designed for continuous heavy-duty, all-angle operation, and equipped with built-in thermal overload protection.
  - b. Propeller Fan: Aluminum, directly connected to motor, and specifically designed for unit heater application.
5. Louvers: Stainless steel, individually adjustable to control air flow.
6. Accessories:
  - a. Single pole internal thermostat, 40F - 85F temperature range.
  - b. Wall-mounting bracket.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install wall-mounted unit heater according to the manufacturer's printed instructions in the location indicated on the drawings.

END OF SECTION

SECTION 260500  
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers basic electrical materials and methods including:
1. Conduit, fittings and accessories.
  2. Wire, cable, connectors and markers.
  3. Boxes.
  4. Wiring devices.
  5. Supporting devices.
- B. Related Work:
1. Section 262816 - Electrical Distribution Equipment
  2. Section 312333 - Trenching and Backfilling for Utilities
- C. References:
1. American National Standards Institute (ANSI):
    - a. ANSI C80.1 - Specification for Rigid Steel Conduit, Zinc-Coated
    - b. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc-Coated
    - c. ANSI C80.4 - Fittings for Rigid Metal Conduit and Electrical Metallic Tubing
  2. Federal Specifications (FS):
    - a. FS A-A-50552 - Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible
    - b. FS A-A-50553 - Fittings for Conduit, Metal, Rigid (Thick-Wall and Thin-Wall (EMT) Type)
    - c. FS A-A-50563 - Conduit Outlet Boxes, Bodies and Entrance Caps, Electrical
    - d. FS A-A-55810 - Flexible Metal Conduit
  3. National Electrical Manufacturers Association (NEMA):
    - a. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies
    - b. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports
    - c. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
    - d. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
    - e. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing
    - f. NEMA WC 5 - Specific Purpose Wiring
  4. Underwriter's Laboratories, Inc.(UL):
    - a. UL 1 - Standard for Safety Flexible Metal Conduit
    - b. UL 6 - Standard for Safety Electrical Rigid Metal Conduit - Steel
    - c. UL 360 - Standard for Safety Liquid-Tight Flexible Metal Conduit
    - d. UL 486A - Standard for Safety Wire Connectors and Soldering Lugs for Use with



Copper Conductors

- e. UL 514A - Standard for Safety Metallic Outlet Boxes
- f. UL 514B - Standard for Safety Conduit, Tubing, and Cable Fittings
- g. UL 651 - Standard for Safety Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
- h. UL 797 - Standard for Safety Electrical Metallic Tubing - Steel

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Submit manufacturer's product data sheets verifying compliance with specified requirements.

1.03 QUALITY ASSURANCE

- A. Where Underwriter's Laboratories, Inc. has established standards for specified products, provide only products bearing the UL label.
- B. Comply with NEC requirements as applicable for work of this Section.

1.04 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum
- B. Items included: As indicated and required for a complete installation.

PART 2 - PRODUCTS

2.01 CONDUIT, FITTINGS AND ACCESSORIES

A. Design Requirements:

- 1. UL listed and labeled conduit, on each length, fittings and accessories.
- 2. Sizes of conduit, fittings and accessories as indicated, specified, or as required by Electrical Codes and Standards.
- 3. Underground Installations:
  - a. More than 5-feet from foundation wall, use non-metallic conduit.
  - b. Within 5-feet of foundation wall, use PVC coated rigid steel conduit.
  - c. In or under slabs on grade, use PVC coated rigid steel conduit.
- 4. Outdoor locations above grade to 2-feet below grade, use PVC coated rigid steel conduit.
- 5. Wet and damp locations including vaults, use PVC coated rigid steel conduit.
- 6. Dry Locations:
  - a. Indoor locations less than 1-foot above finished floor, use PVC coated rigid steel conduit.
  - b. Indoor concealed locations more than 1-foot above finished floor, use electric metallic tubing.
  - c. Indoor exposed locations more than 1-foot above finished floor, use rigid steel conduit.
- 7. Hazardous locations (Class 1, Divisions 1 & 2), use PVC coated rigid steel conduit.
- 8. Final connections to motors or equipment that may generate vibration through conduit, use liquid-tight flexible metal conduit.

B. Rigid Steel Conduit:

1. Rigid steel, threaded type, zinc-coated inside and outside, conforming to ANSI C80.1 and UL 6.
2. Fittings and Conduit Bodies:
  - a. Conform with ANSI C80.4, FS A-A-50553, and NEMA FB 1.
  - b. Cast malleable iron, threaded or gland compression type, galvanized or cadmium plated. Compression type may be used only in non-hazardous areas and where necessary to avoid a union.
  - c. Insulating or insulated throat type bushings.
  - d. Steel or malleable iron lock nuts.

C. PVC Coated Steel Conduit:

1. Rigid steel conduit with PVC exterior coating and urethane interior coating, conforming to ANSI C80.1 and NEMA RN 1.
2. Fittings and Conduit Bodies:
  - a. Conform with UL 514A, UL 514B and FS A-A-50563.
  - b. Threaded rigid steel fittings with PVC external coating to match conduit.
  - c. Thermoplastic or thermosetting internal coating to match conduit.
  - d. Sleeves: Provide flexible PVC sleeve extensions on hubs, fittings and couplings.
  - e. Sleeve Extension Length: Not less than the nominal conduit size for sizes up to and including 2-inch and at least 2 inches for larger conduit.

D. Liquid-Tight Flexible Metal Conduit:

1. Interlocked steel construction with PVC jacket conforming with FS A-A-55810 and UL 360. Rated for outdoor service.
2. Fittings and Conduit Bodies:
  - a. Conform with FS A-A-50552.
  - b. Cadmium plated, malleable iron fittings with compression type steel ferrule, neoprene gasketed sealing rings and insulated throat.

E. Electric Metallic Tubing:

1. Galvanized tubing conforming to ANSI C80.3 and UL 797.
2. Fittings and Conduit Bodies:
  - a. Conform with NEMA FB 1
  - b. Cast malleable iron or steel compression type couplings and connectors. Set screw type not acceptable.

F. Rigid Nonmetallic Conduit:

1. Schedule 40 PVC conforming with NEMA TC2, Type 3 and UL 651, for direct burial and normal above-ground duty.
2. Fittings and Conduit Bodies: NEMA TC3, solvent weld type, match to conduit type and material.
3. Fittings and Conduit Bodies:
  - a. Conform with FS A-A-50563.

- b. Malleable iron with threaded hubs, gasketed covers, and stainless steel screws.
- c. Of type, shape and size to fit specific location.
- d. Mogul type for conduit sizes 1-1/2" and larger.

## 2.02 WIRES, CABLES, AND ACCESSORIES

### A. Wire and Cable:

- 1. Sizes and types as indicated on the drawings.
- 2. Wire:
  - a. Thermoplastic insulated wire conforming to NEMA WC 5.
  - b. 600 volt, soft-drawn annealed copper conductor.
  - c. Use Type THHN/THWN above grade and Type XHHW below grade.
  - d. Service, Feeder and Branch Circuits: #12 AWG minimum; stranded wire for #8 AWG and larger; solid wire for lighting and receptacles in #10 and #12 AWG; stranded wire for all conductors terminating at motors.
  - e. Control Circuits: #14 AWG stranded wire.

### B. Terminal Lugs:

- 1. Provide terminal lugs on the ends of feeder and branch circuit conductors unless lugs are provided on the connected device.
  - a. Use solderless, compression type copper terminal lugs for wires #6 AWG and smaller.
  - b. Use color keyed, compression type copper terminal lugs with insulating sealing collars for wires #4 AWG and larger.
  - c. Two-hole type for connection of wires #4 AWG and larger to copper bus bars.
- 2. Sizes as recommended by manufacturer for the wire being terminated.

### C. Connectors:

- 1. Designed and sized for the specific wire or cable being connected.
- 2. Rated current-carrying capacity equal to, or greater than, the wire or cable being connected and with silver-plated contact surfaces for conductors of 500-kcmil copper capacity or greater.
- 3. Equipment feeder or branch circuits:
  - a. Use mechanical compression or bolted type connector for #6 AWG and larger.
  - b. Use compression type ring tongue terminal connectors bolted together for #8 AWG and smaller.
  - c. Cover connector with insulating tape or heat shrinkable insulation equivalent to 150% conductor insulation.
- 4. Control circuits:
  - a. Use compression type insulated locking fork or ring tongue terminal connectors.
- 5. Lighting and receptacle circuits:
  - a. Use insulating spring compression connectors for #10 AWG and smaller.
  - b. Cover splice with insulating tape equivalent to 150% conductor insulation.

D. Terminal Blocks:

1. Designed and sized for the wires being terminated.
2. Block rated for 600 volts.
3. Binding screw-type terminals for power and control wires #8 AWG and smaller.
4. Rated current carrying capacity equal to or greater than the wire being terminated.
5. Marking strip.

2.03 BOXES

A. Outlet and Device Boxes:

1. Indoor Boxes: Galvanized steel with conduit knockouts and attached lugs for locating. NEMA OS 1.
2. Outdoor Boxes or Exposed Indoor Boxes in Wet or Damp Location: Cast aluminum, deep type, corrosion proof fasteners, watertight, gasketed, threaded hubs.
3. Exposed Boxes in Hazardous Locations (Class 1, Divisions 1 & 2): PVC coated galvanized steel, deep type, stainless steel fasteners, watertight, gasketed, threaded hubs.

B. Junction Boxes:

1. Galvanized steel with drip lip and galvanized steel covers fastened with bronze or cadmium-plated screws or bolts; or cast iron with galvanized finish and flanged bolt covers.
2. Threaded conduit entrances or rigid conduit hubs on all boxes.
3. Rubber or neoprene gasket for cover.
4. Conform to NEMA 3R unless otherwise indicated.
5. Include stainless steel piano-hinged, gasketed cover and interior back panel when enclosing terminal blocks and control relays.
6. Lockable.

C. Pull Boxes:

1. Underground type as manufactured by Quazite, Synertec or equal.
2. Constructed of fiberglass reinforced polymer concrete.
3. Open bottom type with standard duty, gasketed, bolt-down cover rated for minimum 7500 pound vertical loading.
4. Cover stamped "Electric" and equipped with stainless steel holddown bolts and washers.
5. Minimum dimensions of 12" x 18" x 20" depth.
6. Provide with mouse holes for conduit entry as required for specific location.
7. Provide conduit system bonding using ground lug type bushings.

2.04 WIRING DEVICES

A. Wall Switches:

1. Specification Grade, 20A, 120-277 volt, quiet type, side wired, toggle handle.
2. Switches in hazardous locations shall be explosion-proof, rated for Class 1, Divisions 1 & 2.

B. Receptacles:

1. Duplex: Specification grade, 20A, 120 volt, straight blade, 3-wire grounding, side wired.
2. Ground Fault Circuit Interrupter: Specification grade, terminal type, UL Class A-Group 1,

20A, 125 volt, solid state ground fault sensing and signaling, 5mA trip level. Each protected device shall have individual test and reset buttons.

3. Receptacles in hazardous locations shall be explosion-proof, rated Class 1, Divisions 1 & 2, 3-wire, grounding, 20 amp, 125 volt. Provided with mating plug.

C. Device Plates:

1. Stainless steel for flush mounted devices in finished areas.
2. Galvanized steel for surface mounted devices in unfinished areas.
3. Weatherproof, cast metal, gasketed for outdoor mounted devices. Provide spring-loaded cover for receptacles, allowing cord and cap to be inserted with cover closed.

## 2.05 SUPPORTING DEVICES

- A. Fabricated from manufactured stainless steel framing members equal to Unistrut P-3000 Series as indicated.
- B. Construct as required to rigidly support all conduit runs, boxes, switches, and panels.
- C. Support all exposed metallic conduit with galvanized steel conduit clamps, sized for specific conduit size.
- D. Support PVC coated metallic conduit with nonmagnetic conduit clamps, sized for specific conduit size.
- E. Stainless steel support hardware including fittings, anchors, inserts, bolts, washers and nuts.

## 2.06 ELECTRICAL IDENTIFICATION

A. Wires and Cables:

1. Service, Feeder and Branch Circuits Identification:
  - a. Color-coded conductor insulation for #8 AWG and smaller.
  - b. Color-coded self-adhesive vinyl tape not less than 3 mils thick by 1-1/2 inches wide for #6 AWG and larger.
  - c. Standard Colors: Conform to NEC.
2. Control Circuit Markers:
  - a. Split sleeve type; or self-adhesive, wrap-around, write-on type, with transparent extension. Use only marking pen approved by marker manufacturer.
  - b. Numbered to show circuit identification.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF CONDUIT

A. General:

1. Install conduit sizes and runs as indicated on the drawings. Shift locations as required to avoid interference with other equipment and piping being installed.
2. Where routing of conduit is not indicated, such as for small lighting home run circuits and other systems requiring small conduit runs, route conduit as specified subject to Engineer's approval.
3. All conduit in finished spaces shall be concealed unless otherwise noted.
4. Maintain 6-inches clearance between conduit and piping.

5. Maintain 12-inches clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
6. Unless otherwise indicated no conduit shall be smaller than 3/4", except 1/2" flexible conduit may be used for final connections to lighting fixtures and control devices.
7. Cut conduit square, properly ream to remove burrs, and cut threads for RGS conduit, deep and clean. Coat all field cut threads with zinc rich paint.
8. Bring conduit to shoulder of fittings and fasten securely.
9. Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.
10. Provide nylon pull cord in conduits to be installed but left empty.
11. Indoors, fasten conduit terminations in sheet metal boxes by 2 locknuts, and terminate with insulated bushing. Outdoors, use threaded hub or sealing locknuts.
12. Use of running threads at conduit joints and terminations is prohibited.
13. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture during construction.
14. Complete installation of conduit before starting installation of conductors.
15. Comply with applicable requirements of NEC pertaining to installation of conduit systems.
16. Bond electrical boxes, fittings and enclosures to conduit to provide electrical continuity.

B. Rigid Steel Conduit:

1. Install in locations permitted in Part 2.01 A. of this Section.
2. Conduits installed underground, under concrete slabs, or outdoors are to have conduit threads painted with corrosion inhibiting compound before couplings are assembled. Draw up coupling and conduit sufficiently tight to ensure watertightness.
3. Maintain at least 24-inches cover over all underground conduits.
4. Provide long radii bends on underground electrical service conduits. Use conduit bodies to make sharp changes in direction above grade.
5. Limit conduit runs to no more than 4-90° bends and 250 feet in length between pull boxes.
6. Slope underground conduits to drain away from structures to pull boxes. Place drainage fittings or weep holes at unavoidable low points.
7. Two or more conduits in the same general routing shall be parallel with symmetrical bends.
8. Place conduits between the reinforcing steel in walls or slabs which have reinforcement in both faces. In slabs which have only a single layer of reinforcement, place conduits under reinforcement.
  - a. Place conduits either parallel, or perpendicular, to main reinforcing steel.
  - b. Separate conduits by not less than 1-1/2 inches to ensure proper concrete bond.
  - c. Embedded conduit diameter is not to exceed 1/3 of concrete thickness.
9. Neatly grout conduit into openings cut into concrete and masonry structures.
10. Conduits through roofs or metal walls shall be flashed and sealed watertight.
11. Install exposed conduit either parallel, or perpendicular, to structural members and surfaces.
12. Support exposed conduit with either one-hole rigid galvanized pipe clamp or adjustable hinged-ring hangers, secured to structure with corrosion resistant bolts or screws. Support conduit as follows:
  - a. On each side and within 18" of bends, fittings and boxes.
  - b. At 6-foot centers for conduit sizes 1 inch and smaller.
  - c. At 8-foot centers for conduit sizes 1-1/4 inch and larger.
13. Do not support conduit with nails, wire or perforated pipe straps.

14. Exposed conduit stubs for future use shall be terminated with galvanized pipe caps.

C. PVC Externally Coated RGS:

1. Install in locations specified in Part 2.01 A of this Section.
2. Make all joints watertight by field-applied coat of vinyl plastic compound furnished by the conduit manufacturer.
3. Use strap wrench to tighten conduit joints. Repair any damaged coating with liquid patching compound recommended by conduit manufacturer.

D. Liquid-Tight Flexible Metal Conduit:

1. Install between rigid conduit and motor terminal boxes or other equipment subject to vibration.
2. Install at points of connection to equipment mounted on supports to allow for expansion and contraction.
3. Install at locations where rigid connections are impractical.
4. Use minimum length required for the application, not to exceed 3 feet unless otherwise approved by the Engineer.
5. Install an external bonding jumper to conform to NEC on conduit sized 1-1/2 inches and larger.

E. EMT Conduit:

1. Install in locations permitted in Part 2.01 A. of this Section.
2. Route conduit parallel and perpendicular to structure. Run concealed in walls and above ceiling.
3. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

### 3.02 WIRES AND CABLES

A. General Wiring Methods:

1. Install wires and cables of types, sizes and groups indicated and specified.
2. Use no wire smaller than #12 AWG for feeder and branch circuits.
  - a. Stranded wire for #8 AWG and larger.
  - b. Solid wire for #10 and #12 AWG on receptacle and lighting circuits only.
  - c. Stranded wire for all conductors terminating at motors.
3. Use no wire smaller than #14 AWG for control circuits; stranded wire.
4. Unless otherwise indicated, use #10 AWG for 20A, 120-volt branch circuits home runs longer than 60 feet and #8 AWG for runs longer than 130 feet.
5. Install separate neutral conductor for each branch circuit. Unless otherwise indicated, combining neutrals will not be permitted.
6. Neatly train and lace wiring inside boxes, equipment and panelboards.
7. Make wire lengths for parallel circuits equal.
8. Terminate spare conductors with electrical tape and roll up in box.

B. Wiring Installation In Conduits:

1. Thoroughly clean and swab conduits before installing wire.
2. Pull wires simultaneously where more than one is being installed in same conduit.

3. Use UL listed wire pulling lubricant for pulling #4 AWG and larger. Use of soap, oil, or grease as pulling lubricant will not be permitted.
4. Use pulling means including fish tape, cable, rope and basket weave wire/cable grips which will not damage wire or conduit.
5. Do not subject cable to pulling tension in excess of manufacturer's recommendations.
6. Attach pulling grips over the wire sheath to prevent slipping the cable insulation.
7. Do not subject wire to bending radius of less than 8 times the wire outside diameter during or after installation.
8. Sealing of Conduits:
  - a. After wires are installed and connected, seal conduit ends by forcing nonhardening sealing compound into the conduits to a depth at least equal to the conduit diameter. Seal conduit ends at junction boxes, pull boxes and conduit connections to equipment.
  - b. Provide NEMA 7 conduit seal with sealing compound in conduits entering corrosive or hazardous areas.

#### C. Wiring Connections and Terminations

1. Keep conductor splices to a minimum. Splice only in accessible junction boxes.
2. Make splices with enough spare wire for a minimum of two splices to be remade with the wire.
3. Install splices which possess equivalent, or better, mechanical strength and insulation ratings than conductor being spliced.
4. Make splices, taps and connections to carry full ampacity of conductors without perceptible temperature rise.
5. Thoroughly clean wires before installing lugs and connectors.
6. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A.

#### D. Electrical Identification:

1. Feeder and Branch Circuits
  - a. Provide color-coded markers for each conductor as specified in Part 2.06 A.1. this Section.
  - b. Attach to each conductor in junction boxes, pull boxes, panelboards, switchgear enclosures and motor control centers.
2. Control Circuits:
  - a. Tag each individual wire with marker as specified in Part 2.06 A.2. this Section.
  - b. With terminal designation indicated on schematic diagrams or given on manufacturer's equipment drawings.

### 3.03 BOXES

#### A. General:

1. Provide electrical boxes as indicated on the drawings and as required for splices, taps, wire pulling, equipment connections and code compliance.
2. Coordinate with conduit installation work.



3. Locate and install boxes to allow access.
4. Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces to which attached, or solidly embed in concrete or masonry.
5. Support boxes independent of conduit system.
6. Provide cast boxes for outdoor locations and for exposed indoor wet or damp locations.
7. Provide electrical connections for installed boxes.
8. Protect from construction debris and damage.

B. Pull and Junction Boxes:

1. Provide pull and junction boxes of type and size indicated and specified.
2. Install underground pull boxes on 6-inch thick layer of granular bedding material.

### 3.04 WIRING DEVICES

- A. Provide wiring devices as indicated on the drawings and as specified.
- B. Install wiring devices only in electrical boxes which are clean and free from excess construction debris.
- C. Install wiring devices after wiring work is complete.
- D. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with the tightening torques specified in UL Standard 486A.
- E. Install device plates as indicated and specified.
- F. Unless otherwise indicated, install wiring devices with centers at the following heights:
  1. Indoor receptacles: 1'-4" above floor; 0'-8" above counter top.
  2. Outdoor weatherproof receptacles: 2'-0" to 4'-0" above grade.
  3. Wall switches: 4'-3" above floor.

### 3.05 SUPPORT DEVICES

- A. Provide equipment supports as indicated on the drawings and as specified.
- B. Construct with sufficient rigidity to hold all mounted equipment and material in permanent and neat alignment.

### 3.06 FIELD QUALITY CONTROL

- A. Prior to energization of circuitry, check installed wiring with megohm meter to determine insulation resistance levels to ensure requirements are fulfilled.
- B. Prior to energization, test wiring for electrical continuity and for short-circuits. Ensure proper polarity of connections is maintained.
- C. Subsequent to completing wiring connections, energize circuitry and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units and then retest to demonstrate compliance.

END OF SECTION

SECTION 262816  
ELECTRICAL DISTRIBUTION EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes equipment and materials for electrical distribution systems including:
  - 1. Disconnect switches.
  - 2. Secondary grounding.
  - 3. Overcurrent protective devices.
  - 4. Panelboards.
  
- B. Related Work:
  - 1. Section 260500 - Basic Electrical Materials and Methods
  
- C. References:
  - 1. National Electrical Code (NEC).
  - 2. National Electrical Manufacturers Association (NEMA).
    - a. NEMA KS 1 - Enclosed Switches.
    - b. NEMA AB 1 - Molded-Case Circuit Breakers.
    - c. NEMA ICS 2 - Industrial Control Devices, Controllers and Assemblies.
  
  - 3. Underwriter's Laboratories, Inc. (UL).

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Furnish manufacturer's product data indicating electrical characteristics and verifying compliance with specified requirements.
- C. Furnish dimensional drawings of equipment including spatial relationship to proximate electrical equipment.
- D. Furnish power and control wiring diagrams. Clearly differentiate between portions of wiring that are manufacturer-installed and portions that are field-installed.

1.03 QUALITY ASSURANCE

- A. Where Underwriter's Laboratories, Inc. has established standards for specified products, provide only products bearing the UL label.
- B. Comply with NEC requirements as applicable to construction and installation of service and distribution systems.

1.04 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum
- B. Items included: As indicated and required for a complete installation.

PART 2 - PRODUCTS

2.01 GENERAL:

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- A. Provide distribution equipment and accessories of types, sizes, ratings and electrical characteristics indicated on the drawings.

## 2.02 DISCONNECT SWITCHES

### A. Acceptable Manufacturers:

- 1. Square D.
- 2. Cutler Hammer.
- 3. Allen Bradley.
- 4. Approved equal.

### B. Fusible and Nonfusible Disconnect Switches:

- 1. Heavy duty type conforming with NEMA KS 1.
- 2. Quick-make, quick-break, load interrupter, enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
- 3. Fused type where indicated. Designed to accommodate Class R Fuses.

### C. Enclosures: Provide NEMA Type 1 in interior locations and NEMA Type 3R in exterior locations, unless otherwise indicated on the drawings.

## 2.03 GROUNDING MATERIALS

### A. Conductors:

- 1. Solid copper in #6 AWG and smaller.
- 2. Stranded copper in #4 AWG and larger.

### B. Grounding Rods:

- 1. Copper-clad steel or copper alloy.
- 2. One end pointed to facilitate driving.
- 3. 5/8-inch diameter by 8-feet long, with diameter and length stamped near end of rod.

### C. Connections:

- 1. Below grade: Exothermic welding type process.
- 2. Above grade: Compression type bronze clamps or grounding lugs.

## 2.04 OVER-CURRENT PROTECTIVE DEVICES

### A. Acceptable Manufacturers:

#### 1. Circuit Breakers:

- a. Square D.
- b. Cutler-Hammer.
- c. General Electric.
- d. Approved equal.

#### 2. Fuses:

- a. Bussmann.
- b. Gould-Shawmut
- c. Approved equal.

B. Circuit Breakers:

1. Factory assembled molded-case type conforming to NEMA AB 1.
2. Of electrical characteristics indicated on the drawings, with interrupting rating to meet available fault current. If available fault current is not indicated on the drawings, contact servicing utility.
3. Permanent thermal and instantaneous magnetic trips in each pole.
4. Provide fault current limiting protection to comply with series rated fault protection.
5. Construct with overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle trip indication.
6. Provide push-to-trip button on cover for mechanical tripping circuit breakers.
7. Equip with mechanical screw type removable connector lugs for number, size and material of conductors indicated.

C. Fuses:

1. Unless otherwise indicated on the drawings, provide UL Class RK5 current-limiting, time delay fuses with 100,000 RMS amperes interrupting rating for protecting service entrance, feeder or branch circuits of 600 amperes or less. Bussman FRN-R for 250 volt and FRS-R for 600 volt.

## 2.05 PANELBOARDS

A. Acceptable Manufacturers:

1. Square D.
2. Cutler Hammer.
3. General Electric.
4. Approved equal.

B. Branch Circuit Panelboards:

1. Provide dead-front safety type lighting and appliance panelboards as indicated, with switching and protective devices in quantities, ratings, types and arrangements shown in notes and schedules.
  - a. Equip with anti-turn solderless pressure type lug connectors approved for copper conductors.
  - b. Unless otherwise indicated, construct unit for connecting feeders at top of panel.
  - c. Equip with copper bus bars and full sized neutral bar.
2. Provide plug-in type heavy-duty, quick-make, quick-break, single-pole circuit-breakers, with toggle handles that indicate when tripped.
3. Provide suitable lugs on neutral bus for each outgoing feeder requiring neutral connection.
4. Provide bare uninsulated grounding bars suitable for bolting to enclosures.

C. Panelboard Enclosures:

1. Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types as

indicated.

- a. Code-gage, minimum 16-gage thickness.
  - b. Construct with multiple knockouts and wiring gutters.
  - c. Provide fronts with adjustable trim clamps and doors with flush locks and keys, all panelboards keyed alike.
  - d. Equip with concealed piano door hinges and door swings as indicated.
  - e. Equip with interior circuit-directory frame, and card with clear plastic covering.
  - f. Provide baked gray enamel finish over a rust inhibitor coating.
2. Design enclosures in finished areas for recessed mounting.
  3. Provide enclosures which are fabricated by same manufacturer as panelboards, which mate properly with panelboards.

## 2.06 ELECTRICAL IDENTIFICATION

- A. Engraved phenolic nameplates, black face with white core lettering, punched for mechanical fastening.
- B. Minimum size of 1" x 3" x 1/16" thickness with 3/8" letters.
- C. Stainless steel fasteners.
- D. Coordinate names and other designations with corresponding designations shown, specified or scheduled. Provide numbers, lettering or wording as indicated or approved by Engineer.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Install service and distribution equipment, materials and devices as indicated, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that equipment, materials and devices fulfill requirements.
- B. Comply with applicable installation requirements of NEC and NEMA standards.

### 3.02 INSTALLATION OF ELECTRICAL GROUNDING SYSTEM

#### A. General:

1. Install grounding system as indicated on the drawings.
2. Ground metal conduits and electrical equipment.
3. Bond together system neutrals, service entrance enclosures, building steel, exposed non-current carrying metal parts of electrical equipment, metal conduit systems, grounding conductor in conduits and cables, and receptacle ground connectors.

#### B. Ground Rods:

1. Install ground rods at locations indicated by driving and not by drilling or jetting.
2. Drive ground rods into unexcavated portion of earth where possible.
3. Where ground rods must be installed in excavated areas, drive rods into earth after compaction of backfill is completed.
4. Drive to a depth such that the top of ground rods will be approximately 12" below finish grade.
5. Check each grounding electrode for resistance to earth. If greater than 25 ohms, contact Engineer for additional instructions.

#### C. Connections:

1. Make connections using compression connectors listed for grounding and bonding equipment, ground lugs, or by exothermic welding process, except below grade connections shall be by exothermic welding process. Conform to manufacturer's instructions for grounding system connections.
2. Chemically degrease and dry connections completely before welding.
3. Apply one coat of asphaltic coating to all exothermic-welded connections to be buried.
4. Install compression connectors only on thoroughly cleaned metal contact surfaces, to ensure electrical conductivity and circuit integrity.
5. Make connections to equipment clean and tight to assure a low-resistance connection with resistance not exceeding 3 ohms. Install so as not to be susceptible to mechanical damage during operation or maintenance of equipment.

D. Equipment Grounding Conductors:

1. Install a separate, continuous, insulated equipment grounding conductor in all feeder and branch circuits.
2. Route in same conduit as phase conductors.
3. Bond grounding conductor to all boxes and equipment enclosures through which they pass and at each end of conduit run by means of grounding bushings.

### 3.03 INSTALLATION OF DISTRIBUTION EQUIPMENT

- A. Install distribution equipment including disconnect switches, over-current protective devices and panelboards at locations indicated and as follows:
1. Surface mount on walls or support devices approximately 4 feet to center line above floor or grade when possible. Anchor enclosures firmly, ensuring that they are permanently and mechanically secure.
  2. Arrange with proper clearances from other equipment and material to obtain accessibility for operation and maintenance.
  3. Coordinate with installation of conduits and wires.
- B. Provide properly wired electrical connections within enclosures.
- C. Install fuses in fused disconnect switches.
- D. Provide engraved phenolic nameplates on cover of each device identifying the loads connected.
- E. Provide type-written circuit directory card for each panelboard upon completion of installation work.

### 3.04 FIELD QUALITY CONTROL

- A. Upon completion of installation of service entrance and distribution equipment, energize circuitry and demonstrate capability and compliance with requirements.
- B. Prior to energization of over-current protective devices, test devices for continuity of circuitry and for short-circuits.
- C. Upon completion of electrical connections and after circuitry has been energized with rated power source, test connections to demonstrate capability and compliance with requirements. Ensure that direction of rotation of each motor fulfills requirements.
- D. Where possible, correct malfunctioning units, then retest to demonstrate compliance. Otherwise, remove and replace with new units and retest.

END OF SECTION

SECTION 311000  
SITE PREPARATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers site preparation work including:
  - 1. Clearing and grubbing.
  - 2. Topsoil stripping and stockpiling.
  - 3. Disposal of debris and waste material.
  
- B. Related Work:
  - 1. Section 312200 - Grading
  - 2. Section 312300 - Excavation and Fill
  - 3. Section 312316 - Excavation and Backfilling for Structures
  - 4. Section 312333 - Trenching and Backfilling for Utilities

1.02 BASIS OF PAYMENT

- A. Work under this Section shall be considered incidental to other related work and no measurements or direct payment will be made.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Topsoil is defined as selectively excavated surface soil that is representative of local soils that produce heavy growths of crops, grass or other vegetation. Satisfactory topsoil is reasonably free of underlying subsoil, clay lumps, weeds, litter, brush, matted roots, toxic substances or any material harmful to plant growth or which would hinder grading, planting, or maintenance operations. Topsoil shall not contain more than 5% by volume of stones or other such objects larger than 1/2" in any dimension for lawn seeded areas and 1" in any dimension in other seeded areas.

PART 3 - EXECUTION

3.01 CLEARING AND GRUBBING

- A. Clearing includes removal of trees, brush and other vegetation interfering with installation of new construction.
- B. Grubbing includes removal of tree stumps and roots greater than 3" in diameter to a minimum depth of 18" below existing grade elevation.
- C. Fill all depressions caused by clearing and grubbing operations with satisfactory fill material unless further excavation or earthwork is indicated. Place fill material in horizontal layers not exceeding 8" loose depth and thoroughly compact to a density equal to original adjacent ground.
- D. Confine clearing and grubbing operations within limits of easements and property lines indicated on the drawings.
- E. Conduct Work in a manner to prevent damage to adjacent property and existing improvements,

and to provide for the safety of workmen and others.

### 3.02 TOPSOIL STRIPPING AND STOCKPILING

- A. Strip topsoil from excavation limits of the construction area and stockpile in areas where it will not interfere with construction operations or existing facilities.
- B. Strip to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
- C. Scrape areas clean of all grass, weeds, brush, roots and other materials prior to stripping.
- D. Where trees are designated to be saved, stop stripping at a sufficient distance to prevent damage to main root system.
- E. Segregate and stockpile topsoil adjacent to the Work for subsequent use in finish grading and site restoration. Unless otherwise specified, any excess topsoil not used in the Work shall remain the property of the Owner. Stockpile and stabilize on-site as directed by the Owner's Representative.

### 3.03 DISPOSAL OF DEBRIS AND WASTE MATERIAL

- A. Burning of combustible debris and waste material from clearing, grubbing, and stripping operations will not be permitted on the job site.
- B. Dispose of all combustible and non-combustible debris and waste material at an off-site location arranged for by Contractor.

END OF SECTION



SECTION 312200  
GRADING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes the following:
  - 1. Site rough grading.
  - 2. Site fine grading.
  - 3. Spreading and grading topsoil.
  - 4. Protection of work.
  
- B. Related Work:
  - 1. Section 311100 - Site Preparation
  - 2. Section 312300 - Excavation and Fill
  - 3. Section 312316 - Excavation and Backfilling for Structures
  - 4. Section 312333 - Trenching and Backfilling for Utilities
  - 5. Section 321540 - Aggregate Surfacing
  - 6. Section 329200 - Turf and Grasses

1.02 BASIS OF PAYMENT

- A. Measurement: Work under this Section shall be considered incidental to other related work and no measurements or direct payment will be made.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

- A. Satisfactory Soil Material: Job excavated material that is free of debris, roots, stumps, organic matter, and frozen material, and is free of stones or rock fragments greater than 4" in any dimension.
- B. Topsoil: Specified in Section 311100.
- C. Unsatisfactory soil materials include organic silts and clays, peat and materials of any kind that are determined by Engineer to be too wet or otherwise unsatisfactory.
- D. Waste materials includes excess usable materials and materials unsuitable for use in the Work.

PART 3 - EXECUTION

3.01 SITE GRADING

- A. General: Complete all excavation, fill, compaction and rough grading as required to bring project area to proper subgrades at the elevations, slopes, cross sections and contours indicated.
  - 1. Provide a smooth transition between adjacent grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surfaces.
  
- B. Rough Grading: Uniformly grade areas to a smooth surface, free of irregular surface changes.

Slope grades to direct water away from buildings and to prevent ponding.

1. Degree of finish shall be that ordinarily obtained with blade grader or other power equipment except as otherwise specified.
  2. Finished rough grades shall generally be within 0.50' of established grades with due allowance for topsoil.
  3. Finished rough grades within 20' of structures and surfaced areas shall be within 0.15' of established subgrades.
- C. Fine Grading: Unless otherwise indicated, slope grades to provide effective drainage away from structures in all directions at a grade not less than 1%.
1. Finish subgrades to required elevations within the following tolerances:
    - a. Turf or Unpaved Areas: Plus or minus 1".
    - b. Walks: Plus or minus 1".
    - c. Pavements: Plus or minus ½".
  2. Grading Inside Building Lines: Finish subgrade to a tolerance of ½" when tested with a 10' long straight edge.
  3. Finish all ditches, swales and gutters to drain readily.
  4. Final grades and adjacent transition areas shall be reasonably smooth and even and free from irregular surface changes.
  5. Remove all stones and rock fragments greater than 1" in size and dispose off-site.
- D. Spreading and Grading Topsoil:
1. After completion of fine grading place topsoil on all areas disturbed or damaged by construction operations and not designated to receive other surfacing to a depth of at least 4".
  2. Use topsoil obtained and stockpiled for such purpose under Section 311100 Site Preparation to the extent available.
  3. Provide additional topsoil from approved borrow sites as necessary to complete the Work.
  4. Loosen subgrade by discing or scarifying to a depth of at least 2" to insure adequate bond of the topsoil with the subgrade.
  5. Place topsoil without specific compaction other than that obtained with spreading equipment.
  6. Shape cuts, fills and embankments to the elevations, slopes, cross-sections and contours indicated on the drawings.
  7. Transition final grades to match adjacent areas and provide effective drainage.
  8. After topsoil has been placed and shaped to final grades, remove all stones or other objects greater than 1" in any dimension and any other objectionable material that may interfere with seeding operations.

### 3.02 PROTECTION OF THE WORK

A. Maintenance:

1. Protect newly graded and top soiled areas from the elements until grass is established.
2. Repair eroded areas with satisfactory topsoil and re-establish final grades.

END OF SECTION

SECTION 312300  
EXCAVATION AND FILL

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Excavation as required.
2. Handling, storage and disposal of all excavated material.
3. Pumping and dewatering as required.
4. Preparation of subgrades.
5. Construction of fills and embankments.
6. Quality control.
7. Protection of work.

B. Related Work:

1. Section 311100 - Site Preparation
2. Section 312200 - Grading
3. Section 312316 - Excavation and Backfilling for Structures
4. Section 312333 - Trenching and Backfilling for Utilities
5. Section 313700 - Riprap

C. References:

1. ASTM International (Formerly American Society for Testing and Materials):
  - a. ASTM D422 - Standard Test Method for Particle Size Analysis for Soils
  - b. ASTM D698 - Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. (2.49 Kg) Rammer and 12-in (305-mm) Drop
  - c. ASTM D2167 - Standard Test Methods for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
  - d. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
  - e. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods
  - f. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
  - g. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils
  - h. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

1.02 SUBMITTALS

A. Submit as under provisions of Section 013300.

B. Material Test Reports:

1. For each on-site and borrow material proposed for fill and backfill as follows:

- a. Standard Proctor Curve, ASTM D698.
- b. Liquid Limit and Plastic Limit, ASTM D4318.
- c. Insitu Moisture Content.
- d. Material Description.
- e. Particle Size Analysis, ASTM D422.
- f. Soil Classification, ASTM D2487.

### 1.03 PROJECT CONDITIONS

- A. Existing Conditions: Accept the Project site in the condition which it exists at the time of the award of the contract and perform all work to the grades indicated.
- B. Existing underground, surface, and overhead utilities and structures are shown on the drawings in approximate locations as determined from existing construction drawings and data or surface observations. Not all utilities and structures may be shown. Contractor shall verify the exact horizontal and vertical location of existing utilities and structures prior to commencing installation of new construction.
- C. Locate existing underground piping and utilities in areas of Work. If piping and utilities are to remain in place, provide adequate means of protection during earthwork operations.
  - 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult Owner and Engineer immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility Owner.
  - 2. Do not interrupt existing utilities serving facilities occupied and used by Owner or others unless permitted in writing by the Owner and then only after acceptable temporary utility services have been provided. Provide a minimum of 48-hour notice to utility companies and receive written notice to proceed before interrupting any utility.

### 1.04 PROTECTION

- A. Safety: Provide protective measures necessary for the safety of workmen, to the public and adjacent property. Prevent cave-ins, collapse of walls, structures and slopes, both on and adjacent to the site.
- B. Standards: Comply with regulations of local authorities having jurisdiction, including all applicable OSHA requirements.
- C. Repair: Includes the removal and replacement with new materials affected by settlement.

### 1.05 QUALITY ASSURANCE

- A. Geotechnical Testing Firm Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

### 1.06 BASIS OF PAYMENT

- A. Measurement: No measurements will be made for work under this Section. Payment will be made on a lump sum basis.
- B. Items included: As indicated and required to complete the work.

## PART 2 - PRODUCTS

### 2.01 EXCAVATION CLASSES

- A. All materials encountered in excavations shall be unclassified regardless of type, composition, character and condition thereof. Any rock encountered shall be handled at no additional cost to Owner.

## 2.02 MATERIALS

- A. Satisfactory materials for use in embankment and fills shall be free of debris, roots, stumps, organic matter and frozen material, and shall be free of stones or rock fragments greater than 4" in any dimension.
  - 1. Cohesive materials include inorganic silts and clays generally exclusive of sands and gravel and are materials for which impact compaction will produce a well-defined moisture-density relationship curve.
  - 2. Cohesionless materials include gravels, sands and gravel-sand mixtures generally exclusive of clayey materials; are free draining; and are materials for which impact compaction will not produce a well define moisture-density relationship curve. Maximum density by vibrating methods will generally be greater than by impact methods.
- B. Unsatisfactory materials for use in embankments and fills include organic silts and clays, peat and materials of any kind that are determined by Engineer to be too wet or otherwise unsatisfactory.
- C. Rock shall be defined as stone or hard shale discovered in excavations in original ledge formation or in pieces having a volume greater than 1/3 cubic yard which cannot be fractured and removed by means other than drilling and blasting or drilling and wedging.
- D. Waste materials includes excess usable materials and materials unsuitable for use in the Work.
- E. Borrow materials includes all earthfill materials and topsoil obtained from off-site locations. Borrow materials shall be subject to the approval of Engineer and shall be arranged for by Contractor at no additional cost to Owner.
- F. Earthfill materials shall be satisfactory cohesive materials and shall have a liquid limit not greater than 50 and a plasticity index between 10 and 25 when tested in accordance with ASTM D4318.
- G. Granular material for subgrade stabilization shall be a well-graded mixture of quarry stone or shot rock having a 4 to 6-inch top size with less than 20% passing the No. 200 sieve.

## PART 3 - EXECUTION

### 3.01 EXCAVATION AND FILL

- A. Excavation:
  - 1. Perform excavation of every type of material encountered within the limits of the Work, to the lines and grades indicated on the drawings and as required to complete new construction.
  - 2. Dewatering:
    - a. Divert or otherwise prevent surface water from entering excavated areas to the extent practical without causing damage to adjacent property.
    - b. Provide and maintain adequate dewatering equipment to remove and dispose of all water entering excavations from any source.
    - c. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the Work is complete to the extent that no damage from hydrostatic

- pressure or other cause will result.
- d. Remove subgrade materials rendered unsatisfactory by excessive wetting and replace with satisfactory fill material as approved by Engineer.

3. Stockpiling of Satisfactory Excavated Materials:

- a. Segregate and stockpile satisfactory materials in sufficient amounts adjacent to the Work to provide for construction of embankments and fills, and for backfilling.
- b. Maintain safe distance between toe of stockpiles and edge of excavation sufficient to prevent cave-ins.
- c. Do not obstruct or prevent access to roads and driveways, utilities, ditches or natural drainage channels.
- d. Stockpile satisfactory materials in other areas or off-site when adjacent structures, easement limitations, or other restrictions prohibit sufficient storage adjacent to the Work.

4. Disposal of Excess Excavated Materials:

- a. Insofar as needed, satisfactory excavated materials shall be used in embankments or fills.
- b. All unused satisfactory excess materials together with unsatisfactory excavated materials and rock shall be disposed of on-site at a location acceptable to the Owner. All unused satisfactory excess materials together with unsatisfactory excavated materials and rock shall be removed from the immediate job site and disposed of at a location approved by the Owner's Representative.
- c. Place excavated rock in the interior portions of disposal area fills so that it will not be exposed to view.
- d. Grade disposal areas to leave them free draining and in a pleasing appearance.

B. Earthfills and Embankments:

1. Construct earthfills and embankments to the lines and grades indicated on the drawings using excess satisfactory materials obtained from job site excavations to the extent available.
2. Provide additional materials from approved borrow sites as necessary to complete the Work.
3. Subgrade Preparation:
  - a. Excavate or fill as required to construct subgrades to the elevations and grades indicated on the drawings.
  - b. Remove all unsatisfactory material to the level of firm material, fill with satisfactory material and compact as specified in Part 3.01 B.4.d herein to provide a satisfactory subgrade.
  - c. Removal of unsatisfactory material below design subgrade elevation and its replacement will be paid on the basis of Contract conditions relative to changes in the Work.
4. Placement and Compaction:
  - a. Prior to placing fill or embankment, scarify or disc the prepared subgrade to a minimum depth of 6-inches and moisture condition as required to assure adequate bond with fill or embankment.

- b. Place fill or embankment materials in approximately horizontal layers not to exceed 8" loose depth.
- c. The material placed in each layer shall be moistened or aerated and thoroughly mixed to insure uniform moisture content throughout the layer.
- d. Each layer shall then be thoroughly compacted to not less than 95% of maximum density at a moisture content within 2% of optimum as determined by ASTM D698.
- e. Do not place frozen materials in embankments or fills and do not place on a frozen surface.

### 3.02 FIELD QUALITY CONTROL

- A. Contractor shall retain the services of a Geotechnical Engineering Firm/Testing Laboratory to inspect and test all subgrades, embankments, and fills to determine conformance with specified density relationships.
  - 1. Testing method may be according to ASTM D2167 or ASTM D2922 as determined by Owner's Representative.
  - 2. A minimum of 3 compaction tests shall be made for each layer of fill, embankment or excavation at a frequency not to exceed 2,500 square feet of area.
  - 3. All testing shall be reported to the Owner and Engineer in written form.
- B. Subgrade Tolerances: Owner's representative will inspect all subgrades to determine conformance with lines and grades.

### 3.03 PROTECTION OF THE WORK

- A. Maintenance:
  - 1. Protect newly graded and top soiled areas from the elements until grass is established.
  - 2. Repair eroded areas with satisfactory topsoil and re-establish final grades.
- B. Correction of Settlement:
  - 1. Under the provisions of the guarantee as provided for in the General Conditions, Contractor is responsible for correcting any settlement and damages caused by same.
  - 2. Contractor shall make necessary repairs within 14 days after notification by Owner.

END OF SECTION

SECTION 312316  
EXCAVATION AND BACKFILLING FOR STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes all necessary excavation and backfilling for structures including:

1. Excavation as required.
2. Subgrade preparations.
3. Sheet piling and Shoring.
4. Filling and backfilling.
5. Field quality control.

B. Related Work:

1. Section 311100 - Site Preparation
2. Section 312300 - Excavation and Fill
3. Division 3 - Concrete

C. References:

1. ASTM International (Formerly American Society for Testing and Materials):
  - a. ASTM C33 - Standard Specification for Concrete Aggregates.
  - b. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Course Aggregates.
  - c. ASTM D698 - Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. (2.49 Kg) Rammer and 12-in (305-mm) Drop.
  - d. ASTM D4253 - Standard Test Methods for Maximum Index Density of Soils Using a Vibratory Table.
  - e. ASTM D4254 - Standard Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Submit the following:

1. Granular materials: Sieve Analysis, ASTM C136.

1.03 BASIS OF PAYMENT

- A. Measurement: No measurements will be made for work under this Section. Payment will be made on a lump sum basis.
- B. Items included: As indicated and required to complete the work.

PART 2 - PRODUCTS

2.01 EXCAVATION CLASSES

- A. All materials encountered in excavations shall be unclassified regardless of type, composition,



character, and condition thereof. Any rock encountered shall be handled at no additional cost to Owner.

## 2.02 MATERIALS

- A. Earth backfill materials shall be job excavated material that is free of debris, roots, stumps, organic matter and frozen material, and shall be free of stones or rock fragments greater than 4" in any dimension.
- B. Unsatisfactory backfill materials include organic silts and clays, peat and materials of any kind that are determined by Owner's Representative to be too wet or otherwise unsatisfactory.
- C. Waste materials includes excess usable materials and materials unsuitable for use in the Work.
- D. Granular backfill material shall be a well-graded mixture of crushed stone or gravel conforming to the gradation requirements of ASTM C33 Size No. 467, No. 5, No. 56 or No. 57. The material shall meet hardness and soundness requirements of ASTM C33.
- E. Crushed stone fill material shall be a well-graded mixture of crushed limestone or dolomite conforming to the gradation requirements of ASTM C33 Size No. 6. The material shall meet hardness and soundness requirements for ASTM C33 concrete course aggregate.
- F. Granular material for subgrade stabilization shall be a well-graded mixture of quarry stone or shot rock having a 4 to 6-inch top size with less than 20% passing the No. 200 sieve.

## PART 3 - EXECUTION

### 3.01 EXCAVATION

- A. Perform excavation to the lines and grades indicated on the drawings and as required for new construction.
- B. Excavations shall provide adequate working space and clearances for the Work to be performed therein and for erection and removal of concrete formwork.
- C. In no case shall excavation faces to be undercut for extended footings.
- D. Remove all loose excavated materials and trim to neat lines.
- E. Notify the Owner's Representative when excavation is completed to the required grade. Do not proceed with any further Work in the excavated area until approved by the Owner's Representative.
- F. Excavation shall be performed using methods and equipment that prevent disturbance of the bearing materials. If bearing materials are disturbed due to excavation operations, they shall be recompacted, removed or stabilized to produce a firm, dense and thoroughly compacted and consolidated subgrade to the satisfaction of the Owner's Representative.
- G. Excavate by hand in areas where space and access prevent use of machines.
- H. Unauthorized Excavation:
  - 1. Except where otherwise authorized by the Owner's Representative, all satisfactory materials excavated below the required subgrade for cast-in-place concrete structures shall be replaced with concrete of the same quality and placed monolithic with the concrete above.
  - 2. Excavation of satisfactory materials below the required subgrade for precast concrete structures shall be replaced with crushed stone fill material placed in maximum 6" lifts and compacted to not less than 70% relative density as determined by ASTM D4253 and D4254 using vibratory methods.
- I. Subgrade Preparation:
  - 1. Subgrades for concrete structures shall be firm, dense and thoroughly compacted and consolidated; shall be free of mud and muck; and shall be sufficiently stable to remain firm

under the feet of workmen.

2. Any soft or otherwise unsatisfactory materials which are found at the design subgrade elevation shall be removed to the level of firm material as directed by the Owner's Representative and replaced with granular material for subgrade stabilization.

### 3.02 SHEETING AND SHORING

- A. Except where banks are cut back on a stable slope, excavations for structures shall be properly and substantially supported as necessary to prevent caving or sliding; to provide protection for workmen and the Work; and to provide protection for existing structures and facilities.
- B. Space and arrange sheeting and shoring as required to exclude adjacent material based on the stability of the excavated slopes.
- C. Remove sheeting and shoring simultaneously with backfilling operations and backfill voids with granular backfill material.
- D. Leave sheeting and shoring in place when required by conditions of supported material and cut off at least 1' below finished surface grade but no lower than 1' above the top of any buried pipes or conduits.

### 3.03 FILLING AND BACKFILLING

#### A. Crushed Stone Fill:

1. Where indicated on the drawings, provide a crushed stone fill under all concrete work in contact with grade.
2. Place on properly prepared subgrade in minimum 6" thick loose lift.
3. Compact to not less than 70% relative density as determined by ASTM D4253 and D4254 using vibratory methods.

#### B. Earth Backfill:

1. Use satisfactory materials as specified in Part 2.01 of this Section and stockpiled from structure excavations.
2. Backfilling around structures shall not proceed until concrete has attained 70% design strength.
3. Backfill adjacent to structures only after a sufficient portion of the structure has been built to resist the imposed load as determined by the Owner's Representative.
4. Remove all debris from excavation as directed by Owner's Representative prior to placement of backfill materials.
5. Place backfill layers on all sides of structures before placing next lift.
6. Place earth backfill materials in horizontal layers not exceeding 8" loose depth.
7. Compact backfill materials around structures to not less than 90% of the maximum dry density and within 3% of the optimum moisture content as determined by ASTM D698.

#### C. Granular Backfill:

1. Provide granular backfills where indicated on the drawings.
2. Place in maximum 12" thick loose lifts.
3. Compact to not less than 70% relative density as determined by ASTM D4253 and D4254 using vibratory methods.

### 3.04 GRADING

- A. Specified in Section 312200.

### 3.05 FIELD QUALITY CONTROL

- A. Contractor shall test all subgrades, filling and backfilling for structures to determine conformance with specified density relationships.
- B. Arrangements, methods, frequency, reporting and payment for testing shall be as specified in Section 312300, Part 3.02 A.

END OF SECTION

SECTION 312333  
TRENCHING AND BACKFILLING FOR UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes trenching and backfilling operations for piped utility systems including:
1. Excavation as required.
  2. Preparation of trenches for bedding of pipes and pipe appurtenances.
  3. Backfilling of trenches.
  4. Field quality control.
- B. Related Work:
1. Section 260500 - Basic Electrical Materials and Methods
  2. Section 311100 - Site Preparation
  3. Section 312300 - Excavation and Fill
  4. Division 33 - All Applicable Sections
- C. References:
1. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM C33 - Standard Specification for Concrete Aggregates.
    - b. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
    - c. ASTM D698 - Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. (2.49 Kg) Rammer and 12-in (305-mm) Drop.
    - d. ASTM D4253 - Standard Test Methods for Maximum Index Density of Soils Using a Vibratory Table.
    - e. ASTM D4254 - Standard Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Submit the following.
1. Granular embedment and trench stabilization materials: Sieve Analysis, ASTM C136.

1.03 BASIS OF PAYMENT

- A. All Work under this Section shall be considered incidental to other related Work and no measurement or direct payment will be made.

PART 2 - PRODUCTS

2.01 EXCAVATION CLASSES

- A. All materials encountered in trench excavations shall be unclassified regardless of type,

composition, character and condition thereof. Any rock encountered shall be handled at no additional cost to Owner.

## 2.02 GRANULAR EMBEDMENT MATERIAL

### A. Granular Embedment Material for Pipe:

1. Shall be crushed limestone or dolomite.
2. Shall conform to the gradation requirements of ASTM C33 Size No. 67.
3. Maximum embedment material diameter for plastic pipe shall conform to the following:
  - a. 4-inch and smaller diameter pipe, no greater than 1/2-inch (ASTM C33 Size No. 8).
  - b. 6 and 8-inch diameter pipe, no greater than for 3/4-inch (ASTM C33 Size No. 7).
  - c. 10-inch and greater diameter pipe, no greater than 1-inch (ASTM C33 Size No. 67).

### B. Granular Embedment Material for Conduits and Cables:

1. Shall be natural sand of siliceous origin.
2. Shall conform to the gradation requirements of ASTM C33 for fine aggregate for concrete.

## 2.03 EMBEDMENT CLASSES

### A. Class B Bedding:

1. Pipe shall be embedded in compacted granular embedment material placed on a flat trench bottom.
2. The granular bedding shall have a minimum thickness of one-fourth the outside diameter of the pipe or 4" (6" in rock cuts), whichever is greater, between pipe barrel and bottom of trench excavation and shall extend over the pipe crown a minimum thickness of 6" for the full trench width.
3. Use for all pipelines unless otherwise indicated.

## 2.04 TRENCH STABILIZATION MATERIAL

- A. Trench stabilization material shall be a well-graded mixture of crushed limestone or dolomite conforming to the gradation requirements for coarse aggregate for concrete as defined in ASTM C33, Size #467 (1-1/2" to #4).

## 2.05 TRENCH BACKFILL MATERIALS

- A. Earth backfill material shall be job excavated material containing sufficient fine materials to provide a dense mass free of voids and capable of satisfactory compaction. Masses of moist, stiff clay shall not be used. Gravel, rock or shale particle size shall be limited as follows:
  1. Shall not exceed 4" in greatest dimension within 12" of pipe and upper 18" of trench.
  2. In all other areas, the maximum dimension shall not exceed 2/3 the lift thickness to be compacted.
- B. Granular backfill material shall be a well-graded mixture of crushed stone or dolomite conforming to the gradation requirements for concrete coarse aggregate as defined in ASTM C33, Size 467 (1-1/2" to #4).

## PART 3 - EXECUTION

### 3.01 TRENCH EXCAVATION

- A. Perform trench excavation to the lines and grades indicated on the drawings and as required to complete new construction.
  - 1. In the event organic chemicals are encountered during trenching operations, Contractor shall cease construction activities and contact Engineer for further instructions.
- B. Equipment and Methods:
  - 1. Types of equipment and methods will be at Contractor's option subject to the following restrictions.
    - a. The use of mechanical equipment will not be permitted in locations where its operation would cause damage to trees, structures, utilities or other facilities above or below ground. Use hand excavating methods in all such locations.
    - b. Equipment and methods shall be subject to approval of jurisdictional agency where stability or usefulness of existing facility may be impaired.
  - 2. All trench excavation shall be open cut from the surface except where tunneling is indicated on the drawings or is specified.
  - 3. Material excavated from trenches shall be placed a sufficient distance from trench walls to reduce the potential for cave-ins.
  - 4. Maximum length of open trench ahead or behind laying operations shall be 100'.
  - 5. No trench shall be left open overnight.
- C. Trench Side Walls:
  - 1. Shall be vertical below a horizontal plane 12" above the top of pipe.
  - 2. Shall be vertical or sloped as required for stability and safety above a horizontal plane 12" above the top of pipe.
  - 3. Slope sidewalls to comply with the requirements of any authorities having jurisdiction.
  - 4. Sheet and brace where sloping is not possible because of space restrictions or stability of materials excavated. Remove sheeting and shoring simultaneously with backfilling operations and backfill voids with granular backfill material. Leave sheeting and shoring in place when required by conditions of supported material and cut off at least 1' below finished grade but no lower than 1' above the top of any buried pipes.
  - 5. Maintain sides and slopes in safe condition until completion of backfilling.
- D. Trench Depth:
  - 1. Excavate trenches to a sufficient depth to provide the minimum bedding requirements for the pipe being installed.
  - 2. Do not exceed the indicated or required depth where satisfactory bearing materials exist.
  - 3. Increase trench depths when necessary for the following:
    - a. To remove unsatisfactory bearing materials encountered at the indicated or required subgrade elevation.
    - b. To obtain clearance beneath existing utilities, drains, structures, or other obstructions encountered at the indicated or required subgrade elevation.

- c. To install pipe on vertical curves.
  - 4. Where pipe grades or elevations are not definitely fixed by the drawings, excavate trenches to a depth sufficient to provide a minimum depth of backfill cover of 42" over the top of pipes.
- E. Trench Bottom:
- 1. Protect and maintain in a stable condition when satisfactory bearing materials are encountered at indicated or required subgrade elevations.
  - 2. Remove rock fragments and loose materials disturbed during excavation or that slough from trench sidewalls.
  - 3. When groundwater is present in the trench, de-water as required to maintain the stability of in-situ or imported materials.
    - a. Maintain water level below pipe bedding and trench subgrade elevation to provide a stable trench bottom.
    - b. Maintain control of water in the trench before, during and after pipe installation, and until embedment is installed and sufficient backfill has been placed to prevent floatation of the pipe.
  - 4. Restore all over-excavation to proper subgrade with trench stabilization material.
    - a. Place trench stabilization material in maximum 12" thick loose lifts and compact to not less than 70% relative density as determined by ASTM D4253 and D4254 using vibratory methods.
    - b. Removal of unsatisfactory materials encountered at indicated or required subgrade elevations and its replacement shall be paid on the basis of contract conditions relative to changes in the Work.
    - c. Unauthorized excavation of satisfactory material below indicated or required subgrade elevations shall be corrected by and at the expense of the Contractor.
- F. Trench Width:
- 1. Trenches shall be excavated to a width which will provide adequate working space and sidewall clearances for proper pipe installation, jointing and placement of embedment material.
  - 2. The trench width below a horizontal plane 12" above the top of the pipe shall be sufficient to provide a sidewall clearance of 9" to 12" on each side of the pipe.
  - 3. Undercutting the trench sidewall to obtain the specified sidewall clearance will not be permitted.
- G. Trenching in Fill Areas:
- 1. Perform trenching in fill areas only after compacted fill has reached an elevation of not less than 1' above the top of the pipe.
- H. Test Pits:
- 1. Excavate test pits sufficiently in advance of trenching to enable adequate planning of construction procedure.
  - 2. Excavate test pits in locations where:

- a. Unstable material is suspected that may require special protective measures.
- b. Interference or conflict with other utilities and/or structures could affect pipe alignment or grade.

### 3.02 GRANULAR EMBEDMENT

#### A. Placement and Compaction:

1. Granular embedment material shall be placed on a stable, flat trench bottom.
2. Spread and level embedment material at proper grade to provide a uniform and continuous support beneath the pipe barrel throughout its length.
3. Form depression under each joint such that no part of bell or coupling is in contact with the trench when pipe is placed in position.
4. Additional layers of embedment material shall be placed and compacted uniformly and simultaneously on each side of the pipe to prevent lateral displacement.
5. Work in and compact embedment material under pipe haunches by rodding or shovel slicing to insure complete contact with the pipe bottom, and to fill voids below the pipe.

### 3.03 TRENCH BACKFILL

#### A. Placement and Compaction:

1. Backfill trenches promptly after completion of pipe embedment.
2. Limit depth of backfill over concrete reaction blocking to 8" until concrete has reached at least 70% of design strength.
3. Compacted Earth Backfill: Required for full depth of trench above the embedment in established lawn areas.
  - a. Place in horizontal layers not exceeding 8" loose depth.
  - b. Compact upper 12" to at least 95% of maximum density and within 2% of optimum moisture content as determined by ASTM D698.
  - c. Compact remainder of depth to at least 90% of maximum density and within 3% of optimum moisture content as determined by ASTM D698.
4. Compacted Granular Backfill: Required for full depth of trench above the embedment beneath pavements, surfacings, shoulders, driveways, curbs, gutters, or other surface construction or structures.
  - a. Place in horizontal layers not exceeding 12" loose depth.
  - b. Compact upper 12" to at least 75% of relative density as determined by ASTM D4253 and D4254 using vibratory methods.
  - c. Compact remainder of trench to at least 70% relative density as determined by ASTM D4253 and D4254 using vibratory methods.
5. Uncompacted Backfill:
  - a. Compaction of trench backfill above pipe embedment in locations other than those specified will not be required except to the extent necessary to prevent future settlement.
  - b. Uncompacted backfill material above embedments shall be placed by methods which will not impose excessive concentrated or unbalanced loads, shock, or impact on



installed pipe, and which will not result in displacement of the pipe.

#### 3.04 IMPERVIOUS TRENCH SEALS

- A. Conform to the dimensions and details shown in the drawings.
- B. Place trench seals against unyielding, undisturbed earth or rock.

- 1. Install trench seals at locations indicated on the drawings.

#### 3.05 GRADING

- A. Specified in Section 312200.

#### 3.06 FIELD QUALITY CONTROL

- A. Contractor shall test all trench stabilization, embedments, trench checks and trench backfill to determine conformance with specified density relationships.
- B. Arrangements, methods, frequency, reporting and payment for testing shall be as specified in Section 312300, Part 3.02 A.

END OF SECTION

SECTION 313700  
RIPRAP

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers material and installation requirements for riprap (rock blanket) for the protection of slopes, channels and structures.
- B. Related Work:
  - 1. Section 312200 - Grading
  - 2. Section 312300 - Excavation and Fill
- C. References:
  - 1. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Course Aggregates.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Bedding Aggregate:
  - 1. Sieve Analysis, ASTM C136.
  - 2. Representative sample of proposed material for inspection and acceptance by Engineer.
- C. Riprap:
  - 1. Representative sample of proposed material for inspection and acceptance by Engineer.

1.03 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items Included: Excavation, subgrade preparation, bedding aggregate, riprap material, and placement.

PART 2 - PRODUCTS

2.01 BEDDING AGGREGATE

- A. Bedding aggregate for riprap shall be crushed stone with a gradation consisting of 100% passing the 3-inch sieve, 30 to 70% passing the 1½-inch sieve, and 0 to 15% passing the No. 4 sieve.

2.02 RIPRAP MATERIAL

- A. Riprap material shall be durable rock fragments of suitable quality to insure permanence in the structure and in the climate which it is to be placed.
- B. Quarried rock shall be used and shall be reasonably well graded within the following limits such

that the material contains an appreciable percentage of pieces as large as the layer thickness will permit with enough smaller pieces of various sizes to fill the larger voids.

Nominal Layer Thickness (inches)	Size of Rock Fragments (inches)			
	Maximum Size	40 to 50 percent from - to	50 to 60 percent from - to	0 to 10 percent from - to
12	12	9 - 12	6 - 9	4 - 6
18	18	12 - 18	8 - 12	6 - 8
24	24	18 - 24	12 - 18	8 - 12
36	36	24 - 36	18 - 24	12 - 18

- C. The percentage of smaller rock fragments shall not exceed an amount which will fill the voids in the larger rock.
- D. Sand and rock fines shall be less than 10%, by weight, of the total riprap material.
- E. Quantity of rock with an elongation greater than 3:1 shall not exceed 20 percent of the mass. No stone shall have an elongation greater than 4:1.

**PART 3 - EXECUTION**

**3.01 SUBGRADE PREPARATION**

- A. Trim and dress areas to receive rock blankets to the lines and grades indicated on the drawings within an allowable tolerance of  $\pm 6$ -inches.
- B. Correct areas which are below the allowable minus tolerance limit by filling with satisfactory cohesive embankment material.

**3.02 AGGREGATE BEDDING PLACEMENT**

- A. Place aggregate bedding material on the prepared subgrade to a minimum thickness of 6-inches.
- B. Compaction is not required, but the surface shall be finished reasonably smooth and free of mounds, dips, or windrows.

**3.03 RIPRAP PLACEMENT**

- A. Place riprap material at the locations and within the limits indicated on the drawings.
- B. Place riprap material in such a manner as to produce a reasonably well graded densely placed mass of rock with a minimum practicable percentage of voids.
  - 1. Install to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying bedding material.
  - 2. Riprap shall be delivered and placed in a manner that ensures the riprap in place is reasonably homogeneous with the larger stones uniformly distributed and firmly in contact one to another without bridging and the smaller stones and spalls filling the voids between the larger stones.

- C. Finished riprap shall be free from objectionable pockets of small rocks and clusters of larger rocks. Hand placement will be required only to the extent necessary to achieve the results specified.
- D. Maximum deviation from the lines and grades indicated on the drawings shall not exceed 6-inches. Maximum deviation shall not be continuous over an area greater than 10 square feet.

END OF SECTION

SECTION 320117  
PAVEMENT REMOVAL AND REPLACEMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers removal and replacement of bituminous pavement, concrete pavement, curbs, gutters, walks and other surface improvements for utility construction.
- B. Related Work:
  - 1. Section 312333 - Trenching and Backfilling for Utilities
- C. References:
  - 1. American Society for Testing and Materials (ASTM)
    - a. ASTM D1190 - Specification for Concrete Joint Sealer, Hot-Poured Elastic Type.
    - b. ASTM D1751 - Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
  - 2. Missouri Department of Transportation Standard Specifications for Highway Construction (MODOT):
    - a. Division 300 - Bases and Aggregate Surfaces.
    - b. Division 400 - Flexible Pavements
    - c. Division 500 - Rigid Pavements
    - d. Division 1000 - Materials Details

1.02 SUBMITTALS

- A. Submit as specified in Section 013300.
- B. Provide certification that materials conform to the applicable requirements of the specified standards.

1.03 BASIS OF PAYMENT

- A. Removal of bituminous pavement, concrete pavement, curbs, gutters, walks and other surface improvements shall be considered incidental to other related Work and no measurement or direct payment will be made.
- B. Plant Mix Bituminous Pavement Replacement:
  - 1. Measurement: Complete product in place per lump sum.
  - 2. Items included: As indicated and required for a complete installation including, but not limited to, subgrade preparation, aggregate base course, prime coat and bituminous surface course including all materials, hauling, spreading, compaction and finishing.
- C. Portland Cement Concrete Pavement Replacement:
  - 1. Measurement: Complete product in place per lump sum.
  - 2. Items included: As indicated and required for a complete installation including, but not limited to, subgrade preparation, aggregate base course and Portland cement concrete pavement including all materials, hauling, placement and surface finishing.

D. Concrete Curb and Gutter Replacement:

1. Measurement: Complete product in place per lump sum.
2. Items included: As indicated and required for a complete installation including, but not limited to, subgrade preparation, aggregate base course and concrete work including all materials, equipment, placement, surface finishing, backfilling and grading.

E. Concrete Walk Replacement:

1. Measurement: Complete product in place per lump sum.
2. Items included: As indicated and required for a complete installation including, but not limited to, subgrade preparation, aggregate base course and concrete work including all materials, equipment, placement, surface finishing, backfilling and grading.

F. Replacement of other surface improvements not specifically listed above shall be considered incidental to other related Work and no measurement or direct payment will be made.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Aggregate for base shall be Type 1 Aggregate as defined in MODOT Section 1007.1.
- B. Bituminous material for surface preparation shall conform to the following:
1. Tack coat for bituminous or concrete surfaces shall be Emulsified Asphalt Grade SS or CSS conforming to MODOT Sections 407 and 1015.7.
  2. Prime coat for aggregate surfaces shall be Liquid Asphalt Grade RC-800 conforming to MODOT Sections 408 and 1015.2.
  3. Blotter material shall be natural sand of siliceous origin with 100% passing the No. 4 sieve and not more than 2% passing the No. 200 sieve, and moisture content less than 3% by weight.
- C. Plant Mix Bituminous Pavement shall conform to MODOT Section 401.
1. Bituminous material shall be Asphalt Cement Grade AC-10 or AC-20 conforming to MODOT Section 1015.5.
  2. Aggregate and mineral filler materials shall conform with MODOT Section 1002. Gradation of combined aggregates shall conform with gradation BP-2.
- D. Concrete for pavement, curbs, gutters and walks shall conform to ASTM C94, 4000 psi, high early strength. Accelerator (high early strength) admixture shall comply with ASTM C494, Type C specifications. Reinforcement shall conform to ASTM A615, Grade 60, deformed.
1. Expansion Joint Filler shall be bituminous type, 1/2" thick, conforming to ASTM D1751.
  2. Hot-Poured Joint Sealing Compound shall conform to ASTM D1190.

## PART 3 - EXECUTION

### 3.01 PERMITS TO OPEN SURFACES

- A. Obtain permit to open surfaces from the authority having jurisdiction, as required.
- B. Post bond and pay any fees as required.
- C. Obtain prior to cutting pavement or surface.

### 3.02 CUTTING AND REMOVAL

- A. Removal of pavement, curbs, gutters, walks and other surface construction shall be performed prior to trench excavation.
- B. Dimensions of the area removed shall be no larger than necessary to provide adequate working space for proper installation of pipe and appurtenances.
  - 1. Remove to the extent necessary to provide a shoulder not less than 12" in width at any point between the cut edge of the pavement and the top of the trench wall.
  - 2. Extend area to existing pavement joints or edge of pavement where cut would result in the remaining pavement strip being less than 3' in width.
- C. Cutting shall be started with a concrete saw in such a manner to provide straight cuts with vertical edges to the depth required to establish break line.
  - 1. Make cuts to and between straight or accurately marked curved lines parallel to the centerline of the trench, unless otherwise directed by the Engineer
  - 2. Pavement crossed diagonally shall be squared by saw cutting at right angles to the paved area.
- D. Where trench crosses drives, walks, curbs, or other surface construction, remove and replace same between existing joints or between saw cuts as specified for pavement.
- E. Where trench parallels concrete walks and the location is partially under the walk, remove and replace the entire walk.
- F. All concrete and bituminous materials removed shall be disposed as waste material.

### 3.03 REPLACEMENT

- A. General:
  - 1. Unless otherwise indicated on the drawings, replace pavements, curbs, gutters, walks and other surface improvements with like materials to those removed.
  - 2. Complete within 60 days of utility construction, weather permitting.
  - 3. Restore to equal or better condition than existed before start of Work and to satisfaction of the authority having jurisdiction.
- B. Aggregate Base Course:
  - 1. Conform to the construction requirements of MODOT Section 304.
  - 2. Place aggregate base course on properly prepared subgrade.
  - 3. Place to a compacted thickness equal to existing base course, but not less than 6".
- C. Tack or Prime Coat:
  - 1. Conform to the equipment and construction requirements of MODOT Section 407 and 408 as applicable.
  - 2. Apply tack coat to existing bituminous or concrete surfaces at a rate between 0.02 and 0.10 gallons per square yard as directed by Engineer.
  - 3. Apply prime coat to existing aggregate surfaces at a rate between 0.2 and 0.5 gallons per square yard as directed by Engineer.
  - 4. If asphalt material is not completely cured within the maximum recommended curing time, spread sufficient sand over the surface to blot up excess asphalt. Sweep loose sand from primed to tacked surface prior to placing bituminous paving course.

D. Flexible Pavement Replacement:

1. Conform to the equipment and construction requirements of MODOT Sections 401 or 409 as applicable.
2. Place plant mix bituminous pavement to a finished thickness equal to existing bituminous surface, but not less than 2".
3. Place double seal coat consisting of two applications of bituminous material and cover aggregate where required on the drawings.
4. After placement, the pavement shall be free from ragged edges and shall have a finished surface conforming to the established contours of the original pavement and existing adjacent surfaces.

E. Rigid Pavement Replacement:

1. Conform to the equipment and construction requirements of MODOT Section 502.
2. Place to a finished thickness equal to existing concrete pavement, but not less than 6".
3. Both transverse ends of all new Portland cement concrete repairs shall be sawed 2" deep by 3/8" wide, and sealed with joint sealing compound.

F. Curb and Gutter Replacement:

1. Construct curb and gutter to the cross-section and gutter cross-slope of that removed.
2. Place bituminous preformed expansion joints, 1/2" thick and precut to exact cross-section of the curb and gutter at the radii of all changes in direction and at intervals not greater than 50'.
3. Provide contraction joints at intervals not exceeding 6'.
  - a. Contraction joints shall consist of a groove at least 1" deep, and 1/8" to 1/2" in width, sawed in the green concrete, or
  - b. A plane of weakness formed by inserting a removable metal template.
4. Fill all expansion and contraction joints with joint sealing compound, finished slightly concave so as not to overflow the joint.
5. Round all exposed edges of curb and gutter to a 1/2" radius with a suitable edging tool.
6. Exposed surfaces shall be finished smooth and even with a steel trowel and given a light broom finish.

G. Concrete Walk Replacement:

1. Construct walks to the width of that removed, and a thickness not less than 6" in driveways and 4" in all other areas.
2. Provide bituminous preformed expansion joints, 1/2" thick, where walks abut a structure, at changes in direction, and at intervals not more than 40'.
3. Walks shall be divided by grooves into equal length sections of 4' to 6' in length. Grooves shall be 1/8" to 1/4" in width and extend to 1/4 the depth of the walk.
4. Round edges to a 1/4" radius with a suitable edging tool.
5. Walks shall be floated smooth and even and given a light broom finish at right angles to their length.

### 3.04 FIELD QUALITY CONTROL

A. Flexible Pavements:

1. Contractor shall sample the completed pavement at no additional cost to the Owner to



- verify that the compacted layer is constructed to specified thickness.
2. Samples shall be obtained by drilling 4" diameter cores at locations designated by the Engineer.
  3. Samples shall be taken the full depth of the compacted layer and shall consist of an undisturbed portion of the compacted mixture.
  4. Restore surface from which samples are taken within 48 hours using an approved commercial mixture.

B. Rigid Pavements

1. Contractor shall furnish test equipment, test cylinder molds, and trained personnel to make the required concrete test cylinders and deliver the test cylinders to the testing laboratory.
2. Concrete sampling for cylinder making shall be done conforming to ASTM C172. Samples shall be taken at random as directed and at the point of truck discharge.
3. Prepare test cylinders conforming to ASTM C31, with not less than one set of cylinders (four cylinders) from each day's placement for each 100 cubic yards or fraction thereof.
4. Laboratory Testing:
  - a. Contractor shall employ and pay to retain the services of an engineering testing laboratory to perform required laboratory testing.
  - b. Laboratory shall cure and test concrete cylinders conforming to ASTM C192 and C39, testing two cylinders at 7-days of age and two cylinders at 28-days of age.
  - c. Low-strength concrete is defined as either:
    - 1) Concrete whose average, of any sets of three consecutive 28-day strength tests, is below the required 28-day strength.
    - 2) Concrete whose individual 28-day strength tests (average of two cylinders) is more than 500 psi below the required 28-day strength.
  - d. Potentially low-strength concrete is defined as concrete whose 7-day strength tests (average of two cylinders) is less than 70% of the specified 28-day strength.
5. Should test results indicate low strength concrete, contractor shall take immediate corrective action, as approved by Engineer.
6. Remove and replace with acceptable concrete when the quality and location of the low-strength concrete is such that Engineer considers the strength or durability of the pavement is impaired and so orders.

END OF SECTION

SECTION 321540  
AGGREGATE SURFACING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes material and construction requirements for aggregate surfacing.
- B. Related Work:
  - 1. Section 312200 - Grading
- C. References:
  - 1. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
    - b. ASTM D698 - Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. (2.49 Kg) Rammer and 12-in (305-mm) Drop.
    - c. ASTM D4253 - Standard Test Methods for Maximum Index Density of Soils Using a Vibratory Table.
    - d. ASTM D4254 - Standard Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.
    - e. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
    - f. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.
    - g. ASTM D5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
    - h. ASTM D6241 - standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
  - 2. Missouri Department of Transportation Standard Specifications for Highway Construction (MoDOT):
    - a. Division 300 - Bases and Aggregate Surfaces.
    - b. Division 1000 - Materials Details

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Granular Materials.
  - 1. Sieve Analysis, ASTM C136.
  - 2. Representative sample of proposed material for inspection and acceptance by Owner's representative.
- C. Vegetation Barrier.
  - 1. Manufacturer's product data documenting compliance with requirements.

2. Representative sample of proposed material for inspection and acceptance by Owner's representative.

### 1.03 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items Included: As indicated and required for a complete installation including, but not limited to, excavation, subgrade preparation, vegetation barrier, aggregate surfacing, installation and compaction.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Aggregate Surfacing: Type 1 Aggregate for Base as defined in MoDOT Section 1007.2.
- B. Vegetation Barrier: Medium-weight, polypropylene, non-woven geotextile conforming to the following:
  1. ASTM D5261 - Minimum Weight, 6.0 oz/sy .
  2. ASTM D6241 - CBR Puncture, 410 lbs.
  3. ASTM D4751 - Apparent Opening Size, 70 U.S. Sieve.
  4. ASTM D4491 - Water Flow Rate, 110 gpm/sf.

## PART 3 - EXECUTION

### 3.01 CONSTRUCTION REQUIREMENTS

- A. Construct areas to receive crushed stone surfacing to the lines, grades, cross sections, and dimensions indicated on the drawings.
- B. Subgrade Preparation:
  1. Subgrades shall be firm, dense and thoroughly compacted and consolidated; shall be free of mud and muck; and shall be sufficiently stable to remain firm under traffic loads.
  2. Any soft or otherwise unsatisfactory materials which are found shall be removed to the level of firm material as directed by the Owner's Representative and replaced with granular material for subgrade stabilization as specified in Section 312300.
  3. Compact subgrade to not less than 95% of maximum density at a moisture content within 2% of optimum as determined by ASTM D698.
  4. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner's Representative without additional compensation.
  5. Subgrades to receive aggregate surfacing shall have a maximum deviation of not more than 1-inch in any 10-feet when tested with a 10-foot straight edge applied parallel with and perpendicular to the centerline of subgrade areas.
- C. Vegetation Barrier Placement:
  1. Conform to geotextile manufacturer's installation guidelines and as specified herein.
  2. Place vegetation barrier on prepared subgrade, laid smooth and free of tension, stress, folds, wrinkles or creases.
  3. Place vegetation barrier strips to provide not less than 12 inches of overlap. Overlap (shingle) strips in the direction the aggregate surfacing will be spread.

4. Anchor strips to prevent dislocation during placement of aggregate surfacing.
5. Do not permit tracked or wheeled equipment on areas covered with vegetation barrier.
6. Do not leave vegetation barrier exposed more than 48 hours prior to placing aggregate surfacing.

D. Crushed Stone Surfacing Placement:

1. Place aggregate surfacing material by end dumping onto the vegetation barrier such that a minimum of 6 inches of material will be between the construction equipment tires or tracks and the vegetation barrier at all times.
2. Place, spread, and compact aggregate surfacing in such a manner that minimizes the development of wrinkles and/or movement of the vegetation barrier strips.
3. Compact aggregate surfacing to not less than 75% relative density as determined by ASTM D4253 and D4254.

### 3.02 FIELD QUALITY CONTROL

A. Subgrade Tolerances:

1. Owner's Representative will inspect all subgrades to determine conformance with lines, grades, cross sections, and dimensions indicated on the drawings.

B. Compaction Tests:

1. Contractor shall retain the services of an engineering testing laboratory to test and verify that the compacted aggregate surfacing is constructed to specified thickness and density.
2. Testing method shall conform to MoDOT Section 304.
3. A minimum of 3 compaction tests shall be made for each layer at frequency not to exceed 2500 square feet.
4. All testing shall be reported to the Owner and Engineer in written form.

END OF SECTION

SECTION 329200  
TURF AND GRASSES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers establishment of new lawns, and restoration of existing lawns and other areas disturbed during construction including:
  - 1. Preparation of subgrade to receive topsoil.
  - 2. Spreading topsoil.
  - 3. Seed bed preparation.
  - 4. Seed protection on areas subject to erosion.
  - 5. Maintenance of seeded areas until acceptance.
  
- B. Related Work:
  - 1. Section 311100 - Site Preparation
  - 2. Section 312200 - Grading
  
- C. References:
  - 1. Missouri Department of Transportation Standard Specifications for Highway Construction (MoDOT):
    - a. Section 801 - Fertilizing
    - b. Section 802 - Mulching
    - c. Section 805 - Seeding

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Suppliers or vendors guaranteed statement of analysis stating botanical and common name, percentage by weight, and percentages of purity, germination and weed seed for each grass species.
- C. Suppliers or vendors certified analysis for fertilizer substantiating compliance with specified requirements.
- D. Copy of vendor's invoice for all seed, fertilizer and mulch showing quantity by weight purchased for the project to assure compliance with specified application rates.
- E. Copy of analysis of soil tests supporting specified fertilizer and agricultural lime application rates.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver grass seed in original containers labeled according to the U.S. Department of Agriculture Federal Seed Act showing analysis of seed mixture, percentage of pure seed, year of production, net weight, and date and location of packaging.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis and name of manufacturer.
- C. Protect materials from deterioration during delivery and while stored at site.

1.04 QUALITY ASSURANCE

- A. Unless otherwise specified herein, all materials and construction requirements shall conform to MoDOT Sections 801 through 803 and 805.

1.05 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items Included: As indicated and required for a complete installation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Topsoil: Topsoil is defined as selectively excavated surface soil that is representative of local soils that produce heavy growths of crops, grass or other vegetation. Satisfactory topsoil is reasonably free of underlying subsoil, clay lumps, weeds, litter, brush, matted roots, toxic substances or any material harmful to plant growth or which would hinder grading, planting, or maintenance operations. Topsoil shall not contain more than 5% by volume of stones or other such objects larger than 1/2" in any dimension for lawn seeded areas and 1" in any dimension in other seeded areas.
- B. Lime: Agricultural lime with not less than 90% passing the No. 8 sieve and containing not less than 65% calcium carbonate equivalent.
- C. Fertilizer: Organic 13-13-13 or equivalent analysis commercial grade, uniform in composition, free flowing suitable for application, and conforming to Missouri State Fertilizer Laws.
- D. Grass Seed:
  1. Provide fresh, clean seed from current year's crop complying with tolerances for purity and germination established under the U.S. Department of Agriculture Federal Seed Act and Missouri State Seed Law.
  2. Seed that is wet, moldy or that has otherwise been damaged in transit or storage will not be acceptable.
  3. Type 1 Seed Mixture: Unless otherwise specified or indicated, use the following blend of turf type tall fescue for establishment of new lawn areas and restoration of existing lawn areas that are disturbed during construction operations.

Kind of Seed	Purity %	Germination %	Mixture %
Falcon IV	97	85	20
Finelawn Elite	97	85	20
Houndog	97	85	20
Scorpion 2	97	85	20
Shenandoah	97	85	20

4. Type 2 Seed Mixture: Unless otherwise specified or indicated, use the following blend of grass seed for establishment or restoration of forage grass on areas other than lawns that are disturbed during construction operations.

Kind of Seed	Purity %	Germination %	Mixture %
Kentucky 31 Tall Fescue	97	85	40
Orchard Grass	85	80	40
Annual Rye	90	85	20

E. Mulch:

1. Type 1 Mulch (Vegetative):

- a. Cereal straw from oats, rye, wheat or barley,
- b. Free of prohibited weed seed as stated in the Missouri Seed Law, and
- c. Relatively free of all other noxious and undesirable seed.

2. Type 3 Mulch (Hydraulic Mulch):

- a. Virgin wood cellulose fiber mulch with tackifier. Mulch shall be produced by either the ground or cooked fiber process, shall not be water soluble, and have the following properties:
  - 1) Cellulose Fiber Mulch - 82% ± 3% by weight
  - 2) Organic Tackifier - 3% ± 1% by weight
  - 3) Moisture Content - 12% ± 3% by weight
- b. All components of the hydro-mulch shall be pre-packaged by the Manufacturer to assure compliance with the above values. No chemical additives with the exception of fertilizer, lime and biostimulant materials are to be added to the product.

PART 3 - EXECUTION

3.01 SEQUENCING

- A. Seeding shall progress as rapidly as portions of the site become available, working within seasonal limitations.
- B. Seasonal Limitations:
  1. Unless otherwise authorized, perform seeding only during the following seasons:
    - a. February 15 to June 15
    - b. September 15 to November 15
  2. Unless otherwise authorized, sod shall not be placed during a drought nor during the period from June 1 to September 1.
  3. Seeding shall not be performed when the ground is frozen, covered with snow or otherwise in a non-tillable condition.

3.02 SEED BED PREPARATION

- A. Top Soiling: Specified in Section 312200 - Grading.
- B. Remove and dispose of rocks over 1-inches in any dimension, sticks, roots, rubbish and other extraneous matter which may interfere with tilling, seeding or later maintenance.

- C. Thoroughly loosen and pulverize topsoil to a depth of at least 4 inches.
- D. Application rate of agricultural lime and fertilizer shall be based on soil analysis performed by qualified professional engaged by Contractor. Incorporate lime and fertilizer into the soil to a depth of at least 2 inches by discing, harrowing or raking.
- E. Fine grade and hand rake to a smooth even surface with loose, uniformly fine texture void of any ridges or depressions.
- F. Limit preparation to areas which will be seeded promptly after preparation.
- G. Restore prepared areas to specified condition if eroded or otherwise disturbed after fine grading and prior to seeding.

### 3.03 SEEDING

- A. Distribute seed evenly over the entire area to be seeded by sowing equal quantity in two directions at right angles to each other.
- B. Application Rates: Apply seed mixture at the rate of 8 to 10 pounds per 1,000 square feet (350 to 435 pounds per acre).
- C. Application Methods:
  - 1. Dry Seeding: Perform mechanically with approved equipment designed for even distribution of dry seed. Equipment may be either hand operated, such as knapsack seeder, or be tractor-drawn, such as seed drill, except that tractor-drawn equipment will not be permitted on lawn areas. Cover seed with soil to an average depth of 1/4 inch by raking or other approved method. Roll lightly with a lawn-type roller.
  - 2. Hydraulic Seeding: Mix seed with water and constantly agitate to maintain uniform mixture. Do not add seed to water more than 4 hours before application. Equipment shall have a built-in agitation system and operating capacity sufficient to agitate, suspend and homogeneously mix a slurry containing not less than 50 pounds of organic mulching amendment plus fertilizer, chemical additives and solids for each 100 gallons of water.
    - a. Do not leave hydro-seeding slurry compounds in the hydro-seeding machine for more than two (2) hours prior to application to prevent possible seed destruction. If slurry compounds are left in the machine for more than two hours, add 50% more of specified seed mix to any slurry mixture not applied within two hours after mixing. Add 75% more of the specified seed mix to any slurry mixture which has not been applied four hours after mixing. All mixtures more than six (6) hours old must be disposed off-site at Contractor's expense.

### 3.04 MULCHING

- A. Apply mulch on all seeded areas within 24 hours following seeding operation. Mulch type as indicated on the drawings.
- B. Application Rates:
  - 1. Type 1 Mulch (Vegetative): Apply at the rate of 2½ tons per acre. Immediately after anchoring the mulch, water the seeded area in one watering, in sufficient amount to penetrate the seed bed to a minimum depth of 2 inches.
  - 2. Type 3 Mulch (Hydraulic Mulch): Apply in accordance with the manufacturer's recommendations at a rate of 1500 to 2000 pounds per acre.

### 3.05 MAINTENANCE

- A. Maintain seeded areas until acceptable stand of grass is established.
- B. Perform watering, fertilizing, weeding, mowing, trimming and other maintenance as required to establish a flourishing stand of grass free of weeds, bare spots and surface irregularities.



- C. Repair erosion damage, reseed and replace displaced mulch as necessary until final acceptance.

### 3.06 ACCEPTANCE OF SEEDED AREAS

- A. When seeding work is completed, including maintenance, Engineer and Owner will, upon request, make an inspection to determine acceptability.
- B. Seeding work may be inspected for acceptance in parts agreeable to Engineer and Owner, provided work offered for inspection is complete, including maintenance.
- C. Repair rejected work and continue specified maintenance until reinspected by Engineer and Owner and found to be acceptable.
- D. Seeding work will be acceptable provided, specified requirements have been complied with and a healthy, uniform, close stand of grass is established, free of weeds, bare spots and surface irregularities.

END OF SECTION

SECTION 330130.16  
CLOSED-CIRCUIT TELEVISION INSPECTION (CCTV)

PART 1 - GENERAL

1.01 SUMMARY

- A. Description: The work of this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals necessary to perform an internal television (TV) inspection of gravity sanitary sewer lines and sewer service lateral lines.
- B. Related Work:
  - 1. Section 330130.41 - Sewer Cleaning
- C. References:
  - 1. National Association of Sewer Service Companies (NASSCO)
  - 2. Pipeline Assessment and Certification Program (PACP)

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300. Include the following:
  - 1. Visual and audio record of each sewer line segment televised in a digital format.
  - 2. Digital data exported into a spreadsheet or database file type.

1.03 BASIS OF PAYMENT

- A. CCTV Inspection:
  - 1. Measurement: No measurement for payment will be made. Payment will be made on a lump sum basis.
  - 2. Items Included: Labor, materials, tools, equipment, inspection logs/recordings, cleaning, flow control, and incidentals.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Internal inspection of sewer lines and lateral lines shall be performed using a color closed-circuit television (CCTV) camera and shall include video documentation presenting such information as location and identification of manhole-to-manhole segment, date, footage counter, and written inspection log.
- B. Television Inspection Logs: Location records of the sewer mains and sewer lateral lines inspected and repaired shall be kept and maintained by the Contractor digitally in a PACP-compliant software package certified by NASSCO, such as PipeTech or Owner approved equal. These location records shall clearly show the stationing location in relation to the starting manhole (upstream or downstream). Sewer lateral lines shall also be referenced to the corresponding property address. Observations shall be recorded by the Contractor in an approved digital delivery format and submitted to the Owner. Hard copies of the inspection reports shall be bound and submitted to the Owner with the digital data. The digital information shall contain multiple video inspection records and files that store each line segment as a unique digital record. Combining multiple segments on one form or digital record is not permitted.
- C. The Contractor shall provide a digital video file in an MPG or AVI format of the inspection and repair area. These digital video files must include intelligible audio description in English of each

observation, including the name of the line segment at the same time that the inspection is performed.

- D. Digital Video Recordings: The purpose of digitally recording shall be to supply a visual and audio record of all line segments and lateral lines that are televised. The digital video playback speed shall be at the same speed that it was recorded. Slow motion or stop-motion playback features may be supplied at the option of the Contractor. Title of the video record shall remain with the Owner. The Contractor shall have all digital video and necessary playback equipment readily accessible for review by the Owner during the project. Each digital video file and digital associated log sheet(s) and/or field form(s) using free shareware shall be submitted to the Owner for review no later than thirty (30) days after the completion of the tape. The digital video file, including the audio portion, shall be a deliverable and will be required for completion of the work for each segment televised. The digital video files (recorded on the approved digital storage media) shall be indexed with the line segment and labeled appropriately.
- E. All inspection information in a digital format shall be contained on a PACP compliant software package certified by NASSCO, such as Pietsch or Owner approved equal. Data shall also be exported into a spreadsheet or a database file type.
- F. Video recordings shall be processed by the Contractor and delivered to the Owner after completion of CCTV inspection for review. A line segment or lateral line shall be considered complete for payment once the digital data has been delivered to the Owner, reviewed, and accepted.

**PART 3 - EXECUTION**

**3.01 SANITARY SEWER LINE INSPECTION**

- A. Sewer Flow Requirements: Flow in sewer pipe being inspected shall not exceed the depth of flow shown in the following table. Depth shall be as measured in the upstream manhole of the section being inspected. When depth of flow in upstream manhole exceeds the maximum depth of flow shown in the following table, flow shall be reduced to a level at or below the maximum depth shown by plugging or blocking the flow, or by pumping and bypassing of flow as specified in Section 330130.81 - Sewer Flow Diversion and Control.

Maximum Depth of Flow for CCTV Inspection

Nominal Pipe Diameter	Maximum Depth of Flow
6" – 10"	20% of pipe diameter
12" – 24"	25% of pipe diameter

- B. Sewer lines and manholes shall be cleaned in accordance with the requirements of Section 330130 - Sewer Cleaning.
- C. Sewer lines shall be CCTV inspected per the requirements of this specification.
- D. Deliver electronic data and written logs to Owner upon completion of all cleaning and inspection for the work completed.
- E. Owner shall have access to observe TV monitor and other operations at all times.
- F. The following information shall be recorded on the audio track of the video: narrative of location, direction of view, manhole numbers, pipe diameter and material, date and time of inspection, and location of laterals and other key features. The information presented shall also be visually displayed at the beginning and end of each manhole-to-manhole pipe segment. In addition, the data shall visually display the length in feet from starting point of each manhole-to-manhole pipe segment.
- G. Sewer Identification: Electronic data and written inspection documentation shall include sewer line and manhole identifiers as given to the Contractor by the Owner.
- H. Image Perspective: Camera image shall be down the center axis of pipe when camera is in motion. Provide 360-degree sweep of pipe interior at points of interest to more fully document condition of existing sewer. Points of interest may include, but shall not be limited to, the following: defects, obstructions, encrustations, mineral deposits, debris, sediment, lateral connections, and any location determined not to be clean. X and Y coordinates of each defect shall be provided.

- I. Sewer Reach Length: Physically measure and record length of each sewer line segment from centerline to centerline of upstream and downstream manholes.
- J. Inspection Rate: Camera shall be pulled through sewer in either direction, but if a section of sewer line has to be re-inspected for any reason, the camera during the re-inspection shall travel the same direction as the initial inspection. Maximum rate of travel shall be 30 feet per minute when recording.
- K. Each file name shall include the upstream manhole number of the line segment as the first identifier followed by the downstream manhole number of the line segment (e.g. 144 to 145).
- L. Clean Up: The Contractor shall keep premises free from accumulations of waste materials, rubbish, and other debris generated by Contractor's operations.

### 3.02 SEWER LATERAL LINE INSPECTION

- A. All sewer lateral line inspection shall be approved by the Engineer in writing prior to beginning inspection.
- B. Access: The Contractor shall have access to the sewer lateral line through the main sewer line's upstream and downstream manholes. At no time shall the Contractor have access to private property without written permission from the Property Owner.
- C. Sewer Lateral Line Flow Requirements: Flow in sewer lateral lines being inspected shall not interfere with the inspection or cause the inspection video to be incomplete or not viewable. If the flow within a lateral line is deemed excessive, the Contractor shall wait a few minutes to see if the flow subsides enough to allow for inspection. If necessary, the Contractor shall contact the Homeowner and request that they relinquish using their sewer lateral line temporarily during the inspection and then notify the Homeowner when the inspection is complete.
- D. Sewer lateral lines shall be CCTV inspected per the requirements of this specification.
- E. Deliver electronic data and written logs to Owner upon completion of all cleaning and inspection for the work completed.
- F. Owner shall have access to observe TV monitor and other operations at all times.
- G. The following information shall be recorded on the audio track of the video: narrative of location, direction of view, property address, pipe diameter and material, date and time of inspection, and location of key features. The information presented shall also be visually displayed at the beginning and end of each sewer lateral line. In addition, the data shall visually display the length in feet from starting point of upstream or downstream manhole.
- H. Sewer Identification: Electronic data and written inspection documentation shall include sewer service lateral line identifiers as given to the Contractor by the Owner.
- I. Image Perspective: Camera image shall be down the center axis of pipe when camera is in motion. Provide 360-degree sweep of pipe interior at points of interest to more fully document condition of existing sewer lateral line. Points of interest may include, but shall not be limited to, the following: defects, obstructions, encrustations, mineral deposits, debris, sediment, and any location determined not to be clean. X and Y coordinates of each defect shall be provided.
- J. Each file name shall include the upstream manhole number as the first identifier followed by the number of the lateral line downstream (e.g. 144-5 would be for the 5<sup>th</sup> lateral line from the upstream manhole 144).
- K. Clean Up: The Contractor shall keep premises free from accumulations of waste materials, rubbish, and other debris generated by Contractor's operations.

END OF SECTION

SECTION 330130.41  
SEWER AND MANHOLE CLEANING

PART 1 - GENERAL

1.01 SUMMARY

- A. The work of this section shall consist of furnishing all labor, materials, tools, equipment, and incidentals necessary for sewer line cleaning, manhole cleaning, manhole inspection, and removing internal obstructions.
1. Sewer line cleaning shall include removing sediment, rocks, debris, roots, grease accumulations and obstructions from the sections of sanitary sewer to be rehabilitated.
  2. The Owner shall provide access to all manholes.
- B. Related Sections:
1. Section 330130.16 - Closed Circuit Television Inspection (CCTV)
  2. Section 330130.62 - Manhole Rehabilitation
  3. Section 330130.72 - Sanitary Sewer Rehabilitation Using Cured-in-Place Pipe (CIPP)
  4. Section 330130.74 - Cured-in-Place (CIP) Point Repairs
  5. Section 330130.81 - Sewer Flow Diversion and Control

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300. Include the following:
1. Document visible signs of potential problems observed during cleaning operations.
  2. Cleaning and inspection log for each manhole.

1.03 BASIS OF PAYMENT

- A. All Work under this Section shall be considered incidental to other related Work and no measurement or direct payment will be made.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Chemicals shall not be allowed without prior written approval of the Owner. In no event shall chemicals be used that may be considered hazardous or detrimental to the processes or equipment at the Owner's wastewater treatment facility.
- B. Cleaning shall be done by high-velocity hydraulic (hydro-cleaning) equipment specifically designed for and capable of removing dirt, grease, rocks, sand, roots, and other materials and obstructions from buried sewer lines and from manholes.
- C. Equipment shall have a selection of two or more high-velocity nozzles. Nozzles shall be capable of producing scouring action from between 15 to 45 degrees in all size lines to be cleaned, with nozzles capable of producing flows from fine spray to solid stream.
- D. Equipment shall carry its own water tank, auxiliary engines, and high-pressure water pump. Pumps and bypass lines shall be of adequate size and capacity to handle flows that may be encountered during peak flow periods or from precipitation. The bypass system shall be constructed using materials and workmanship that shall prevent leakage during pumping operations.
- E. Combination Unit Pump: Capable of pumping at least 80 gpm at 2,000 psi, measured at beginning of hose reel.
- F. Water Pump: Shall be able to produce 2,000 psi while pulling full vacuum, completely

independent from vacuum system, without affecting water pressure.

- G. Water for cleaning shall be provided by the Owner. Contractor shall make arrangements with the Owner for purchase of water. All costs of water shall be considered incidental to the cleaning services.

### PART 3 - EXECUTION

#### 3.01 SEWER LINE CLEANING

- A. Designated sewer lines shall be cleaned using methods and equipment described in this specification, or other methods or equipment that has been prior approved by the Owner. Internal obstructions, such as roots or gaskets, shall be removed by trenchless techniques whenever an obstruction is encountered that prevents the pipe from being cleaned. Special care shall be taken during cleaning operations to assure almost complete removal of roots from joints. Procedures to remove internal obstructions may include use of equipment such as root saws or root cutters, porcupines, and jet machines equipped with hydraulically driven cutters.
- B. If cleaning of entire section cannot be successfully performed from one manhole, Contractor shall set up equipment at next manhole upstream or downstream, as required, and attempt cleaning again. In the event that successful cleaning cannot be performed, or if equipment fails to traverse the entire sewer line section, it will be assumed that a major blockage exists. Cleaning operations shall be suspended, and the Contractor shall immediately notify the Owner.
- C. The Contractor shall take all precautions to protect the sewer lines from damage that might be inflicted by improper use of cleaning equipment. The Contractor shall immediately notify the Owner if fresh soil, pieces of pipe, or other visible signs of potential problems are observed during cleaning operations.
- D. The Contractor shall take all precautions to ensure that cleaning operations do not cause water damage to properties, structures, and buildings that are connected to and served by the sewer lines being cleaned.
- E. All damage to sewer lines or to connected properties, structures, and buildings that results from the Contractor's failure to take all precautions outlined and required in the specification shall be repaired or replaced to the Owner's satisfaction at the Contractor's expense.

#### 3.02 MANHOLE CLEANING

- A. The Contractor shall clean the entire manhole interior, including manhole benches and walls. Manhole cleaning shall be incorporated into line cleaning operation by scouring walls with high velocity nozzle after pipe segment cleaning operation is complete.
- B. Cleaning of the manholes shall be documented, and the findings included in the final report. The Contractor shall provide a manhole cleaning log form that shall be approved by the Owner and Engineer prior to commencing work. The log form shall include as a minimum:
  - 1. Names of the individuals performing the inspection.
  - 2. Field conditions during the inspection.
  - 3. Name and location of the manhole.
  - 4. Type of manhole frame and cover.
  - 5. Condition of the manhole frame and cover.
  - 6. Vertical profile of manhole including location of lid above or below grade.
  - 7. Sketch of the manhole, including identifying pipe locations, sizes and materials.
  - 8. Manhole structure type (brick, precast, block, etc.).
  - 9. Condition of the manhole interior.
  - 10. List of inflow and/or infiltration sources, and vertical depth to these sources:
    - a. List of any maintenance required.
    - b. Photos of the manhole; both inside and outside.
    - c. Notes of observation of the field personnel.

- C. Removal of Debris: Gravel and sand collected during cleaning operations shall not be allowed to pass on through to downstream sewers. Large, intact root balls and large debris (bricks, large rock, etc.) shall be removed from the sewer and disposed of by the Contractor at no additional expense to the Owner. All such disposal shall be in accordance with state and federal laws and regulations. Under no circumstances shall the Contractor discharge sewage or solids collected from downstream manholes onto streets or into ditches, catch basins or storm drains.
- D. Clean Up: The Contractor shall keep premises free from accumulations of waste materials, rubbish, and other debris generated by Contractor's operations.

END OF SECTION

SECTION 330130.62  
MANHOLE RENOVATION

PART 1 – GENERAL

1.01 SUMMARY

- A. This specification shall govern all work, materials, and equipment required for the renovation of manholes for the purpose of eliminating inflow, infiltration and exfiltration, providing corrosion protection, repairing of voids, and restoration of the structural integrity of the substrate as a result of applying a monolithic fiber-reinforced structural cementitious liner, replacing the manhole frame and cover, adjusting the rim elevation to match the existing or proposed grade, and applying a flexible manhole chimney seal to existing brick, concrete, or other masonry construction material.
1. Described herein are procedures for adjusting the rim elevation and replacing the manhole frame and cover and procedures for cleaning, preparation, application, and testing of the cementitious liner and flexible chimney sealant. Work of this section includes the following:
    - a. Removal and disposal of existing manhole frame and cover and steps.
    - b. Installation of adjustment rings, as necessary to bring finished rim elevation to grade.
    - c. Installation of new frame and cover.
    - d. Removal of any loose and unsound material.
    - e. Cleaning of the area to be sprayed.
    - f. The elimination of active infiltration prior to making the application.
    - g. The repair and filling of voids.
    - h. The repair and sealing of the invert and benches.
    - i. The spray application of a cementitious mix to form a structural monolithic liner.
    - j. The spray application of a flexible sealant to prevent infiltration between manhole cover and frame and the manhole chimney.
- B. Related Work:
1. Section 330130.41 - Sewer and Manhole Cleaning
  2. Section 330130.81 - Sewer Flow Diversion and Control
- C. References:
1. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM C94 - Standard Specification for Ready Mixed Concrete
    - b. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)
    - c. ASTM C234 - Standard Test Method for Comparing Concretes on the Basis of the Bond Developed with Reinforcing Steel
    - d. ASTM C267 - Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes
    - e. ASTM C293 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading)
    - f. ASTM C596 - Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement
    - g. ASTM C666 - Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
    - h. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear
    - i. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic



Elastomers—Tension

- j. ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness
  - k. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- 2. Environmental Protection Agency (EPA).
  - 3. Occupational Safety and Health Administration (OSHA).
  - 4. Resource Conservation and Recovery Act (RCRA).

## 1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. The following items shall be submitted to the Engineer prior to application.
  - 1. A technical data sheet for each product used, including ASTM test results verifying product meets specifications and verifying product is suitable for its intended use.
  - 2. Material Safety Data Sheets (MSDS) for all products used, including materials used for patching, profiling, & leak stoppage and corrosion protection.
  - 3. Project guidelines and manufacturer recommendations.
  - 4. Qualification of applicator.
    - 1) Manufacturer certification stating that personnel have been trained and approved in the handling, mixing and application of the products to be used.
    - 2) Certification that the equipment to be used for applying the products has been manufactured or approved by the manufacturer.
  - 5. Design details for any additional ancillary systems and equipment to be used on site.

## 1.03 QUALITY ASSURANCE

- A. Described herein are procedures for cleaning, preparation, application, and testing of manhole cementitious liner and flexible chimney sealant. The applicator of the cementitious liner and flexible chimney sealant shall be approved and trained by the manufacturer, shall furnish all labor, equipment and materials for applying a corrosive resistant structural cementitious mixture to rebuild deteriorated structures back to original dimensions, restore structural integrity, eliminate infiltration, and the application of sealant to eliminate infiltration between the cover ring and chimney, using machinery specially designed for the application. All aspects of the application of the cementitious liner and flexible chimney sealant shall be in accordance with the manufacturer's recommendation and per the following specifications.

## 1.04 DELIVERY, STORAGE AND HANDLING

- A. Materials are to be kept dry, protected from weather, and stored under cover protected from the elements.
- B. Materials are to be stored between 40°F and 110°F. Do not store near flame, heat, or strong oxidants.
- C. All materials are to be handled according to specific material safety data sheets.

## 1.05 SITE CONDITIONS

- A. Applicator shall conform to all local, state, and federal regulations including those set forth by OSHA, RCRA, and EPA, and other applicable authorities.
- B. Method statements and design procedures are to be approved by the owner when confined space entry or flow diversion bypass pumping is necessary in order for applicator to perform the specified work.

1.06 BASIS OF PAYMENT

A. Manhole Frame and Cover:

- 1. Measurement: Complete product in place per lump sum.
- 2. Items Included: As indicated and required for a complete installation including, but not limited to, removal and disposal of existing frame and cover, and installation of adjustment rings (where indicated), joint sealant, and new frame and cover.

B. Cementitious Liner with Fused Aluminate Clinker:

- 1. Measurement: Complete product in place per lump sum.
- 2. Items Included: As indicated and required for a complete installation including, but not limited to, cleaning, flow control, surface preparation, invert repair, patching material, grouting material, cementitious liner material, application, curing, and field quality control testing.

C. Cementitious Liner with Antimicrobial Additive:

- 1. Measurement: Complete product in place per each. Reference Document 004322 - Unit Price Form and Division 01 Section 012200 - Unit Prices.
- 2. Items Included: As indicated and required for a complete installation including, but not limited to, cleaning, flow control, surface preparation, invert repair, patching material, grouting material, cementitious liner material, application, curing, and field quality control testing.

D. Flexible Chimney Sealant:

- 1. Measurement: Complete product in place per lump sum.
- 2. Items Included: As indicated and required for a complete installation including, but not limited to, surface preparation and application of patching material, grouting material, and flexible chimney sealant.

E. Surface Restoration:

- 1. Bituminous or Concrete Pavement Replacement: Specified in Section 320117.
- 2. Aggregate Surfacing: Specified in Section 321540.
- 3. Grass Areas: Specified in Section 329200.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Manhole adjustment rings and frame and cover shall be the type as called for on the drawings and as described in specification Section 330516 – Utility Structures.
- B. Patching Material: A quick setting, fiber reinforced, high early strength, corrosion resistant, hand applied, calcium aluminate based cementitious material shall be used as a patching material to fill voids and to repair inverts. It shall be mixed and applied according to manufacturer's recommendations and shall have the following minimum requirements:

Compressive Strength	ASTM C109	>1800 psi, 1 hour & >2600 psi, 24 hours
Minimum Bond	ASTM C882	>1600 psi, 28 days
Calcium Aluminate Cement		Sulfate Resistant
Applied Density		105 pcf ± 5 pcf
Shrinkage	ASTM C596	0% at 90% Relative Humidity

- C. Infiltration Control Material: A rapid setting, high early strength, hand applied, cementitious material specifically formulated for leak control shall be applied to stop minor water infiltration. It shall be mixed and applied according to the manufacturer's recommendations and shall have the following minimum requirements:

Compressive Strength	ASTM C109	>1000 psi, 1 hour & >2500 psi, 24 hours
Sulfate Resistance	ASTM C267	No weight loss after 15 cycles @ 2000 ppm
Freeze/Thaw Resistance	ASTM C666 Method A	100 cycles
Pull Out Strength	ASTM C234	14,000 lbs
Set Time		<1 minute

- D. Grouting Material: A cementitious grout shall be used for stopping very active infiltration and filling voids and shall be mixed and applied according to the manufacturer's recommendations. The cementitious grout shall be volume stable and have a minimum 28-day compressive strength of 2500 psi. As determined by the manufacturer, the contractor shall be prepared to use a cementitious grout designed for special soil conditions that is volume stable and has a minimum 28-day compressive strength of 1000 psi. Chemical grouts may also be used for stopping very active infiltration and shall be mixed and applied per manufacturer's recommendation.
- E. Cementitious Liner with Fused Aluminate Clinker (Manholes to be renovated): A cementitious liner shall be used to form a structural monolithic liner covering all interior substrate surfaces and made from a blend of 100% pure fused aluminate clinker with a minimum aluminate content of 38% and reinforced with alkaline resistant fiberglass rods not less than ½-inch in length. Liner shall be factory blended requiring only the addition of water at the jobsite. The contents shall have a dry bulk density of 100-102 pounds per cubic foot with alkaline-resistant fiberglass rods. When mixed with manufacturers' recommended amount of water it shall have a wet nozzle density in the range of 140 to 150 pounds per cubic foot and have a typical yield of 0.48 cubic feet per bag. The material shall meet or exceed industry standards and shall not have any basic ingredient that exceeds EPA maximum allowable limits for any heavy metal. The liner shall be installed per the manufacturer's recommendations and have the following minimum requirements:

Compressive Strength	ASTM C109	>9000 psi, 28 days
Tensile Strength	ASTM C496	>800 psi, 28 days
Flexural Strength	ASTM C293	>1500 psi, 28 days
Shrinkage	ASTM C596	0% at 90% Relative Humidity, 28 days
Bond	ASTM C882	>3000 psi, 28 days
Density (When Applied)		145 ± 5 pounds per cubic foot
Freeze/Thaw	ASTM C666 Method A	300 cycles, no visible damage

- F. Cementitious Liner with Antimicrobial Additive: A cementitious liner shall be used to form a structural monolithic liner covering all interior substrate surfaces and shall be made with Type I Portland Cement reinforced with fiberglass rods not less than ½-inch in length complete with an antimicrobial additive which renders the concrete uninhabitable for bacteria growth. Liner shall be factory blended requiring only the addition of water at the jobsite. The contents shall have a dry bulk density of 82-85 pounds per cubic foot. When mixed with manufacturers' recommended amount of water it shall have a wet nozzle density in the range of 129 to 139 pounds per cubic foot and have a typical yield of 0.57 cubic feet per bag. The material shall meet or exceed industry standards and shall not have any basic ingredient that exceeds EPA maximum allowable limits for any heavy metal. The liner shall be installed per the manufacturer's recommendations and have the following minimum requirements:

Compressive Strength	ASTM C109	>9000 psi, 28 days
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Tensile Strength	ASTM C496	>800 psi, 28 days
Flexural Strength	ASTM C293	>1200 psi, 28 days
Shrinkage	ASTM C596	0% at 90% Relative Humidity, 28 days
Bond	ASTM C882	>2000 psi, 28 days
Density (When Applied)		134 ± 5 pounds per cubic foot
Freeze/Thaw	ASTM C666 Method A	300 cycles, no visible damage

The antimicrobial additive shall be ConShield, MasterLife ADA 100, or engineer approved equal meeting the following requirements:

1. The liquid antibacterial additive shall be an EPA registered material and the registration number shall be provided to the Owner and Engineer for review prior to use in the project.
  2. The antibacterial additive shall have successfully demonstrated prevention of microbial induced corrosion in sanitary sewers for a minimum of 5-years. A list of references shall be provided to the Owner and Engineer prior to use in the project.
  3. The application Contractor shall be manufacturer trained and certified.
- G. Water: Water used to mix product shall be clean and potable. Questionable water shall be tested by a laboratory per procedure outline in ASTM C-94. Potable water need not be tested.
- H. Flexible Chimney Sealant: The sealant shall be designed to prevent leakage of water into the manhole through the frame joint area and the area above the manhole cone, including all extensions to the chimney area. Extensions shall include, but not be limited to: lifting rings, brick, block, concrete, and other material that may have been used to achieve finished grade. The chimney seal shall remain flexible allowing for repeated vertical and horizontal movements of the frame due to frost lift, ground movement, or thermal expansion of pavements. The manhole chimney sealing system shall have the following minimum requirements:

Adhesion	ASTM D4541	>350 psi
Durometer Hardness	ASTM D2240	Shore A-75
Tensile Strength	ASTM D412	>1150 psi

- I. Pavement Replacement: Each manhole located under pavement shall have a minimum 4'x4'x8" thick concrete pavement section installed around the new frame and cover. The concrete pavement shall be installed in a diamond configuration with the tip of the diamond facing the direction of traffic flow. All pavement disturbed during manhole frame and cover installation shall be replaced with concrete. Any concrete required in addition to the 4'x4' square shall be at the Contractor's expense. New concrete pavement shall be flush with surrounding existing pavement and new frame and cover.

### PART 3 – EXECUTION

#### 3.01 GENERAL

- A. Prior to applying the cementitious liner and the flexible chimney sealant, each manhole designated to be renovated shall receive a new manhole frame and cover. Adjustment rings shall be provided as necessary so that the finished rim elevation matches the surrounding surface elevation for a smooth transition.
- B. Weather Conditions: No application shall be made if ambient temperature is below 40°F. No application shall be made to frozen surfaces or if freezing is expected to occur within the substrate within 24 hours after application. Precautions shall be taken to keep the mix temperatures at time of application below 90°F. Water temperature shall not exceed 80°F. Chill with ice if necessary.

#### 3.02 SURFACE PREPARATION

- A. Place covers over invert to prevent extraneous material from entering sewer lines before cleaning.
- B. All foreign material shall be removed from the manhole wall and bench using a high-pressure water spray (minimum 1500 psi). Unusual conditions such as heavy grease build-up or residues of industrial or processing wastes may require steam, chemical cleaning compounds, or surface abrading. Loose and protruding brick, mortar, and concrete shall be removed using a mason's hammer and chisel and/or scraper. Fill voids greater than 2 inches in depth with quick setting patching material meeting the requirements of Part 2.01 B. above.
  - 1. Active Leaks shall be stopped using quick setting infiltration control material meeting the requirements of Part 2.01 C. above according to manufacturer's recommendations. Some leaks may require weep holes to localize the infiltration during the application. After application, the weep holes shall be plugged with the infiltration control material prior to the application of the final coat. When severe infiltration exists, drilling may be required in order to pressure grout using a cementitious grout or chemical grout. Manufacturer's recommendations shall be followed when pressure grouting is required.

### 3.03 INVERT REPAIR

- A. After all preparations have been completed, remove all loose material and wash wall again.
- B. Any bench, invert, or service line repairs shall be made at this time using a quick setting patching mix meeting the requirements of Part 2.01 B. above.
- C. Repair inverts with visible damage and where infiltration is present. Vacuum testing is required. After blocking flow through manhole and thoroughly cleaning invert, the quick setting patch material shall be applied to the invert in an expeditious manner. The material shall be troweled uniformly onto the damaged invert at a minimum thickness of ½-inch at the invert extending out onto the bench of the manhole sufficiently to tie into the structural monolithic liner to be spray applied. The finished invert surfaces shall be smooth and free of ridges.

### 3.04 APPLICATION OF CEMENTITIOUS LINER MATERIAL

- A. Equipment: Applicator must use approved equipment designed and manufactured by the material supplier specifically for the application of cementitious liners in sanitary systems. Specially designed machines consisting of a progressive cavity pump and an air system for low velocity spray application of product shall be used for applying the materials. Equipment shall be complete with water storage and metering system.
- B. Mixing of Cementitious Liner Materials:
  - 1. Linear material shall be mixed with water in accordance with the manufacturer's instructions. Use only the amount of water specified in the manufacturer's mixing procedures to produce a mix consistency that won't "sag" or "run" when applied on a vertical surface using the approved equipment.
  - 2. The prepared mix shall be discharged into a hopper and another batch prepared to occur in such a manner as to allow spraying continuously without interruption until each application is complete.
- C. Saturated Surface: Ensure that the surface is damp and totally saturated with water, without noticeable free water droplets or running water, just before application of liner material.
- D. Spraying: Spray apply the liner material in one (1) or more passes from the bottom of the wall to the bottom of the frame to form a structurally enhanced monolithic liner. The minimum total thickness when complete shall be one (1) inch.
- E. Finishing: Trowel the surface of sprayed liner material to a relatively smooth finish. Do not over trowel. Apply a brush finish to the trowel-finished surface.
- F. Manufacturer's recommendations shall be followed whenever more than 24 hours have elapsed between applications.

- G. Bench Application: The wooden covers shall be removed, and the bench sprayed with liner material mixed per Part 3.04 B. above. Spray apply liner material to produce a gradual slope from walls to invert to form a structurally enhanced monolithic liner. The minimum thickness at the invert shall be ½ inch. Round the full circumference of the intersection between the wall and the bench to a uniform radius. When complete the bench area shall not pond any water.

### 3.05 CURING

- A. Caution should be taken to minimize exposure of applied product to sunlight and air movement. Cover structure if time between application of additional coats is to be longer than 15 minutes. At no time should the finished product be exposed to sunlight or air movement for longer than 15 minutes before covering or closing access. In hot and arid conditions, manhole shall be shaded while renovation is in progress.
  - 1. Concrete Curing Compound: Prepare surface with bonding agent in accordance with manufacturer's instructions.
  - 2. Cure Time: Allow a minimum of 4 hours cure time before subjecting manholes to storm runoff and surcharge and a minimum of 6 hours cure time before subjecting manholes to force main impact.

### 3.06 FIELD QUALITY CONTROL

- A. All field quality control testing shall be at the Contractor's expense. Inspection by the Engineer or Owner or the waiver of inspection of any portion of the work described within this specification shall not relieve the Contractor of the responsibility to perform the work as specified.
  - 1. Compressive Strength Test: Contractor shall cast four 2-inch cubes each day or from each pallet of material, label, package, and mail cubes to the manufacturer for testing. Manufacturer shall test cubes for compressive strength in accordance with ASTM C 109 and submit test results to the Contractor and Engineer.
  - 2. Leaks: Visually verify the absence of leaks.
  - 3. Manhole Testing: All renovated manholes shall be visually inspected by the Engineer for conformance to this specification. If a manhole does not pass visual inspection, the Engineer will require the Contractor to test the manhole in accordance with specification Section 330516 – Utility Structures and make any necessary repairs until it is capable of passing.
- B. Protection: Do not allow traffic for a minimum of 24-hours after final application of liner material.

### 3.07 APPLICATION OF FLEXIBLE CHIMNEY SEALANT

- A. Once the cementitious liner has adequately cured, all manholes being renovated shall receive application of a flexible chimney sealant. The applicator shall be approved and trained by the manufacturer for the application of the chimney sealant. The sealant shall have the physical properties as described in Part 2.01 H. of this specification.
  - 1. Manhole Chimney and Frame Preparation: Installer shall inspect all surfaces specified to receive the sealant prior to application. Applicator shall notify Owner of any noticeable disparity in the surfaces, which may interfere with the proper application of the sealant.
    - a. The substrate surface shall be cleaned and free of release agents, curing compounds, salts, efflorescence, laitance, sand, loose debris, dust, grease, chemical contamination, and any other foreign matter by sandblasting, shot blasting, mechanical scarification, or suitable chemical means.

- b. Active leaks shall be stopped using infiltration control material as specified above in Part 2.01 C. Openings or gaps larger than 1/8 inch shall be patched using the patching material as specified above in Part 2.01 B.
  - c. Check pH of structural liner surfaces prior to application of chimney sealant. Rinse thoroughly to achieve a final pH as recommended by the manufacturer. Allow to dry thoroughly prior to coating.
- 2. Application procedures shall conform to the manufacturer's recommendations including material handling, mixing, safety, spray equipment and environmental controls during application.
  - 3. The lining product shall have an aromatic urethane primer resin on the complete surface. The sealing system shall line the interior of the adjustment area from the cone/top manhole section up to and including the inside of the casting. The chimney sealant shall begin at a point at least 2-inches above the bottom of the casting and extend downward a minimum of 12-inches, or as necessary in order to overlap the cementitious lining applied during manhole renovation.
  - 4. The final thickness shall be a minimum of 170 mils of corrosion resistant aromatic flexible urethane resin coating.
  - 5. Manhole cover shall be replaced immediately, and traffic withheld for 30 minutes after application is complete.

END OF SECTION

SECTION 330130.72  
SANITARY SEWER RENOVATION USING CURED-IN-PLACE PIPE (CIPP)

PART 1 - GENERAL

1.01 SUMMARY

- A. The work this section consists of the renovation of pipelines and conduits by the installation of a cured-in-place pipe (CIPP) consisting of a thermosetting resin-impregnated flexible felt tube coated on one side with an impermeable plastic which is inverted into the original conduit by the use of a hydrostatic head or pressurized air. Curing is accomplished by circulating hot water or controlled steam throughout the length of the inverted tube to cure the resin into a hard, impermeable pipe with the plastic coating on the internal surface of the CIPP. The final product shall extend the entire length of the original pipe segment providing a continuous, tight-fitting and joint-less CIPP.
1. No pull-in method will be allowed.
- B. Related Work:
1. Section 330130.16 – Closed-Circuit Television Inspection (CCTV)
  2. Section 330130.41 – Sewer and Manhole Cleaning
  3. Section 330130.75 – Service Connection Renovation and Replacement
  4. Section 330130.81 – Sewer Diversion and Flow Control
- C. References: This specification references the following Industry Standards which are made a part hereof by such reference and shall be the latest edition and revision thereof. Where conflicts exist between the referenced standard and this specification, this specification will govern.
1. ASTM International (Formerly American Society of Testing and Materials):
    - a. ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics
    - b. ASTM D5813 – Standard Specification for Cured-in-Place Thermosetting Resin Sewer Piping Systems
    - c. ASTM F1216 – Standard Practice for Renovation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300. Include shop drawings, ASTM standards, and manufacturer's data for the following items:
1. Lining materials to be installed.
  2. Thermosetting resin to be utilized in producing the CIPP in accordance with these specifications.
  3. Bypass plan layout.
  4. Safety plan.
  5. Design calculations for CIPP thickness of the liner system.
  6. Procedures for preparing CIPP samples and testing of physical properties.
  7. Pre-installation inspection reports.
  8. Facility representative notification plan.

1.03 QUALITY ASSURANCE



- A. Product and Contractor Qualification Requirements: The provided product shall have a 50-year design life, and in order to minimize the Owner's risk, only proven products with substantial long-term track records will be approved. In order for products and contractors to be deemed Commercially Acceptable and approved for this project they must meet the following criteria:
1. For a Manufacturer's inversion liner product to be considered commercially proven, a minimum of 1,000,000 linear feet or 4,000 manhole-to-manhole line sections of successful wastewater collection system installations in the U.S. must be documented to the satisfaction of the Owner.
  2. The Manufacturer of the inversion liner product must operate under a quality management system that is third party certified to ISO 9001:2000 or other internationally recognized organization standards. Proof of certification shall be required for approval.
  3. Third party test results for the sewer renovation product resin system supporting the long-term performance and structural strength of the product shall be submitted for approval, and such data shall be satisfactory to the Owner. No product will be approved without independent third-party testing verification.
  4. For a Contractor to be approved by the Owner, the Contractor must satisfy all insurance, financial, and bonding requirements of the Owner, and must have successfully installed at least 200,000 linear feet of CIPP in wastewater collection systems.
  5. For a Contractor to be approved by the Owner, the Contractor must submit with their bid correspondence from the Manufacturer stating that the Contractor is certified to install the Manufacturer's inversion liner product.
- B. Bidders must submit proof that they meet the above product and installer requirements with their bid.
- C. Safety: The Contractor shall carry out their operations in strict accordance with OSHA and NIOSH and the manufacturer's safety requirements. Particular attention is drawn to those safety requirements involving working with scaffolding and entering confined spaces.

#### 1.04 BASIS OF PAYMENT

- A. Measurement: Complete product in place lump sum.
- B. Items Included: As indicated and required for a complete installation including, but not limited to, cleaning, flow control, CIPP liner, end seals, trimming, post-CCTV inspections, reinstatement of branch connections, and incidentals.

### PART 2 – PRODUCTS

#### 2.01 LINER TUBE

- A. The tube shall consist of one or more layers of absorbent non-woven felt fabric and meet the requirements of ASTM F1216, Section 5. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe, and stretch to fit irregular shaped pipe sections.
- B. The wet-out tube shall have a uniform thickness that when compressed at installation pressures will meet or exceed the calculated minimum design CIPP wall thickness.
- C. The tube shall be manufactured to a size that when installed will tightly fit the internal circumference and length of the original pipe. In the event that under-sized pipe is present, the liner tube shall be manufactured so that overlap folds or wrinkles do not occur. Allowances shall be made for circumferential stretching during inversion.
- D. The outside layer of the tube (before wet-out) shall be coated with a translucent, impermeable polyurethane or polyethylene plastic coating. This coating shall be an impermeable, flexible membrane that will contain the resin and facilitate monitoring of resin saturation during the resin impregnation (wet-out) process. This coating shall form the inner layer of the finished pipe and is required for enhancement of corrosion resistance, flow, and abrasion properties.

- E. The tube shall be homogenous across the entire wall thickness containing no intermediate or encapsulated layers of any material. Additionally, no material shall be included in the tube that may cause delamination in the cured liner, and no dry or unsaturated layers shall be evident.
- F. The wall color of the interior liner surface after installation shall be a light reflective color so that a clear detailed inspection with closed-circuit television equipment may be conducted.
- G. The outside of the tube shall be marked for distance at regular intervals not to exceed 10 feet. Such markings shall include the Manufacturer's name or identifying symbol. The tubes must be manufactured in the USA.
- H. The minimum length shall be that deemed necessary by the Contractor to effectively span the distance between manhole sections of the segment to be lined unless otherwise specified. The Contractor is solely responsible for field verification of all pipe diameters and lengths prior to fabrication, wet-out and installation.

2.02 RESIN

- A. The resin system shall be a corrosion resistant polyester or vinyl ester catalyst system that when properly cured, with the tube composite, meets the requirements of ASTM F1216, the physical properties herein, and those which are to be utilized in the design of the CIPP for this project. The resin shall produce a CIPP that will comply with the structural and chemical resistance requirements of this specification.
- B. The resin shall be shipped directly from the resin manufacturer's facility to the CIPP wet-out facility. The resin shall not be sent to any intermediate mixing facility.
- C. When requested by the Owner, the Contractor shall submit a Certificate of Authenticity from the resin manufacturer for each shipment to the wet-out facility to include the date of manufacture.

2.03 CIPP PRODUCT

A. Structural Requirements:

1. The CIPP shall be designed as per ASTM F1216, Appendix X1. The CIPP design shall assume no bonding to the original pipe wall.
2. Long-term testing must have been performed for flexural creep of the CIPP pipe material to be installed. Such testing results are to be used to determine the long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (tube and resin) and general workmanship of the installation and curing as defined within the relevant ASTM standard. A percentage of the instantaneous flexural modulus value (as measured by ASTM D790 testing) will be used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, will be verified by this testing. Retention values exceeding 50% of the short-term test results shall not be applied unless substantiated by qualified third party test data to the Owner's satisfaction. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus used in the CIPP design.
3. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly, or the probe or knife blade moves freely between the layers. If separation of the layers occurs during field sample testing, new samples will be required to be obtained from the installed pipe. Any reoccurrence may cause rejection of the work.
4. The cured pipe material (CIPP) shall conform to the structural properties, as listed below.

Minimum CIPP Physical Properties		
<u>Property</u>	<u>Test Method</u>	<u>Results</u>
Modulus of Elasticity	ASTM D790	400,000 psi
Flexural Stress	ASTM D790	4,500 psi

5. The minimum acceptable nominal (wet) liner thickness shall be based on the design considerations of ASTM F1216 or 6 mm for pipe 12-inches in diameter and less, 7.5 mm for pipe 15-inches in diameter, and 9.0 mm for pipe 18-inches in diameter, whichever is greater.
  - a. Design Safety Factor (typically used value) ..... 2.0
  - b. Retention Factor for Long-Term Flexural Modulus to be used in Design..... 50%  
(As determined by long-term tests described in Part 2.03 A.2. and approved by the Owner)
  - c. Ovality (Calculated from X1.1 of ASTM F1216) .....Not Less than 2%
  - d. Groundwater Depth (above invert of pipe) ..... Same as Soil Depth
  - e. Soil Depth (above crown of pipe)..... Field Verify
  - f. Soil Density ..... 120 pcf
  - g. Live Load .....H20 Highway
  - h. Design Condition .....Fully Deteriorated
6. Any layers of the tube that are not saturated with resin prior to insertion into the existing pipe shall not be included in the structural CIPP wall thickness computation.

**B. Testing Requirements:**

1. Chemical Resistance: The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical-testing requirements.
2. Hydraulic Capacity: Overall, the hydraulic cross-section shall be maintained as large as possible. The CIPP shall have a minimum of the full flow capacity of the original pipe before renovation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.
3. CIPP Field Samples: When requested by the Owner, the Contractor shall submit test results from field installations of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified in Part 2.03 A.4. herein have been achieved in previous field applications. Samples for this project shall be made and tested as described in Part 3.04 A. of this specification.

**PART 3 – EXECUTION**

**3.01 INSTALLATION RESPONSIBILITIES FOR INCIDENTAL ITEMS**

- A. Cleaning of Sewer Lines: The Contractor shall remove all internal debris out of the sewer line that will interfere with the installation of CIPP. The Owner shall also provide a dumpsite for all debris removed from the sewers during the cleaning operation. Unless stated otherwise, it is assumed this site will be at or near the sewage treatment facility to which the debris would have arrived in absence of the cleaning operation. Any hazardous waste material encountered during this project will be considered as a changed condition.
  1. All work shall be completed in accordance with Section 330130.41 – Sewer and Manhole Cleaning.
- B. Pre-CIPP Installation Inspection of Pipelines: Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections using close circuit television (CCTV) inspection techniques. The pipeline interior shall be carefully inspected to determine the location of any conditions that may prevent proper installation of CIPP. These shall be noted and corrected. A DVD and suitable written log for each line section shall be produced, complete with all “live” service connections noted, for later reference by the Owner. Contractor shall utilize all techniques, as required, to distinguish between “live”, abandoned, and/or capped service

connections. Each file name shall include the upstream manhole number of the line segment as the first identifier followed by the downstream manhole number of the line segment (e.g., 144 to 145). The Contractor shall utilize the most current manhole numbers as provided by the Owner.

1. All CCTV inspection shall be completed in accordance with Section 330130.16 – Closed Circuit Television Inspection (CCTV) and Section 330130.81 – Sewer Flow Diversion and Control.
- C. Line Obstructions: It shall be the responsibility of the Contractor to clear the line of obstructions such as solids and roots that will prevent the insertion of CIPP. If pre-installation inspection reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that will prevent the installation process and cannot be removed by conventional sewer cleaning equipment, then the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work. Point repair excavation shall be completed as described in Section 312333 – Excavation and Backfilling for Utilities. Owner reserves the right to perform necessary point repair excavations with its own work force.
- D. Sewer Line Sags: It shall be the responsibility of the Contractor to identify and make a point repair excavation of an existing sewer line when a pipe sag is greater than 25% of the cross-sectional area of the pipe. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work. Point repair excavation shall be completed as described in Section 312333 – Excavation and Backfilling for Utilities. Owner reserves the right to perform necessary point repair excavations with its own work force.
- E. Renovation of Existing Manholes: Where existing manholes are to be renovated and the adjoining gravity sewer line is to be lined with CIPP, the Contractor shall install CIPP prior to renovating the existing manhole. CIPP installer shall leave a 3" stub of CIPP in the existing manhole to accommodate manhole renovation. Manhole renovation shall be completed as described in Section 330130.62 – Manhole Renovation.
- F. Bypassing Sewage: The Contractor, when required, shall provide for the flow of sewage around the section or sections of pipe designated for repair. Plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system shall make the bypass. The pump(s) and bypass line(s) shall be of adequate capacity to accommodate the sewage flow. The Owner shall require a detail of the bypass plan to be submitted.
- G. Facility Notification: The Contractor shall make every effort to maintain sewer service usage throughout the duration of the project. Any sewer service interruptions shall be scheduled and coordinated with facility management and kept to an absolute minimum time frame. A notification program shall be implemented, and shall as a minimum, require the Contractor to be responsible for contacting Facility Representatives and informing them of the work to be conducted, and when the sewer will be off-line. The Contractor shall also provide the following:
  1. Written notice to be delivered to Facility Representatives the day prior to the beginning of work being conducted on the section, and a local telephone number of the Contractor they can call to discuss the project or any potential problems.
  2. Personal contact with Facility Representatives for any sewer service connection which cannot be reconnected within the time stated in the written notice.

### 3.02 INSTALLATION

- A. CIPP installation shall be in accordance with ASTM F1216, Section 7, with the following modifications.
  1. Resin Impregnation: The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the potential loss of resin during installation through cracks and irregularities in the original pipe wall, as applicable.

2. Tube Insertion: The wet-out tube shall be inverted into the pipeline using as defined within relevant ASTM standards previously stipulated. The tube should be inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point.
  3. Temperature gauges shall be placed between the tube and the host pipe's invert position to monitor the temperatures during the cure cycle.
  4. Curing shall be accomplished by utilizing hot water under hydrostatic pressure or steam pressure in accordance with the manufacturer's recommended cure schedule. A cool-down process shall be conducted that complies with the resin manufacturer's specification. A liner curing and cool down log shall be maintained by the Contractor for each CIPP inversion.
- B. Sealing Liner at Ends: Prior to the installation of the CIPP, the Contractor shall install hydrophilic waterstops to the interior circumference of the existing sewer at the inlet and outlet of each manhole, or as otherwise directed by the City. The waterstop material shall be Insignia by LMK or an engineer approved equal. End seal shall be composed of neoprene rubber with a mechanical fastener composed of spring-loaded retaining rings. Install one end seal at each end of the existing line. Upon completion of CIPP installation the interface between the CIPP pipeline and the adjoining manhole shall be watertight.
- C. Liner Trimming: After the liner has been cured, the liner should be trimmed entering and exiting the manhole, so that 3" extends into the manhole. Also, a V-notch should be cut in the crown of the liner in the downstream manhole, so as to reduce future wear on television cables or cleaning equipment. For each inversion of two (2) or more line segments using a single liner, the liner should be cut flush with the trough at the intermediate manhole(s), so that there is no ponding on the bench of the manhole(s). If additional line segments enter these intermediate manhole(s), the liner should not obstruct the flow from these lines.

### 3.03 REINSTATEMENT OF BRANCH CONNECTIONS

- A. It is the intent of these specifications that branch connections to buildings be re-opened to 100% of the original diameter without excavation, utilizing a remotely controlled cutting device, monitored by CCTV. The Contractor shall certify a minimum of two complete functional cutters plus key spare components are on the job site before each installation or are in the immediate area of the jobsite and can be quickly obtained at all times during liner installation. Unless otherwise directed by the Owner or his authorized representative, only active laterals shall be reinstated. In the event that a "non-active" lateral line has been reinstated, it shall be the Contractor's responsibility to install a CIPP point repair liner with no additional cost to the Owner. No additional payment will be made for excavations for the purpose of reopening connections unless approved by the Engineer prior to CIPP installation and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work.
1. The Contractor shall be prepared to utilize CCTV and dye tablets to verify "active" or "non-active" status of sewer service lateral lines. All costs associated with this work shall be the responsibility of the Contractor. Any branch connections serving open lots where the lateral line has been brought to the surface and securely capped shall be reinstated.

### 3.04 INSPECTION

- A. CIPP samples shall be prepared for each installation designated by the Owner/Engineer or approximately 20% of the project's installations. Pipe physical properties will be tested in accordance with ASTM F1216, Section 8, using either method proposed. The flexural properties must meet or exceed the values listed in Part 2.03 A.4. of this specification, Table 1 of ASTM F1216, or the values submitted to the Owner/Engineer by the Contractor for this project's CIPP wall design, whichever is greater.

- B. Wall thickness of samples shall be determined in a manner consistent with 8.1.2 of ASTM D5813. The minimum wall thickness at any point shall not be less than 87.5% of the specified design thickness calculated in Part 2.03 A.5. of this section.
- C. Post-CIPP CCTV Inspection: Installation shall be inspected visually by closed-circuit television (CCTV). Variations from true line and grade may be inherent because of the conditions of the original piping. No infiltration of groundwater should be observed. All service entrances should be accounted for and be unobstructed. The CCTV inspections shall be provided in a quality acceptable to the Engineer and/or Owner where the camera view is not underwater, blurry, or full of pixels distorting the picture. Video shall not be taken at such a speed so that the reviewer cannot properly identify objects in the camera's path. At each re-instated service connection, the CCTV camera shall come to a complete stop and the service shall be panned in its entirety to show a clear picture of the service lateral cutout and confirm the smoothness of the re-instated service. Each file name shall include the upstream manhole number of the line segment as the first identifier followed by the downstream manhole number of the line segment (e.g. 144 to 145). The Contractor shall utilize the most current manhole numbers as provided by the Owner.
  - 1. All CCTV inspection shall be completed in accordance with Section 330130.16 – Closed Circuit Television Inspection (CCTV) and Section 330130.81 – Sewer Flow Diversion and Control.
- D. All defects discovered during the post-CIPP CCTV inspection shall be corrected by the Contractor at his expense before the work is considered complete. Defects include any wrinkles in the finished liner that cause backwater greater than one-half (1/2) inch or that result in a reduction of pipeline hydraulic capacity.

### 3.05 CLEAN-UP

- A. Upon acceptance of the installation work and testing, the Contractor shall restore the project area affected by the operations to a condition at least equal to that existing prior to the work. All work necessary to restore areas damaged by construction activities shall be restored in accordance with the applicable section for such required work contained within these project specifications.

END OF SECTION

SECTION 330130.75  
SERVICE CONNECTION RENOVATION AND REPLACEMENT

PART 1 – GENERAL

1.01 SUMMARY

A. The work of this section consists of open trench replacement or trenchless renovation of sanitary sewer service lateral to main line connection, including the installation of CIP point repair liners in order to close “non-active” service lateral connections. The main sewer lines vary in size, as indicated on the drawings, and the sanitary sewer service lateral lines and connections may vary in size from 4-inch to 6-inch diameter. All existing sanitary sewer service lateral to main line connections shall be open trench replaced or renovated depending on the location of the main sewer line and/or the condition of existing sanitary sewer service lateral to main line connection.

1. Open trench sanitary sewer service lateral replacement shall consist of open trench replacement of the existing sanitary sewer service lateral to main line connection.
2. Trenchless sanitary sewer lateral connection repair (LCR) shall consist of the trenchless installation of a resin-impregnated, flexible felt tube inverted into the existing sanitary sewer service lateral a minimum of 18-inches utilizing a pressure apparatus positioned in the main sewer line. Curing shall be accomplished by ambient steam or other Engineer approved method to cure the resin into a hard impermeable pipe-within-a-pipe.
3. Removal of “non-active” sanitary sewer service lateral to main line connections shall consist of the trenchless installation of a resin-impregnated fiberglass tube which is inflated in a short length of the pipeline to form a hard, impermeable, corrosion resistant pipe-within-a-pipe. The CIP point repair liner shall be a minimum of five (5) feet in length.

B. Related Work:

1. Section 330130.16 – Closed-Circuit Television Inspection (CCTV)
2. Section 330130.41 – Sewer and Manhole Cleaning
3. Section 330130.72 – Sanitary Sewer Renovation Using Cured-in-Place Pipe (CIPP)
4. Section 330130.74 – Cured-in-Place (CIP) Sectional Point Repairs
5. Section 330130.81 – Sewer Diversion and Flow Control

1.02 SUBMITTALS

A. Submit under provisions of Section 013300. Include shop drawings, ASTM standards, and manufacturer’s data for the following items:

1. Pipe and fittings.
2. Repair liner and thermosetting resin to be utilized in producing the LCR in accordance with these specifications.
3. Bypass plan layout.
4. Safety plan.
5. Pre- and post-installation inspection reports.
6. Facility representative notification plan.

1.03 BASIS OF PAYMENT

A. Open Trench Service Lateral Replacement (4- and/or 6-inch):

1. Measurement: Complete product in-place per each.
2. Items Included: As indicated and required for a complete installation including, but not

limited to, trenching, granular bedding, pipe, fittings, installation and jointing, backfilling, and surface restoration.

B. Trenchless Service Lateral Renovation (4- and/or 6-inch):

1. Measurement: Complete product in-place per each.
2. Items Included: As indicated and required for a complete installation including, but not limited to, flow control, repair liner, installation, post-CCTV inspection, and incidentals.

## PART 2 - PRODUCTS

### 2.01 OPEN TRENCH LATERAL LINE REPLACEMENT

- A. All material for the open-trench replacement of the existing sanitary sewer service lateral line shall be as specified in Section 330517 – Gravity Sewer Pipe and Fittings.
- B. Open-trench sanitary sewer service lateral to main line replacement shall consist of the installation of a compression-fit type service connection or flexible PVC saddle combined with a hardened PVC saddle shield held in-place with stainless steel clamps, equal to Inserta-Tee or Fernco Saddle, and all the required fittings, pipe, couplings, etc. in order to reconnect to the existing sanitary sewer service lateral line. All service connections shall connect to the newly installed CIPP and not the existing host pipe.
- C. All construction activity shall be contained within the existing or proposed sanitary sewer easement or public right-of-way. Temporary construction easements allowing work on private property have only been obtained where shown on the construction drawings.

### 2.02 TRENCHLESS LATERAL LINE RENOVATION

- A. The liner tube shall be fabricated to a size that when installed will tightly fit the internal circumference and length of the original pipe. Allowance shall be made for circumferential stretching during inversion.
- B. The outside layer of the tube (before inversion) shall be Polyurethane (PU) or Polyethylene (PE) coated with a flexible, impermeable material that clearly allows inspection of the resin impregnation (wet-out) procedure. The PU or PE coating shall not be subject to delamination after curing.
- C. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the tube that is subject to delamination in the CIPP. No dry or unsaturated layers shall be evident.
- D. The wall color of the interior pipe surface after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment can be made.
- E. The resin system shall be a 100% solids epoxy or silicate-based system or a polyester or vinylester resin system that incorporates the use of hydrophilic O-Rings at all termination points of liner.
- F. The minimum length of the LCR within the main line shall be 18-inches and cover 360 degrees of the main line pipe interior.
- G. The Contractor shall take care to ensure that the liner extends into the service connection at the main, creating a watertight seal with the main liner, but that no portion of the lateral liner protrudes into the main at the completion of the installation.
- H. The cured-in-place service lateral to main line connection repair liner shall be an LCR-Liner System as manufactured by EPROS, BLD, SAK, T-liner as manufactured by LMK Enterprises, or engineer approved equal.
- I. All construction activity shall be contained within the existing sanitary sewer easement or public right-of-way. Temporary construction easements allowing work on private property have NOT been obtained.



## PART 3 – EXECUTION

### 3.01 OPEN TRENCH LATERAL LINE REPLACEMENT

- A. Open-trench replacement of existing sewer service lateral lines shall be as called for on the drawings. Open trench replacement of existing sewer service lateral lines shall take place at all open cut sewer main line replacements and at locations where trenchless lateral line renovation cannot be completed due to existing lateral line condition or as directed by the Owner's Representative. All open trench lateral line replacement work shall take place during main line construction and after the renovation of the main sewer line.
1. Slope: Four (4) inch diameter lateral lines shall be laid at a uniform minimum slope of 0.011 ft/ft (1.1%) and six (6) inch diameter lateral lines shall be laid at a uniform minimum slope of 0.006 ft/ft (0.6%).
  2. Trenching, Bedding, and Backfilling: Shall be as specified in Section 312333 – Trenching and Backfilling for Utilities.
  3. Depth: Lateral lines shall be installed so as to have minimum 30 inches of cover above the top of the pipe.
  4. Tracer Wire: For all proposed sanitary sewer service lateral line that is to include the installation of a cleanout, the Contractor shall install a tracer wire system conforming with Section 330526.
  5. Cleanouts: As directed by the Engineer, lateral lines shall be installed with a single cleanout located as close as practical to the existing property or easement line. All construction shall be confined within the existing easement or City right-of-way. Cleanouts shall be constructed as shown on the construction plans. Cleanouts shall not be located in depressions likely to collect surface water.
  6. Connection of the service lateral to the new sewer main shall be accomplished by use of watertight compression-fit service connection or a flexible PVC saddle as specified in Part 2.01 B. of this section. The service connection shall be specifically designed for connection to the type of sewer main being installed. Installation shall be in accordance to the manufacturer's written installation instructions.
  7. Surface Restoration: Ground surfaces disturbed by construction of sewer service lateral lines shall be fully restored to a condition equal to that which existed prior to construction.

### 3.02 TRENCHLESS LATERAL LINE RENOVATION

- A. Closed Circuit Television Inspection – Pre & Post Construction:
1. Before and after the renovation of the existing sewer service lateral line, the Contractor shall televise and record the condition of the lateral/main line connection.
  2. Inspection of sewers shall be performed by experienced personnel, as certified by the manufacturer, and trained in locating breaks, obstacles, and service connections using closed circuit television (CCTV) inspection.
  3. All costs involved with the pre- and post-renovation CCTV inspection/video shall be paid for at the unit bid price for the lateral/main line connection repair.
  4. All DVDs for this project shall be provided to the Owner. If the videos are of inferior quality or coverage, as determined by the Owner, the Contractor shall have that portion of the lateral/main line connection re-videoed at the Contractor's expense.
- B. Installation: The following installation procedures shall be adhered to unless otherwise approved by the Engineer or the Owner's Representative.
1. Access: The Contractor shall have access to the service lateral through the main sewer line's upstream and downstream manholes. At no time shall the Contractor have access to private property without written permission from the property Owner.

2. Safety: The Installer shall carry out his operations in strict accordance with all applicable OSHA standards. Particular attention is drawn to those safety requirements involving entering confined spaces.
3. Cleaning of Sewer Line: It shall be the responsibility of the Installer to remove internal debris out of the sewer line prior to lining.
4. Inspection of Pipelines: The interior of the pipeline shall be carefully video inspected to determine the location of any conditions which may prevent proper installation of CIPP service lateral liner into the existing service lateral, and it shall be noted so that these conditions can be corrected. A video recording and suitable log shall be provided to the Resident Project Representative.
5. It is required that the service lateral be inactive during the time of installation. This is normally accomplished by requesting the property owner relinquish using their sewer services during the required period of installation and then notifying property owner when the work is complete. A public notification program shall be implemented and shall, as a minimum, require the Contractor to be responsible for contacting each property owner connected to the sanitary sewer and informing them of the work to be conducted and when the lateral connection will be offline. Written notice shall be delivered to each property owner the day prior to the beginning of work being conducted on the lateral connection and a local telephone number of the Contractor shall be included so the property owner can call to discuss the project or any potential problems.
6. Line Obstruction: If inspection reveals an obstruction or defect that prevents trenchless lateral line renovation, then the Contractor shall replace the existing service lateral line as described in Part 3.01 of this specification. Such excavation shall be approved in writing by the Engineer or the Resident Project Representative prior to the commencement of the work. Any required open trench sewer service lateral replacement shall take place after the main line renovation.
7. The main line pipe opening (lateral connection to the main) shall be prepared to accept the CIPP Service Lateral/Main Line Connection Repair Liner, and the rehabilitated main line pipe opening shall be 100% of the original pipe diameter.
8. There is no guarantee that cleanouts are available. As such, it shall be the Contractor's responsibility to install the lateral/main line connection repair liner without the use of a cleanout.
9. If, as directed by the Engineer or Owner's Representative, a new lateral line cleanout is to be installed, the new cleanout shall be installed first and then the lateral service lining completed in order to obtain the best possible connection between the two.

END OF SECTION

SECTION 330130.81  
SEWER FLOW DIVERSION AND CONTROL

PART 1 – GENERAL

1.01 SUMMARY

- A. Work of this section consists of furnishing all labor, materials, tools, equipment, and incidentals necessary to control sanitary sewer flow during evaluation, rehabilitation, and emergency repairs. Limited sewage flow is acceptable during internal inspection of sanitary sewers. Complete stoppage or bypassing of flow shall be required for sewer line and manhole rehabilitation work.
  - 1. Pumping and Bypassing: When pumping and bypassing is required, the Contractor shall provide pumps, conduits, and other equipment to divert and control sewage flows around manholes and/or sewer lines in which work is to be performed. Flow diversion and control shall be done in accordance with this specification.
  
- B. Related Work:
  - 1. Section 330130.16 – Closed-Circuit Television Inspection (CCTV)
  - 2. Section 330130.41 – Sewer and Manhole Cleaning
  - 3. Section 330130.62 – Manhole Rehabilitation
  - 4. Section 330130.72 – Sanitary Sewer Rehabilitation Using Cured-in-Place Pipe (CIPP)
  - 5. Section 330130.74 – Cured-in-Place (CIP) Point Repairs
  - 6. Section 330130.75 – Service Connection Rehabilitation and Replacement

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300. Include the following:
  - 1. Flow diversion plan.

1.03 BASIS OF PAYMENT

- A. Work under this Section shall be considered incidental to other related Work and no measurement or direct payment will be made.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIALS

- A. Provide temporary pumps, conduits, and other equipment to bypass sewage flow. Engines shall be equipped with mufflers and/or shall be enclosed so that noise level does not exceed 50 decibels or 10 decibels above ambient noise levels when measured at the building closest to noise source.
- B. Pumps and bypass lines shall be of adequate size and capacity to handle flows that may be encountered during peak flow periods or from precipitation. The bypass system shall be constructed using materials and workmanship that shall prevent leakage during pumping operations.
- C. Maintain sufficient equipment and materials on site to ensure continuous and successful operation of bypass and dewatering systems. Keep standby pumps fueled and ready for operation at all times. Maintain on site a sufficient quantity of valves, tees, elbows, connections, tools, sewer plugs, piping, and all other parts or system hardware to ensure immediate repair or modification of any part of system, as necessary.
- D. Provide piping, joints, and accessories that are designed to withstand at least twice the maximum

system pressure, or 50 psi, whichever is greater.

### PART 3 - EXECUTION

#### 3.01 IMPLEMENTATION

- A. Notification: The Contractor shall notify and provide reasonable access to all properties with the least amount of inconvenience to the Owner or the public. All available safety measures must be maintained.
- B. Discharge of Bypassed Flows: Where flows are bypassed, bypassed flows shall be discharged into Owner's sanitary sewer system at locations approved by the Owner. No bypassed flows shall be discharged to ground surface, surface waters, storm drains, ditches, or gutters. Bypassing which results in groundwater contamination, surface water contamination or presents a threat to public health shall not be permitted.
- C. Spills and Overflows: In the event sewage accidentally drains into a drainage system or street, the Contractor shall immediately stop the overflow, notify the Owner, and take all necessary actions to clean up and disinfect the spillage to the satisfaction of the Owner. If sewage is spilled on private property, the contaminated area shall be washed down, cleaned up and disinfected to the satisfaction of the Owner. Any and all overflow of sewage shall be immediately reported to the Owner.
- D. Plugging or Blocking: A plug shall be inserted in the line upstream of the sewer line being worked. Plugs shall be designed so that all or a portion of upstream flow can be released. If sewer flow control is required for sanitary sewer line or manhole inspections, flow shall be reduced to comply with the requirements of Section 330130.16 – Closed Circuit Television Inspection (CCTV). After completing work on the section of sewer line or manhole in question, flow through that section shall be restored to normal.
- E. Sewer Backups: The Contractor shall indemnify and hold the Owner harmless for any sewer backup claims filed against the Owner, within the scope of the project, and during the warranty period, if caused by Contractor's action or lack thereof.
- F. Incidental Work: All work required by this Contract and necessary to complete the project which is not specifically listed in the items of work indicated are considered incidental to the project. Cost for this incidental work shall be included in the work for which it is a part.
- G. Clean Up and Restoration: The Contractor shall keep premises free from accumulations of waste materials, rubbish, and other debris generated by Contractor's operations. Upon completion of bypass pumping, bypass piping shall be drained into existing sanitary sewers prior to piping being disassembled. Contractor is to save and/or restore, as nearly as possible, to original condition all damaged fences, bushes, trees, lawns and other improvements.

END OF SECTION

SECTION 330516  
UTILITY STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers precast reinforced concrete structures including:
1. Manholes.
  2. Vaults.
  3. Related appurtenances such as adjustment rings, frames, covers and steps.
- B. Related Work:
1. Section 312316 - Excavation and Backfilling for Structures
  2. Section 312333 - Trenching and Backfilling for Utilities
  3. Section 330130.62 - Manhole Rehabilitation
  4. Section 330518 - Pressure Pipe and Fittings
  5. Section 333113 - Sanitary Sewer Systems
  6. Section 333416 - Pressure Pipe Installation
- C. References:
1. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM A48 - Standard Specification for Gray Iron Castings.
    - b. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
    - c. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
    - d. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
    - e. ASTM C890- Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
    - f. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
  2. American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges:
    - a. Section 3.7.6-HS Loading.
  3. Federal Specifications (FS):
    - a. FS SS-S-00210A - Sealing Compound, Preformed Plastic for Expansion Joints and Pipe Joints, Type 1, Rope Form.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Material Certifications: Submit certification that products conform to the applicable requirements of the specified standards.
- C. Shop Drawings: Submit detailed drawings and data covering precast concrete sections and related appurtenances.

### 1.03 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items Included: As indicated and required for a complete installation.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Cast-in-place concrete shall conform to ASTM C94, 4,000 psi compressive strength. Reinforcement shall conform to ASTM A615, Grade 60, deformed.
- B. Precast manhole sections shall conform to ASTM C478 and ASTM C890 except as modified herein. Manufacture in accordance with applicable requirements of Part 3.01 herein.
- C. Joint sealant shall conform to FS SS-S-00210A and shall be K.T. Snyder "Ram-Nek", Hamton-Kent "Kent-Seal No. 2", or approved equal. Cross sectional area as recommended by manhole manufacturer.
- D. Resilient manhole/pipe connectors shall conform to ASTM C923 and shall be A-lok "Manhole Pipe Seal", Press-Seal "Press Wedge Gasket", or approved equal.
- E. Damp-proofing shall be Tnemec "H.B. Tnemecol, 46-465", Mobile Paints "MO-TAR 47", or approved equal.
- F. External joint wrap material shall be "Cretex Wrap" by Cretex Specialty Products, "Mac Wrap" by MarMac Construction Products, or approved equal.
- G. Castings shall conform to ASTM A48 Class 35B or better.
  - 1. Specific pattern as noted on the drawings.
  - 2. Frames and covers shall have machined horizontal bearing surfaces to provide even seating.
  - 3. Coat with coal-tar pitch varnish applied at the foundry.
  - 4. Stamped inscription consistent with intended use.
- H. Steps shall be aluminum reinforced low density polyethylene or steel reinforced copolymer polypropylene.
  - 1. MSU, Mississauga Limited "Model 360", M.A. Industries Type "PS2-PF", or approved equal.
- I. Non-shrink grout shall be Grace "Supreme", Master Builders "Master Flow 713" or "Set Grout", Five Star Products "Five Star Grout" or approved equal.

## PART 3 - EXECUTION

### 3.01 MANHOLES - DESIGN AND MANUFACTURE

- A. Precast concrete manhole sections shall be used and shall conform to the dimensions and details shown in drawings and specified herein.
  - 1. Minimum wall thickness for manholes, having a depth greater than 16-feet shall be 1/12 the internal diameter plus 1-inch.
- B. Base sections with integral inverts shall be provided with circular openings and continuous circular, resilient pipe connectors cast into the wall.
- C. Base sections for use with cast-in-place inverts shall be provided with horseshoe-shaped box-outs for connecting piping to be grouted in, or with circular openings with continuous, circular, resilient pipe connectors cast into the riser wall.
  - 1. Use base sections with horseshoe-shaped box-outs only where manholes are required to be set over an existing sewer line.

2. Cast-in-place inverts shall be used for manholes over 16-feet depth and shall extend at least 8-inches beyond outside of manhole wall.
- D. Manhole tops shall be eccentric type cone sections or flat slab type as required by the drawings.
1. Flat slab tops shall be designed and reinforced to withstand AASHTO HS20 highway loading.
- E. Adjustment rings shall have a thickness not less than 4-inches nor more than 12-inches and shall be fiber reinforced.
- F. Provide lifting notches on the inside faces of precast sections to facilitate handling.
1. Depth of lifting notches shall not exceed 1/2 the wall thickness.
  2. Holes extending through the wall will not be acceptable.
- G. Orient steps on side opposite the outlet pipe unless otherwise directed.

### 3.02 CONSTRUCTION

- A. Construct sanitary sewerage structures on unyielding, undisturbed subgrade.
- B. Set base sections with integral bottoms and inverts on a leveling course of granular embedment material not less than 6-inches in thickness as specified in Section 02225.
- C. Connect inlet and outlet pipes to sanitary sewerage structures with a gasketed, flexible watertight connection that allows for differential settlement between pipe and structure wall.
1. Fill space between connecting pipes and manhole wall with nonmetallic, non-shrink grout. Where resilient connectors are provided, grout only around lower half of pipe on inside face when completing invert.
  2. Provide 3-feet to 4-feet long stubs for future connection as indicated. Terminate with a bell end and plug.
- D. Join all precast concrete sections with a double layer of joint sealant to obtain a pliable watertight joint.
1. Place joint sealant strips end to end. Do not overlap ends.
  2. Joint surfaces shall be clean and dry.
- E. Provide 9-inch-wide external joint wrap on all below grade precast concrete section joints. Install in accordance with product manufacturer's recommendations.
- F. Lifting notches shall be thoroughly wetted and filled with nonmetallic, non-shrink grout, flush with wall.
- G. Apply coal-tar damp-proofing to exterior walls on all sanitary sewerage structures from base to top. Apply in two coats to a minimum dry film thickness of 8-12 mils per coat. Surface preparation shall conform with coating manufacturer's recommendations.
- H. Sewer Manholes: Provide u-shaped invert channels having a minimum depth equal to 1/2 the connecting pipe diameter for pipe sizes less than 15-inches, and 3/4 the connecting pipe diameter for pipe sizes 15-inches or greater.
1. Make changes in flow direction with smooth curves of as large a radius as the manhole size permits.
  2. Make changes in size and grade gradually and evenly.
- I. All castings, frames and covers shall be set true to line and proper grade on double layer of joint sealant. Limit adjustment rings to one per manhole.

### 3.03 PIPE ANCHORS AND THRUST BLOCKS

- A. Conform to the dimensions and details shown in the drawings.
- B. Place pipe anchors and thrust blocks against unyielding, undisturbed earth or rock.
  - 1. Install pipe anchors at locations indicated on the drawings
  - 2. Install thrust blocks at tees, elbows, bends, and dead ends as required.

### 3.04 IMPERVIOUS TRENCH SEALS

- A. Conform to the dimensions and details shown in the drawings.
- B. Place trench seals against unyielding, undisturbed earth or rock.
  - 1. Install trench seals at locations indicated on the drawings.

### 3.05 FIELD QUALITY CONTROL

#### A. Inspection and Rejection:

- 1. The quality of material, the process of manufacture and the finished precast sections shall be subject to inspection and approval by the Engineer.
- 2. Precast 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:
  - a. Fractures or cracks passing through the manhole wall.
  - b. Defects that indicate imperfect proportioning, mixing and molding.
  - c. Surface defects indicating honeycombed or open texture.
  - d. Damaged or cracked ends where such damage would prevent making a satisfactory joint.

#### B. Vacuum Testing of Concrete Manholes:

- 1 Contractor shall perform acceptance tests on all concrete sewer manholes to determine their integrity and resistance to water infiltration/exfiltration using a manhole vacuum tester acceptable to the Engineer.
- 2 Each manhole shall pass two vacuum tests.
  - a. Perform first test after assembly of manhole sections but prior to backfilling.
  - b. Perform second test after backfilling. Include testing of the seal between the cast iron frame and cone section, flat slab or adjustment ring.
- 3. Plug all pipe entrances and exits using suitably sized pneumatic or mechanical plugs. Brace all plugs to prevent the plug or pipe from being dislodged and drawn into the manhole.
- 4. Perform vacuum test at 10-inches Hg (mercury). If vacuum loss does not exceed 1-inches Hg (mercury) over a minimum test period of one minute, manhole is considered acceptable and passes the test.
- 5. If manhole fails either vacuum test, Contractor shall make necessary repairs to the satisfaction of the Engineer and then repeat test procedures until acceptable results are obtained.
- 6. Contractor shall provide Engineer with 48-hours advance notice of testing schedule.

END OF SECTION



SECTION 330517  
GRAVITY SEWER PIPE AND FITTINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers gravity sewer pipe, fittings and specials for collection and transmission of wastewater including:
  - 1. Gravity sanitary sewers.
  - 2. Plant and pump station piping.
  
- B. Related Work:
  - 1. Section 312333 - Trenching and Backfilling for Utilities
  - 2. Section 330516 - Utility Structures
  - 3. Section 333113 - Sanitary Sewer Systems
  
- C. References
  - 1. American Society for Testing and Materials (ASTM)
    - a. ASTM A746 - Ductile Iron Gravity Sewer Pipe.
    - b. ASTM D1784 - Rigid Polyvinyl Chloride Compounds and Chlorinated Polyvinyl Chloride Compounds.
    - c. ASTM D3034 - Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings (4" through 15").
    - d. ASTM D3212 - Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
    - e. ASTM F477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
    - f. ASTM F679 - Specification for Polyvinyl Chloride (PVC) Sewer Pipe and Fittings (18" through 27").
  
  - 2. American Water Works Association (AWWA)
    - a. AWWA C104 - Cement-Mortar Lining for Cast-Iron and Ductile-Iron Pipe and Fittings for Water.
    - b. AWWA C111 - Rubber-Gasket Joints for Cast-Iron and Ductile-Iron Pressure Pipe and Fittings.

1.02 SUBMITTALS

- A. Submit as specified in SECTION 01300.
- B. Furnish certification that products conform to the applicable requirements of the specified standards.
- C. Furnish data and drawings showing the following:
  - 1. Details of joints.
  - 2. Gasket material.
  - 3. Pipe length.
  - 4. Details of fittings and couplings.
  - 5. Details of protective linings and coatings.

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## PART 2 - PRODUCTS

### 2.01 PIPE REQUIREMENTS

- A. Gravity sewer pipe and fittings shall be polyvinyl chloride (PVC), except that ductile iron pipe must be used where specifically called for on the drawings.
- B. All pipe and fittings shall be marked conforming to the applicable standard under which the pipe is manufactured.
- C. All elastomeric gaskets and seals shall be synthetic rubber.

### 2.02 POLYVINYL CHLORIDE PIPE (PVC) AND FITTINGS

- A. All PVC sewer pipe and fittings shall meet the requirements of ASTM D1784 cell classification 12454-B for PVC compounds.
- B. PVC sewer pipe and fittings, 4" through 15", shall conform with ASTM D3034, SDR-26.
- C. PVC sewer pipe and fittings, 18" through 27", shall conform with ASTM F679, PS-115.
- D. Joint systems for PVC sewer pipe and fittings shall be integral bell and spigot type with factory installed, locked in-place, compression type gaskets conforming to ASTM D3212. Gaskets shall be synthetic rubber and shall meet the low head requirements of ASTM F477.

### 2.03 DUCTILE IRON PIPE

- A. Unless otherwise specified or shown on the drawings, ductile iron pipe shall be Pressure Class 350 and shall conform to ASTM A746.
- B. Joint systems for ductile iron gravity sewer pipe shall be push-on type conforming to AWWA C111. Gasket material shall be synthetic rubber.
- C. All ductile iron pipe and fittings shall be provided with Protecto 401 Ceramic Epoxy Lining, nominal 40-mils dry film thickness. Gasket area and spigot ends up to 6-inches back from spigot shall be coated with 6-mils nominal, 10-mils maximum, using Protecto Joint Compound. Surface preparation and lining application shall conform to lining manufacturer's instructions and recommendations.

### 2.04 COUPLINGS

- A. Shall be Fernco "Flexible Couplings", Mission "Eastern Standard Band-Seal Couplings", or approval equal.
- B. Provide couplings with stainless steel shear ring.

### 2.05 WATERSTOPS

- A. Unless otherwise indicated, pipe to wall penetrations shall be Fernco "Concrete Manhole Adaptors", NDS Products "DFW/HPI Concrete Manhole Adaptors", or approved equal.

## PART 3 - EXECUTION

### 3.01 INSTALLATION AND TESTING

- A. Specified in Section 333113.

END OF SECTION

SECTION 330518  
PRESSURE PIPE AND FITTINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes pressure pipe, fittings, specials and appurtenances for piped utility systems.
- B. Related Work:

- 1. Section 312333 - Trenching and Backfilling for Utilities
- 2. Section 331200 - Water Utility Distribution Systems
- 3. Section 333416 - Pressure Pipe Installation
- 4. Section 099100 - Painting

- C. References

- 1. American National Standards Institute (ANSI):
  - a. ANSI A21.10 - Cast Iron and Ductile Iron Fittings, 2 thru 48 In., Water
  - b. ANSI A21.5 - Polyethylene Encasement/Gray & Ductile Cast Iron Pipe
  - c. ANSI B16.1 - Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800
- 2. ASTM International (Formerly American Society for Testing and Materials):
  - a. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
  - b. ASTM A536 - Standard Specification for Ductile Iron Castings
  - c. ASTM A674 - Standard Practice for Polyethylene Encasement for Ductile Iron Pipe for Water or Other Liquids
  - d. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
  - e. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
  - f. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series)
  - g. ASTM D2464 - Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
  - h. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
  - i. ASTM D2467 - Standard Specification for Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
  - j. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
  - k. ASTM D2672 - Standard Specification for Joints for IPS PVC Pipe Using Solvent Cements
  - l. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
  - m. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
  - n. ASTM F656 - Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings

3. American Water Works Association (AWWA):
  - a. AWWA C104 - Cement-Mortar Lining for Cast-Iron and Ductile-Iron Pipe and Fittings for Water
  - b. AWWA C110 - Ductile-Iron and Gray-Iron Fittings, 3 Inches through 48 Inches, for Water and Other Liquids
  - c. AWWA C111 - Rubber-Gasket Joints for Cast-Iron and Ductile-Iron Pressure Pipe and Fittings
  - d. AWWA C115 - Flanged Ductile-Iron Pipe with Threaded Flanges
  - e. AWWA C151 - Ductile-Iron Pipe Centrifugally Cast, for Water or Other Liquids
  - f. AWWA C153 - Ductile-Iron Compact Fittings
  - g. AWWA C800 - Underground Service Line Valves and Fittings
  - h. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inch through 60 Inch

## 1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Furnish certification that products conform to the applicable requirements of the specified standards.
- C. Furnish data and drawings showing the following:
  1. Details of joints.
  2. Gasket material.
  3. Pipe length.
  4. Details of fittings and couplings.
  5. Details of protective linings and coatings.

## PART 2 - PRODUCTS

### 2.01 PIPE REQUIREMENTS

- A. Each pipe material specified herein is given an alphanumeric abbreviation which is shown on the drawings to denote the applicable specified material for the given size and service.
- B. All pipe and fittings shall be marked conforming to the applicable standard under which the pipe is manufactured.

### 2.02 POLYVINYL CHLORIDE PLASTIC PRESSURE PIPE AND FITTINGS (PVC)

- A. All PVC pressure pipe and fittings shall meet the requirements of ASTM D1784 cell classification 12454-B for PVC compounds.
- B. All pipe and fittings shall bear the National Sanitation Foundation (NSF) Seal of Approval.
- C. Sch. 40 and Sch. 80 PVC pipe and fittings shall conform to ASTM D1785.
  1. Pipe joints shall be solvent cement type meeting the requirements of ASTM D2672.
  2. Sch. 40 PVC fittings shall be solvent cement type meeting the requirements of ASTM D2466.
  3. Sch. 80 PVC fittings shall be solvent cement type meeting the requirements of ASTM D2467. Threaded fittings meeting the requirements of ASTM D2464 shall be used only where indicated.
  4. Solvent cements must conform with the requirements of ASTM D2564.
  5. Primers must conform with the requirements of ASTM F656.
- D. Iron pipe size (IPS) O.D. PVC pressure pipe and fittings in sizes 1-1/2 inch through 12-inch

shall conform to ASTM D2241, SDR21.

1. Joint systems shall be integral bell, gasketed type meeting the requirements of ASTM D3139.
  2. Elastomeric gaskets shall be synthetic rubber meeting the requirements of ASTM F477.
- E. Ductile iron O.D. PVC pressure pipe in sizes 4 inch through 60 inch shall conform to AWWA C900, DR18 (235 psi).
1. Joint systems shall be integral bell, gasketed type meeting the requirements of ASTM D3139.
  2. Elastomeric gaskets shall be synthetic rubber meeting the requirements of ASTM F477.
  3. Fittings shall be mechanical joint ductile iron as specified in PART 2.03 and shall have a pressure rating not less than the pipe.

### 2.03 DUCTILE IRON PIPE AND FITTINGS (DIP)

- A. Ductile iron pressure pipe shall conform to AWWA C115 and C151.
1. Unless otherwise indicated, provide the minimum standard pressure class for each respective pipe size.
  2. Minimum thickness class for flanged pipe shall be Class 53.
- B. Joints:
1. All buried pipe shall have push-on joints conforming to AWWA C111.
  2. All interior or exposed exterior pipe shall have flanged joints. Flanges for pipe shall be ductile iron and conform to the applicable provisions of AWWA C110 and C115 and shall be drilled ANSI B16.1 Class 125.
- C. Fittings shall conform to AWWA C110 or C153 and shall be ductile iron.
1. Fittings provided with buried pipe shall have mechanical joints.
  2. Flanged fittings shall be provided for flanged pipe.
  3. Include all specials, taps, plugs, flanges and wall fittings as required.
- D. Interior Linings:
1. All ductile iron pipe and fittings for wastewater applications shall be provided with Protecto 401 Ceramic Epoxy Lining, nominal 40-mils dry film thickness.
    - a. Gasket area and spigot ends up to 6-inches back from spigot shall be coated with 6-mils nominal, 10-mils maximum, using Protecto Joint Compound.
    - b. Surface preparation and lining application shall conform to lining manufacturer's instructions and recommendations.
  2. All ductile iron pipe and fittings for potable water applications shall be provided with cement-mortar lining conforming to AWWA C104.
- E. Exterior Coatings:
1. All buried pipe and fittings shall be finish coated with manufacturer's standard exterior enamel coating, 1-mil minimum.
  2. All exposed pipe and fittings shall be shop primed and finish coated in accordance with

Section 099100.

3. Flange faces shall be coated with a rust preventive coating.

F. Gaskets and Bolting Materials:

1. Provide all gaskets, bolts, lubricants, and other accessories required to install pipe and fittings complete and ready for service.
2. Gasket material for push-on or mechanical joints shall be synthetic rubber.
3. Gaskets for flanged joints shall be 1/8-inch thick, full faced synthetic rubber.
4. Bolts for flanged joints shall conform to ASTM A307 Grade B.

G. Polyethylene Encasement:

1. Seamless, conforming with ANSI/AWWA C105/A21.5 and ASTM A674; 8-mil LLDPE or 4-mil LHDPE.
2. Provide polyethylene encasement on all buried pipe and fittings.

## 2.04 JOINT RESTRAINT DEVICES

A. Mechanical Joint Restraints:

1. Restraint devices shall consist of multiple gripping wedges incorporated into a follower gland meeting applicable requirements of ANSI/AWWA C110/A21.10.
2. Devices shall have a working pressure rating equal to or greater than the joining pipe and/or fitting.
3. Gland body, wedges, and wedge actuating components cast from grade 65-45-12 ductile iron conforming to ASTM A536. Ductile iron gripping wedges heat treated within a range of 370 to 470 BHN.
4. Devices installed with conventional tools and installation procedures per AWWA C600, while retaining full mechanical joint deflection during assembly as well as allowing joint deflection after assembly.
5. Casing bodies and wedge assemblies provided with fusion bonded epoxy coating, NFS 61 certified.
6. Acceptable Manufacturers:
  - a. Ductile Iron Pipe: EBAA Iron Series 1100 MEGALUG® Restraint.
  - b. PVC Pipe: EBAA Iron Series 2000PV MEGALUG® Restraint.
  - c. Approved equal.

## 2.05 TAPPING SADDLES

A. Single Strap Saddles for PVC or DIP:

1. Epoxy coated ductile iron body, confined O-ring seal and stainless-steel strap conforming to AWWA C800.
2. Design working pressure of 250 psi.
3. Outlet: Tap size and thread type as indicated.
4. Markings to indicate pipe O.D. range and tap size.
5. Equal to Ford Style FC101 or Mueller DR1S Series.

B. Double Strap Saddles for PVC or DIP:

1. Epoxy coated ductile iron body, gasket seal and stainless-steel straps conforming to AWWA C800.

2. Design working pressure of 500 psi.
3. Outlet: Tap size and thread type as indicated.
4. Markings to indicate pipe O.D. range and tap size.
5. Equal to Ford Style FC202 or Mueller DR2S Series.

#### 2.06 CORPORATION STOPS

- A. Waterworks brass construction conforming to AWWA C800.
- B. Inlet Connection: Compatible with service saddle.
- C. Outlet Connection: Size and type as indicated.
- D. Acceptable Manufacturers: Ford FB1000 or F1100, Mueller H-15008N or H-15028N, or equivalent.

#### 2.07 WATERSTOPS

- A. Unless otherwise indicated, pipe to wall penetration seals for pipe sizes 4 inch and larger shall be Fernco "Concrete Manhole Adaptors", NDS Products "DFW/HPI Concrete Manhole Adaptors" or approved equal.
- B. Unless otherwise indicated, pipe to wall penetration seals for pipe sizes smaller than 4 inch shall be Thunderline "Link-Seal Service Designation C", Spec Com "Link-Pac", or approved equal.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION AND TESTING

- A. Specified in related Sections.

END OF SECTION

SECTION 330526  
UTILITY MARKERS AND LOCATORS

PART I - GENERAL

1.01 SUMMARY

- A. This Section covers materials and installation requirements for markers and locators for piped utility systems including:
  - 1. Detectable Marking Tape
  - 2. Trace Wire and Related Appurtenances
  - 3. Marker Posts
  
- B. Related Work:
  - 1. Section 312333 - Trenching and Backfilling for Utilities
  - 2. Section 333416 - Pressure Pipe Installation
  
- C. References:
  - 1. American Public Works Association (APWA):
    - a. Uniform Color Code
  - 2. American National Standards Institute (ANSI):
    - a. ANSI Standard Z535.1 – Marking Physical Hazards Safety Color Code
  - 3. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM D1238 – Standard Specification for Test Methods for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
    - b. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Submit manufacturer's catalog data and application installation instructions for each product proposed for use.

1.03 QUALITY ASSURANCE

- A. Products and execution shall be in compliance with all applicable codes and standards including those listed above.
- B. Installation shall be in compliance with Manufacturer's recommendations and installation instructions.

1.04 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items Included: As indicated and required for a complete installation.

PART 2 - PRODUCTS

2.01 GENERAL



- A. All utility markers and locators provided under this Section shall be color coded in accordance with APWA Uniform Color Code and bear a continuous permanently printed inscription describing the specific utility.

## 2.02 DETECTABLE MARKING TAPE

- A. Plastic type specifically manufactured for marking and locating underground utilities and conforming to the following:
  - 1. Material: Solid aluminum foil encased in a protective inert plastic jacket.
    - a. 100% virgin low density polyethylene.
    - b. Impervious to all known alkalies, acids, chemical reagents and solvents within soil.
    - c. Locatable by conductive and inductive methods.
  - 2. Minimum Thickness: 5 mils to ASTM D2103.
  - 3. Minimum Tensile Strength: 28 lbs./in. (5600 psi) at 80% elongation to ASTM D882.
  - 4. Minimum Width: 3-inches.

## 2.03 TRACE WIRE AND RELATED APPURTENANCES

### A. Trace Wire:

- 1. Open Trench: Trace wire shall be #12 AWG high strength copper clad steel conductor, insulated with a 30 mil HDPE insulated jacket, rated for direct burial use at 30 volts with 21% conductivity, and have a minimum 450 lb. break strength. Equal to Copperhead® High Strength Trace Wire, Part #1230-HS.
- 2. Directional Drilling/Boring: Trace wire shall be #12 AWG extra high strength copper clad steel conductor, insulated with 45 mil HDPE insulated jacket, rated for direct burial use at 30 volts with 21% conductivity, and have a minimum 1,150 lb. break strength. Equal to Copperhead® SoloShot™ Extra High Strength Trace Wire, Part #1245-EHS.
- 3. Insulation shall be high density, high molecular weight, polyethylene (HDPE) intended for direct bury and meet or exceed all applicable ASTM specifications including ASTM D1248 and ASTM D1238. Color coded in accordance with APWA Uniform Color Code.

### B. Trace Wire Connectors:

- 1. Trace wire connectors shall be lockable type specifically manufactured for use in underground tracer wire installations.
- 2. Connectors shall be dielectric silicon filled to seal out moisture and prevent corrosion.
- 3. Connectors shall be designed to receive #12 AWG tracer wire and shall be rated for 600 volts.
- 4. Non-locking, friction fit, twist-on or taped connectors are not acceptable. Twisting of trace wiring is not acceptable.

### C. Terminal/Access Boxes:

- 1. Terminal/access boxes shall be grade level, in-ground or above ground type as applicable, and be specifically manufactured for such applications.
- 2. Terminal/access boxes shall consist of tubular housing, terminal board and removable cast or ductile iron lid.
- 3. All boxes shall be appropriately identified with "sewer" or "water" cast into the lid and be color coded.
- 4. Housing and terminal board material shall be high strength ABS or polycarbonate plastic. All materials of construction shall be impervious to chemicals typically used for snow and ice removal and pavement and hardscape maintenance.

5. Acceptable products:
  - a. Grade level, in-ground type: Equal to Copperhead® Snake Pit™ Concrete/Driveway Box, Part #CD14-TP.
  - b. Above ground type: Equal to Copperhead® Cobra Hydrant Flange, Part #T3-FLPKG.
6. Terminal board shall have nickel plated brass terminals. Number of terminals shall be as required for specific installation.

D. Grounding Anode:

1. 1.5 lb. x 1.315" dia. x 18.5" long drive-in magnesium anode with HDPE cap and 20' of factory installed #12 AWG copper clad steel conductor with 30 mil HDPE insulation, rated for direct burial use at 30 volts with 21% conductivity.
2. Equal to Copperhead® Anode, Part #ANO-12.

## 2.04 MARKER POSTS

- A. Plastic type specifically manufactured for marking underground utilities and conforming to the following:
  1. Round dome top constructed of a durable, UV resistant, thermoplastic polymer material which is resistant to impact, ozone and hydrocarbons.
  2. Dimensions: Minimum 3½" OD, 66" length, 42" above grade.
  3. Equal to TAPCO Round Dome Top Utility Marker.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. All underground utilities shall be provided with detectable marking tape.
- B. Provide underground utilities with trace wire where indicated.
- C. Provide marking posts for underground utilities where indicated.
- D. Utility markers and locators shall be installed in accordance with the manufacturer's recommendations. Have on hand all installation manuals, brochures, and procedures for the equipment and materials concerned.

### 3.02 INSTALLATION - DETECTABLE MARKING TAPE

- A. Install detectable marking tape directly over all buried utilities concurrent with backfilling operations.
- B. Unless otherwise indicated or directed, install at a depth of 8-12" below finished grade.

### 3.03 INSTALLATION - TRACE WIRE

- A. Trace 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 signal for distances in excess of 1000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.
- B. Trace wire shall be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.
- C. Trace wire shall be provided in conjunction with all methods of utility installation including open trench and directional drilling/boring.
- D. Open Trench Method:
  1. Trace wire shall be placed at the bottom half of the pipe and secured at 5' intervals with

non-conductive tape. Additional attachment shall be provided at offsets and fittings in piping system. Trace wire shall be placed carefully and great care shall be exercised during backfilling operations to maintain physical integrity and position relative to piping.

2. Splices in trace wire shall be kept to an absolute minimum. When splices are necessary they shall be made with trace wire connectors as specified herein. Other splicing methods are not allowed.

E. Directional Drilling/Boring Method:

1. Two trace wires shall be provided with one wire as backup.
2. Trace wires shall be pulled through bore hole in conjunction with utility pipe. Wires shall be located on opposite sides of utility pipe
3. Trace wire splices are not allowed in drilled/bored sections.

F. Trace wires shall be interconnected at intersections of mainlines and branches utilizing single three-way connector at each point of connection.

G. Trace wire shall be properly grounded at all dead ends and stubs.

1. When grounding the trace wire at dead ends/stubs, install the grounding anode in a direction 180 degrees opposite of the trace wire, at the maximum possible distance.
2. When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the trace wire.
3. 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 trace wire with a mainline to lateral lug connector.
4. Where the anode wire will be connected to a trace wire access box, a minimum of 2 ft. of excess/slack wire is required after meeting final elevation.

H. Terminal/access boxes shall be located no greater than 1,000 linear feet of developed pipe length apart.

I. Terminal boxes shall not be located in areas where access to box is impeded.

J. Terminal boxes shall be installed flush with finished grade and centered in grade level concrete pad. Concrete pad shall be 18" by 18" minimum, 6" thick, and reinforced with four #4 bars chaired at mid depth with 3" clearance to edges.

K. Care shall be taken to extend trace wire from utility pipe to terminal box in an orderly manner as backfill is placed.

L. End of each trace wire shall be properly landed on dedicated terminal within terminal box and securely tightened. Provide 18-24" excess length for each wire within box. Each terminal shall be clearly identified with permanent label. Where trace wires for multiple utilities are terminated care shall be taken to ensure accuracy of identification at both ends.

### 3.04 INSTALLATION - MARKER POSTS

- A. Install at locations indicated in accordance with manufacturer's recommendations.

### 3.05 ACCEPTANCE TESTS

A. Testing of all new trace wire installations shall be performed using typical low frequency line tracing equipment, witnessed by the Contractor, Engineer and Owner as applicable, prior to final acceptance.

1. Testing shall be performed after backfilling and completion of rough grading, and again after final restoration and prior to final completion.
2. Continuity testing in lieu of actual line tracing will not be accepted.

END OF SECTION

SECTION 330529  
UTILITY VALVES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers valves and accessories for use in piped utility systems.
- B. Related Work:
  - 1. Section 333416 - Pressure Pipe Installation
- C. References:
  - 1. American National Standards (ANSI):
    - a. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
  - 2. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM A126 - Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
    - b. ASTM C536 - Specification for Ductile Iron Castings.
  - 3. American Water Works Association (AWWA):
    - a. AWWA C111 - Rubber Gasketed Joints for Ductile Iron Pressure Pipe and Fittings.
    - b. AWWA C507 - Ball Valves, 6 In. Through 60 In. (150 mm Through 1,500 mm)
    - c. AWWA C509 - Resilient Seated Gate Valves for Water and Sewerage Systems.
    - d. AWWA C550 - Protective Epoxy Interior Coatings for Valves and Hydrants.
    - e. AWWA C600 - Installation of Ductile Iron Water Mains and their Appurtenances.
  - 4. National Science Foundation (NSF):
    - a. NSF/ANSI Standard 61 - Drinking Water System Components - Health Effects.
    - b. NSF/ANSI Standard 372 - Drinking Water System Components - Lead Content

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Furnish certification that products conform to the applicable requirements of the specified standards.
- C. Furnish data and illustrations showing materials of construction, principal dimensions and component parts.
  - 1. Recommended spare parts list.
  - 2. Assembly and disassembly or repair instructions.
  - 3. Corrosion protection system details.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Ship all valves with protective covers to prevent entrance of foreign material into valve body.
- B. Protect valve joints, stems and operators from damage.
- C. Ship all valves with tag identifying the piping system in which it is to be installed.

#### 1.04 QUALITY ASSURANCE

- A. Actuators, their controls and appurtenances shall be the responsibility of the valve manufacturer for proper sizing, assembly, certification, field testing, and any adjustments necessary to operate the valve as specified.

#### 1.05 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items Included: As indicated and required for a complete installation.

### PART 2 - PRODUCTS

#### 2.01 GENERAL

- A. Provide valves of same manufacturer throughout where possible.
- B. Provide valves with manufacturer's name, pressure rating and flow direction clearly marked on outside of body.
- C. Valve Connections: Provide valves with end connections compatible with adjoining pipe. Unless otherwise specified or indicated, comply with the following:
  - 1. Flange interior or exposed exterior pipe sizes 4 inch and larger.
  - 2. Buried valves shall have standard mechanical joint ends. Provide with duck tipped transition gaskets for adaption to PVC pipe.

#### 2.02 ECCENTRIC PLUG VALVES

##### A. Acceptable Manufacturers:

- 1. Dezurik, a unit of General Signal Corporation, Series 100.
- 2. Millikan Valve Company, Inc., Millcentric Series 600.
- 3. Approved equal.

##### B. Operational Requirements:

- 1. Provide drop-tight shut-off at full rated working pressure in standard flow direction and 50 psi in reverse flow direction.
- 2. Permit modulating flow control.

##### C. Design and Materials of Construction:

- 1. Plug valves shall be quarter-turn non-lubricated eccentric type with protective epoxy interior lining conforming to AWWA C550 and resilient faced plug.
- 2. Port area for valves 4" and smaller shall be 100% of adjoining pipe area. Port area for valves 6" and larger shall be 80% of the adjoining pipe area.
- 3. Valves shall be rated for 175 psi up to 12" and 150 psi for sizes 14" and larger.
- 4. Valve bodies shall be cast iron conforming to ASTM A126, Grade B with end connections as indicated on the drawings.
  - a. Flanged ends shall conform to ANSI B16.1, Class 125.
  - b. Mechanical joint ends shall conform to AWWA C111.
- 5. Body seating surface in sizes 3" and larger shall be welded nickel overlay containing not less than 90% nickel in accordance with AWWA C507, Section 7.2. Sprayed, plated or

screwed-in seats are not acceptable.

6. Plugs shall be ASTM A126, Grade B cast iron or ASTM A536 ductile iron, resilient faced with neoprene or Nitrile.
7. Valves shall be furnished with replaceable permanently lubricated type bearings. Sleeve type and thrust bearings in the upper and lower journals shall be corrosion-resistant stainless steel.
8. Shaft seals shall be multiple O-ring or self-adjusting V-ring or U-cup type conforming to AWWA C504. Seals shall be replaceable without removing the bonnet from the valve.
9. All exposed fastening hardware shall be stainless steel.

D. Mechanical Actuator with Chainwheel:

1. All valves shall open counterclockwise.
2. Provided with indicator to show position of the plug.
3. Mechanical actuators totally enclosed, permanently lubricated and sealed, worm gear type, furnished with AWWA 2-inch size nut and chainwheel.
  - a. Provide stainless steel chain for each valve, length as required to terminate approximately 4-feet above finish grade.

## 2.03 FLAP VALVES

A. Acceptable Manufacturers:

1. Clow Corporation.
2. M & H Valve Company.
3. Waterman Industries, Inc.
4. Approved equal.

B. Operational Requirements:

1. Automatically open and permit free discharge when the unseating head exceeds the seating head.
2. Automatically close and prevent backflow when the seating head exceeds the unseating head.

C. Design and Materials of Construction:

1. Valve body and flap gate shall be cast iron conforming to ASTM A126, Class B, with a spigot, hub or flanged end connection as indicated on the drawings. Flanged ends shall conform to ANSI B16.1, Class 125.
2. Valves shall have a Neoprene seat.
3. Valves shall be provided with a 316 stainless steel hinge pin, secured with nuts or cotter pins.

## 2.04 GATE VALVES (2 Inch and Larger)

A. Acceptable Manufacturers:

1. American Flow Control.
2. Clow Corporation.
3. Kennedy Valve.
4. M & H Valve Company.
5. Mueller Company.
6. Approved equal.

B. Operational Requirements:

1. Provide drop-tight shut-off at full rated working pressure in both flow directions.

C. Design and Materials of Construction:

1. Gate valves 2" and larger shall be of the resilient seated wedge type conforming to AWWA C509.
2. Valves shall be rated for 200 psi working pressure and 400 psi shell test pressure.
3. Valves shall be of the non-rising stem (NRS) type and open counterclockwise.
4. Valve body and bonnet shall be cast iron conforming to ASTM A126, Grade B, or ductile iron conforming to ASTM A536, with end connections as indicated on the drawings.
  - a. Exposed valves shall have flanged ends conforming to ANSI B16.1, Class 125.
  - b. Buried valves shall have mechanical joint ends conforming to AWWA C111.
5. Valve stems shall be bronze with integral thrust collars and be provided with double O-ring seals. O-rings to be replaceable without having to remove stem.
6. The wedge shall be cast iron or ductile iron and be encapsulated with a bonded Nitrile elastomer covering.
7. All exposed fastening hardware shall be stainless steel.
8. Nut operators shall be AWWA 2-inch size. Provide handwheel for all exposed valves and valve box for all buried valves.
9. All internal ferrous surfaces of valve shall have a fusion bonded epoxy coating conforming to AWWA C550.

## 2.05 VALVE BOXES

A. Acceptable Manufacturers:

1. Clay and Baily
2. Clow Corporation
3. Mueller Company
4. Neenah Foundry Company
5. Tyler Company
6. Approved Equal

B. Provide for all buried valves unless otherwise indicated or specified.

C. Design:

1. Boxes shall be two- or three-piece cast iron screw type with 5" minimum inside diameter.
2. Provide extension stem to bring operating nut within 12" of valve box top.
3. Drop cover shall be marked "Water" or "Sewer" consistent with intended use.

## 2.06 SHOP PAINTING

- A. All interior and exterior ferrous metal surfaces, except bearing and finished surfaces, of valves and accessories shall be shop painted for corrosion protection.
- B. Valve manufacturer's standard coating system will be acceptable provided it is suitable for the service intended and compatible with specified field painting.
- C. Submit details of proposed coating system with compliance submittal drawings and data for approval prior to fabrication.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Comply with provisions of AWWA C600 and as specified.
- B. Thoroughly clean and remove all shipping materials prior to setting. Operate all valves from fully open to totally closed.
- C. Install eccentric plug valves with flow and pressure against the plug face when closed. When installed horizontally with the staff in the horizontal, the plug shall rotate open to the top recess of the valve body.
- D. Install with anchorage where indicated.
- E. Set valve boxes plumb with top flush with finished grade. After box is placed in proper position, place and thoroughly tamp earth fill around box.

### 3.02 ACCEPTANCE TESTING

- A. Perform on piping and valves as specified in Section 333416.

END OF SECTION



SECTION 331200  
WATER DISTRIBUTION SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the furnishing, installation and testing of pipe, fittings, valves, hydrants, and related appurtenances for potable water distribution systems as shown on the drawings.
- B. Related work:

- 1. Section 312333 - Trenching and Backfilling for Utilities
- 2. Section 330518 - Pressure Pipe and Fittings
- 3. Section 330526 - Utility Markers and Locators
- 4. Section 330529 - Utility Valves
- 5. Section 331300 - Disinfecting Water Mains
- 6. Section 333416 - Pressure Pipe Installation

C. References

- 1. American Water Works Association (AWWA):
  - a. AWWA C111 - Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings.
  - b. AWWA C502 - Dry Barrel Fire Hydrants.
  - c. AWWA C550 - Protective Interior Coatings for Valves and Hydrants.
  - d. AWWA C600 - Installation of Gray and Ductile Iron Water Mains and Appurtenances.
  - e. AWWA C800 - Underground Service Line Valves and Fittings.
  - f. AWWA M17 - Manual for Installation, Field Testing, and Maintenance of Fire Hydrants.
- 2. National Sanitation Foundation (NSF):
  - a. NSF 61 - Drinking Water System Components - Health Effects.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Furnish certification that products conform to the applicable requirements of the specified standards.
- C. Furnish data and drawings showing the following:
  - 1. Details of joints.
  - 2. Gasket material.
  - 3. Details of fittings and couplings.
  - 4. Details of protective linings and coatings.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Inspect all material delivered to job site for damage in transit.
  - 1. Do not unload damaged material except upon the instruction of the official freight agent.
  - 2. Promptly remove any damaged materials that are unloaded from the job site so that rejected material will not be mistakenly used in the Work.

- B. Handle all materials in a manner to ensure installation in sound and undamaged condition.
  - 1. Do not drop or bump.
  - 2. Use slings, lifting lugs, hooks and other devices designed to protect product joint elements and protective coatings.
  - 3. Ship, move and store in a manner to prevent movement or shock contact with adjacent units.
  
- C. Store all materials in suitable places as approved by the Resident Engineer.

#### 1.04 BASIS OF PAYMENT

##### A. Water Mains:

- 1. Measurement: Complete system in place per lump sum.
- 2. Items included: As indicated and required for a complete installation including, but limited to, trenching, backfilling, compaction, pipe and related materials, fittings, valves, hydrants, installation and jointing, thrust blocking and anchorage, acceptance testing, disinfection and surface restoration.

##### B. Water Service Connections:

- 1. Measurement: Each.
- 2. Items Included: Service tap and reconnection of existing water service to new water main including, but not limited to, service saddle, corporation stop, curb box, pipe, fittings, installation, disinfection and surface restoration.

### PART 2 - PRODUCTS

#### 2.01 PIPE, TUBE AND FITTING MATERIALS

- A. Water Mains: Pipe and fitting materials for water mains are specified in Section 330518.
- B. Water Service Lines: Copper or polyethylene tubing.

- 1. Copper (Cu.) Tubing: Seamless, Type K, soft tempered tubing conforming to ASTM B88 and suitable for working pressures up to 150 pounds per square inch gage (psig). Required for high pressure services.
- 2. Polyethylene (PE) Tubing: DR 9 PE tubing conforming to ASTM D2737 and AWWA C901, and suitable for working pressures up to 200 psig. Manufactured from PE3408 material meeting the requirements of ASTM D3350 cell classification 345464C. NSF approved.
- 3. Fittings: Wrought copper, cast bronze or brass with compression connections conforming to AWWA C800. Provide tubular stainless steel insert stiffeners for PE tubing, dimpled and flanged to retain placement within tubing.
- 4. All tubing, pipe and fittings marked according to the applicable standard under which it is manufactured.

#### 2.02 VALVES

- A. Specified in Section 330529.

#### 2.03 FIRE HYDRANTS

A. Three-Way Hydrants:

1. Cast iron body, ductile iron barrel, rubber seat, bronze mounted, dry barrel type, designed for 250 psi working pressure and conforming to AWWA C502.
2. Dry-top center stem construction having an O-ring sealed lubrication reservoir.
3. Traffic model, breakaway type, complete with safety flanges and steel stem coupling. Nozzle section must rotate 360 degrees.
4. Designed to permit use of extension sections and allow replacement of all parts from ground level without excavation.
5. Inlet connection: 6-inch mechanical joint conforming to AWWA C111.
6. Main valve: 5-1/4 inch compression type, closing on line pressure.
7. Nozzles: One 4-1/2 inch pumper and two 2-1/2 inch hose connections with caps and chains and threading conforming to NFPA National Standard fire hose threads. Mechanically locked into the barrel and having O-ring pressure seals. Field replaceable.
8. Operating nut: Bronze pentagon, 1-1/2 inch point to flat, open counterclockwise. Protected by a cast iron weather shield.
9. Barrel provided with a positive-operating drain valve which opens to drain the hydrant upon closure of the main valve and closes upon opening of the main valve.
10. Bury depth: As required, 3-1/2 feet minimum.
11. Shop coatings:
  - a. Exterior above grade: One coat of polyamide epoxy primer, 3 to 5 mils dry film thickness and one finish coat of aliphatic acrylic polyurethane, 2 to 5 mils dry film thickness.
  - b. Exterior below grade: Two coats of asphaltic coating.
  - c. Interior ferrous surfaces except machined surfaces: Two-part, thermosetting epoxy coating, minimum 4 mils dry film thickness. Conforming to AWWA C550.
12. Acceptable Manufacturers: Equal to American Darling B-84-B or Mueller Super Centurion 250.

B. One-Way Hydrants:

1. Post type, cast iron upper and lower barrel, rubber seat, bronze mounted, dry barrel type, designed for 150 psi working pressure and conforming to AWWA C502.
2. Inlet connection: 2 inch mechanical joint conforming to AWWA C111.
3. Nozzles: One 2-1/2 inch hose connection with cap and chain. Threading conforming to NFPA National Standard fire hose threads. Mechanically locked into the barrel and having o-ring pressure seals. Field replaceable.
4. Main valve: Minimum 2-1/8 inch compression type, closing on line pressure.
5. Operating nut: Bronze pentagon, 1-1/2 inch point to flat, open counterclockwise.
6. Barrel provided with a positive-operating drain valve which opens to drain the hydrant upon closure of the main valve, and closes upon opening of the main valve.
7. Bury depth: As required, 3-1/2 feet minimum.
8. Shop coatings:
  - a. Exterior above grade: One coat of polyamide epoxy primer, 3 to 5 mils dry film thickness and one finish coat of aliphatic acrylic polyurethane, 2 to 5 mils dry film thickness. Color
  - b. Exterior below grade: Two coats of asphaltic coating.
  - c. Interior ferrous surfaces except machined surfaces: Two-part, thermosetting epoxy coating, minimum 4 mils dry film thickness. Conforming to AWWA C550.

9. Acceptable Manufacturers: Equal to Kupferle Eclipse No. 2, M&H Style 33 or Mueller A-411.

#### 2.04 SERVICE SADDLES

##### A. Dual Strap Saddles for PVC or DIP:

1. Brass body, gasket seal and stainless-steel straps conforming to AWWA C800.
2. Design working pressure of 500 psi.
3. Outlet: AWWA tapered thread, size as indicated.
4. Markings to indicate pipe O.D. range and tap size.
5. Acceptable Manufacturers: Equal to Ford Style 202BSD.

#### 2.05 CORPORATION STOPS

- A. Waterworks brass construction conforming to AWWA C800 for plug type stops. Designed to allow tapping of main through the corporation stop with the main under pressure.
- B. Inlet connection: AWWA tapered thread compatible with service saddle.
- C. Outlet connection: Compression type compatible with service pipe.
- D. Acceptable Manufacturers: Equal to Ford FB1002 Ballcorp.

#### 2.06 CURB BOXES

- A. Cast iron with 1-1/4 inch upper section, plug style lid with standard pentagon bolt and tracer wire terminal, and arch pattern curb box base to fit over 2-inch corporation stop. Length as required for specific application. Provide two (2) shut-off rods, 6-foot rod length.
- B. Acceptable Manufacturers: Equal to Ford Style EA2.

#### 2.07 TAPPING SLEEVES AND VALVES

##### A. Sleeves:

1. All stainless-steel construction with all welds fully passivated to restore stainless characteristics.
2. Rated for 150 psi working pressure.
3. 3/4-inch waterworks brass test plug with standard square head on outlet.
4. Flange with recess to accept standard tapping valves. Conforming to ANSI B16.1, Class 125. Bolt holes straddle pipe centerline.
5. Sleeve gasket gridded virgin SBR or Buna-N, providing 360-degree pipe coverage. Flange gasket Buna-N. Compounded for water service per ASTM D2000.
6. Heavy hex nuts and washers, fluorocarbon-coated to prevent galling.
7. Acceptable Manufacturers: Equal to Ford Style FTSS or Mueller Model No. H-304.

##### B. Valves:

1. Conform with applicable provisions of Section 02640 for resilient seat gate valves.
2. Provide with flanged inlet connection and mechanical joint outlet connection.

#### 2.08 LOCATING WIRE

- A. Specified in Section 330526.

### PART 3 - EXECUTION

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### 3.01 TRENCHING, BACKFILLING AND COMPACTING

- A. Perform in accordance with applicable provisions of Section 312333.
- B. Cut bottom of trench flat, true and even. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Excavate bell holes to relieve the bells of all loads and insure continuous uniform bearing for full length of pipe barrel.
- D. Hand tamp select backfill material around sides and to top of pipe.

### 3.02 INSTALLATION - PIPE AND FITTINGS

- A. Perform in accordance with applicable provisions of Section 333416.
- B. Install access fittings to permit disinfection of water system performed under Section 331300.
- C. Connections to existing distribution system:
  - 1. Make connections to existing distribution system as indicated.
  - 2. Do not operate existing valves, fire hydrants, blow-offs, or other equipment on the existing distribution system without approval of the Utility.
  - 3. Make connections at such hours to cause least disturbance of water supply to existing customers.
  - 4. Notify affected customers at least 24 hours in advance and anticipated duration of service interruption.
  - 5. Connections to existing distribution system shall not be made until the new mains have been satisfactorily disinfected and passed all specified acceptance tests.
  - 6. Connection of new water mains to existing distribution system shall be performed within 48 hours after Bacteriological Examination Results have been received and approved by Engineer. If the system connection is not performed within this time period, Disinfection and Bacteriological Examination processes shall be repeated.

### 3.02 INSTALLATION - VALVES

- A. Conform to applicable provisions of Section 330529.
- B. Set valves on granular embedment material.
- C. Valves 4 inch and larger shall be anchored by placing two epoxy-coated #4 reinforcing bars over valve ends and set in concrete as indicated.
- D. Provide valve box for every (nut operated) valve which has no gearing or operating mechanism, or in which the gearing or operating mechanism is fully protected with an enclosed grease case. Valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the valve operating nut, with box cover flush with finished surface grade.
- E. Place valve box at right angle to main.
- F. Tamp backfill around box to keep box in place and firmly supported to preclude settlement.
- G. Verify valves are in proper working order after installation.

### 3.03 INSTALLATION - FIRE HYDRANTS

- A. Conform to AWWA C600 and AWWA M17.
- B. Prior to installation, inspect all hydrants for direction of opening, nozzle threading, operating-nut and cap-nut dimensions, tightness of pressure containing bolting, and cleanliness of inlet bowl.
- C. Connect each two-way hydrant to main with a 4 inch PVC pressure pipe service run controlled by an independent 4 inch gate valve.
- D. Provide minimum cover over service run piping of 3-1/2 feet below finished grade.
- E. Install hydrants with provision for drainage. Excavate drainage pit, 2 feet square by 2 feet deep,

below hydrant. Fill with coarse gravel, properly placed under and around hydrant bowl, up to a level of 6 inches above drain port.

- F. Set hydrants on concrete slab, minimum 16 inches square by 4 inches thick.
- G. Set hydrants so that breakaway flange is 2 to 6 inches above finished grade.
- H. Set hydrants plumb with nozzles facing roadway.
- I. Thoroughly compact backfill around hydrant to grade.
- J. Protect with secured burlap cover until new main is placed in service.

### 3.04 INSTALLATION - SERVICE CONNECTIONS

#### A. Service Taps:

- 1. Service saddles and corporation stops are required on all taps unless otherwise indicated.
- 2. Perform in accordance with Uni-B-8 and as specified.
- 3. Make taps in upper quadrant of main at an angle of approximately 60 degrees from the vertical. Minimum distance between taps is 24 inches, with a 5-degree stagger. Do not make service taps within 24 inches of end of main.
- 4. Perform using tapping machines designed to tap through the corporation stop. The machine must operate with a cutting tool classified as a core cutting tool or the shell design, which retains the coupon while penetrating the pipe wall. Equipment using a twist drill, hole saw, or auger bit will not be allowed.
- 5. Turn corporation stop so that shut-off is facing up.

#### B. Service Lines:

- 1. Provide all fittings as necessary to complete reconnection of existing water services to new water main.

### 3.05 INSTALLATION - ANCHORAGE AND THRUST BLOCKS

- A. Shall conform to the dimensions and details shown in the drawings.
- B. Place thrust blocks against unyielding, undisturbed earth or rock.
- C. Install at tees, elbows, bends and dead ends as required.

### 3.06 INSTALLATION - LOCATING WIRE

- A. Specified in Section 330526.

### 3.06 ACCEPTANCE TESTS

- A. Perform hydrostatic pressure and leakage tests on water mains as specified in Section 333416 Part 3.08.

### 3.07 DISINFECTION

- A. Perform disinfection and bacteriological testing as specified in Section 331300.

END OF SECTION

SECTION 331300  
DISINFECTING WATER MAINS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers disinfection of potable water mains and appurtenances.
- B. Related Work:

- 1. Section 333416 - Pressure Pipe Installation

- C. References

- 1. American Water Works Association (AWWA):
    - a. AWWA C651 - Disinfecting Water Mains.

1.02 SUBMITTALS

- A. Submit as specified in Section 01300.
- B. Submit disinfection report containing the following information:
  - 1. Type and form of disinfectant used.
  - 2. Date and time of disinfectant injection start and completion.
  - 3. Test locations.
  - 4. Initial and 24-hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
  - 5. Date and time of flushing start and completion.
  - 6. Disinfectant residual after flushing in ppm for each outlet tested.
- C. Submit bacteriological test reports.

1.03 QUALITY ASSURANCE

- A. Comply with applicable requirements of AWWA C651 except as otherwise specified herein.

1.04 BASIS OF PAYMENT

- A. Unless otherwise specified or indicated, disinfection of potable water mains shall be considered incidental to other related work and no measurement or direct payment will be made.

PART 2 - PRODUCTS

2.01 FORMS OF CHLORINE

- A. Forms of chlorine that may be used in the disinfection operations are liquid chlorine, sodium hypochlorite solution, and calcium hypochlorite granular or tablets.
- B. Liquid Chlorine: Contains 100% available chlorine and is packaged in steel containers usually of 100-lb., 150-lb., or 1-ton net chlorine weight. Liquid chlorine shall be used only:
  - 1. In combination with appropriate gas-flow chlorinators and ejectors to provide a controlled high-concentration solution feed to the water to be chlorinated.

2. Under the direct supervision of a person who is familiar with the physiological, chemical, and physical properties of liquid chlorine, and who is trained and equipped to handle any emergency that may arise.
  3. When appropriate safety practices are observed to protect working personnel and the public.
- C. Sodium Hypochlorite: Available in liquid form in glass, rubber-lined, or plastic containers typically ranging in size from 1-qt. to 5-gal.; containers of 30-gal. or larger sizes may be available in some areas. Sodium hypochlorite contains approximately 5% to 15% available chlorine, but care must be used in control of conditions and length of storage to minimize its deterioration.
- D. Calcium Hypochlorite: Available in granular form or in approximately 5-g tablets and contains approximately 65% available chlorine by weight. Store in a cool, dry, and dark environment to minimize its deterioration.

## 2.02 CHLORINE FEED EQUIPMENT

- A. Apply liquid chlorine using a solution-feed, vacuum-operated chlorinator, and booster pump. Direct-feed chlorinators, which operate solely from gas pressure in chlorine cylinders will not be acceptable.
- B. Apply calcium hypochlorite solution using chemical-feed pumps specifically designed for feeding chemical solutions.

## PART 3 - EXECUTION

### 3.01 BASIC DISINFECTION PROCEDURE

- A. The basic disinfection procedure consists of:
  1. Preventing contaminating materials from entering the water main during storage and construction.
  2. Removing, by flushing or other means, those materials that may have entered the water main.
  3. Chlorinating any residual contamination that may remain and flushing the chlorinated water from the main.
  4. Determining the bacteriological quality by laboratory test after disinfection.

### 3.02 DISINFECTION OPERATIONS

- A. Perform disinfection operations on segments of the water main between isolation valves.
- B. Provide and attach all equipment and appurtenances required to execute disinfection operations. Remove when disinfection operations have been satisfactorily completed.
  1. Provide sample cock assemblies at the end of each test segment. Sampling from hydrants will not be permitted.
  2. Provide temporary blow-off at the end of each test segment to permit flushing if hydrant is not available.

### 3.03 METHODS OF CHLORINATION

- A. Tablet Method: Gives an average chlorine dose of approximately 25 mg/l.
  1. Consists of placing calcium hypochlorite granules and tablets in the water main as it is



- being installed and filling the main with potable water when installation is completed.
2. May be used only if pipes and appurtenances are kept clean and dry during construction.
  3. Do not use on solvent-welded plastic pipe or on screwed-joint steel pipe.
  4. Placing of calcium hypochlorite granules:
    - a. Place at upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-foot intervals. The quantity of granules shall be as follows:

Pipe Diameter (inches)	Calcium Hypochlorite Granules (ounces)
2	0.25
4	0.50
6	1.00
8	2.00
12	4.00
16 and larger	8.00

5. Placing of calcium hypochlorite tablets:
  - a. Place 5-g calcium hypochlorite tablets in each section of pipe and also one such tablet in each hydrant branch, and other appurtenance. The number of tablets required for each pipe section shall be as follows:

NUMBER OF 5-g CALCIUM HYPOCHLORITE TABLETS REQUIRED FOR 25-mg/l DOSE  
BASED ON 3.25-g AVAILABLE CHLORINE PER TABLET

Pipe Diameter (inches)	Length of Pipe Section (feet)			
	13 or less	18	20	40
2	1	1	1	1
4	1	1	1	1
6	1	1	1	2
8	1	2	2	4
10	2	3	3	5
12	3	4	4	7
16	4	6	7	13

- b. Attach tablets to pipe crown with food-grade adhesive, with approximately equal numbers of tablets at each end of given pipe length.

6. Filling and Contact:

- a. When installation has been completed, fill main with water. Regulate fill rate to limit velocity within the main to no more than 1.0 fps. Take precautions to assure that air pockets are eliminated.
- b. Retain water in main for at least 24-hrs. If water temperature is less than 41° F., retain water in main for at least 48-hrs.
- c. Position valves so that the strong chlorine solution in the treated main will not flow into water mains in active service.

C. Continuous-Feed Method: Gives a chlorine residual after 24-hrs. of not less than 10 mg/l.

1. May be used for all pipe sizes and lengths.
2. Preliminary flushing: Prior to chlorinating, fill main to eliminate air pockets and flush to remove particulates. Maintain a flushing velocity of at least 2.5 fps unless otherwise permitted.
3. Chlorinating the main:
  - a. Provide constant, measured rate of flow into the new main from the existing distribution system or other approved source.
  - b. Feed chlorine at a constant rate such that the water will have not less than 25 mg/l free chlorine. Measure chlorine concentration at regular intervals using appropriate chlorine test kits. The amount of chlorine required for each 100 feet of pipe shall be as follows:

Pipe Diameter (inches)	100% Chlorine (pounds)	1% Chlorine Solution (gallons)
2	.003	.04
4	.013	.16
6	.030	.36
8	.054	.65
10	.085	1.02
12	.120	1.44
16	.217	2.60

Solutions of 1% chlorine may be prepared with sodium hypochlorite or calcium hypochlorite. The latter requires 1 pound of calcium hypochlorite per 8 gallons of water.

- c. During application of chlorine, position valves to prevent the strong chlorine solution from entering active mains.
- d. Continue chlorine application until the entire main is filled with heavily chlorinated water. Operate all valves and hydrants in the section being treated to ensure disinfection of the appurtenances.
- e. Retain heavily chlorinated water in the main for at least 24-hrs. At the end of 24-hrs., the treated water in all portions of the main shall have a residual chlorine concentration of not less than 10 mg/l free chlorine.

C. Slug Method: Gives a 3-hour exposure of not less than 50 mg/l free chlorine.

1. May be used for all pipe sizes and lengths.
2. Place calcium hypochlorite granules in the main during construction as specified in PART 3.03 A. 4.
3. Fill and flush main as specified in PART 3.03 B. 1.
4. Chlorinating the main:
  - a. Provide constant, slow rate of flow through the new main.
  - b. Dose with chlorine in such a manner that the water flowing through the main will have not less than 100 mg/l free chlorine. Apply chlorine continuously and for a sufficient period to develop a solid column, or "slug" of chlorinated water that will expose all interior surfaces to a chlorine concentration of approximately 100 mg/l for at least 3 hours as the heavily chlorinated water column moves through the main.
  - c. Measure chlorine residual at regular intervals using appropriate chlorine test kits. Should the chlorine concentration drop below 50 mg/l, stop flow, relocate chlorine feed equipment ahead of the slug, and, as flow is resumed, apply chlorine to restore the free chlorine in the slug to not less than 100 mg/l.
  - d. Operate valves and hydrants as the slug flows past to ensure disinfection of these appurtenances.

#### 3.04 FINAL FLUSHING

- A. Clearing the Main of Heavily Chlorinated Water: After the applicable retention period, promptly flush the heavily chlorinated water from the main until chlorine measurements show the water leaving the main is acceptable for domestic use.
- B. Disposing of Heavily Chlorinated Water: Dispose of heavily chlorinated water in accordance with the requirements of authorities having jurisdiction.

#### 3.05 BACTERIOLOGICAL TESTS

- A. Before placing new water main in service, collect and deliver water samples to the Missouri Division of Health Laboratory for bacteriological analysis.
  1. Collect at least one sample for each 1,200 ft. of main at the end of the main, and one from each branch.
  2. New water main will not be accepted and will not be placed into service until bacteriological tests show the absence of coliform organisms. Two safe samples must be obtained with at least 24-hours between samplings.
- B. If the initial disinfection fails to produce satisfactory bacteriological samples, the main shall be re-flushed and resampled. If such check samples show the presence of coliform organisms, the main shall be re-chlorinated by the continuous-feed or slug method of chlorination until satisfactory results are obtained.

END OF SECTION

SECTION 333113  
SANITARY SEWER SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers materials, installation, and testing of gravity sewer pipe and related appurtenances as shown on the drawings.
- B. Related Work:
  - 1. Section 312333 - Trenching and Backfilling for Utilities
  - 2. Section 330130.75 - Service Connection Renovation and Replacement
  - 3. Section 330516 - Utility Structures
  - 4. Section 330517 - Gravity Sewer Pipe and Fittings
- C. References
  - 1. American Society for Testing and Materials (ASTM):
    - a. ASTM D2321 - Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
    - b. ASTM F1417 - Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air.
  - 2. American Water Works Association (AWWA):
    - a. AWWA C600 - Installation of Gray and Ductile Iron Water Mains and Appurtenances.

1.02 DELIVERY, STORAGE AND HANDLING

- A. Inspect all pipe, fittings, and appurtenances delivered to job site for damage in transit.
  - 1. Do not unload damaged material except upon the instruction of the official freight agent.
  - 2. Promptly remove any damaged materials that are unloaded from the job site so that rejected material will not be mistakenly used in the Work.
- B. Handle pipe, fittings and appurtenances in a manner to ensure installation in sound and undamaged condition.
  - 1. Do not drop or bump.
  - 2. Use slings, lifting lugs, hooks and other devices designed to protect pipe, joint elements and coatings.
  - 3. Ship, move and store in a manner to prevent movement or shock contact with adjacent units.
- C. Store all pipe, fittings and appurtenances in suitable places as approved by the Resident Engineer.
- D. Place pipe along the intended alignment of the trench with the bell ends facing the direction in which the work will proceed (upstream) unless otherwise directed.

### 1.03 BASIS OF PAYMENT

- A. Gravity Sanitary Sewers (Open-cut sewer main repair/replacement):
  - 1. Measurement: Length of sewer pipe installed, measured to the nearest linear foot, including the length of fittings and special pieces.
  - 2. Items included: Trenching, granular bedding, pipe, fittings, special pieces, installation and jointing, backfilling, acceptance testing and surface restoration.
- B. Class A Arch Encasement:
  - 1. Measurement: Complete product in place per lump sum.
  - 2. Items included: Trench preparation, dewatering, bracing or anchoring, and cast-in-place concrete work.
- C. Pipe Anchors:
  - 1. Measurement: Complete product in place per lump sum.
  - 2. Items included: Excavation, subgrade preparation, form work, cast-in-place concrete work, and backfill.
- D. Tee or Wye Branch Fittings:
  - 1. Measurement: Complete product in place per lump sum.
  - 2. Items included: Tee or wye fitting and jointing.
- E. Open Trench Service Lateral Replacement (4- and/or 6-inch):
  - 1. Measurement: Complete product in-place per each.
  - 2. Items Included: As indicated and required for a complete installation including, but not limited to, trenching, granular bedding, pipe, fittings, installation and jointing, backfilling, and surface restoration.
- F. Plant and Pump Station Piping:
  - 1. Measurement: Complete product in place per lump sum.
  - 2. Items included: As indicated and required for a complete installation.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Specified in related sections.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Utilize equipment, methods and materials ensuring installation to lines and grades indicated.
  - 1. Maintain alignment and grade within a tolerance of  $\pm 1$  inch per 100 feet.

2. No more than one alignment or grade correction between manholes will be permitted.
  3. Do not lay on block supports unless pipe is to receive total concrete encasement.
  4. If laser beam equipment is used, include provisions to prevent thermal deflection of the laser beam.
  5. Obtain acceptance of method proposed for transfer of alignment and grade from control to the Work.
- B. Install pipe of size, materials, strength class and joint type with embedment indicated for plan location.
- C. Insofar as possible, commence laying at downstream end of line and install pipe with spigot ends in direction of flow.
- D. Clean interior of pipe, fittings and joints prior to installation. Prevent entrance of foreign matter during installation and when work is suspended or stopped.
1. Close open end of pipe with tight-fitting closure.
  2. Do not allow water to fill trench. Prevent floatation if water prevention measures prove inadequate.
  3. Remove water, mud and other undesirable material from trench before removing end closure.
- E. Brace or anchor as required to prevent displacement after establishing final alignment and grade.
- F. Perform only when weather and trench conditions are suitable. Do not lay in water.
- G. Separation of water mains, sanitary sewers and sewage force mains:
1. Parallel Installation: Maintain at least 10 feet horizontal separation, measured edge to edge, between water mains and existing or proposed sewer lines. In cases where it is impractical to maintain 10 feet separation, install water main in a separate trench or on an undisturbed shelf located on one side of the sewer line with at least 18 inches vertical separation between bottom of water main and top of sewer piping. In areas where the above specified separations cannot be obtained, either the water main or sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing.
  2. Crossings: Whenever water mains and sewer lines intersect, maintain at least 18 inches vertical separation, measured edge to edge, between the water main and sewer piping whether the water main is above or below the sewer line. Arrange crossing so that water main joints are equidistant and as far as possible from the sewer line but in no case less than 10 feet. In areas where the above specified separation cannot be obtained, either the water main or sewer line shall be constructed of mechanical joint pipe or cased in a continuous casing that extends no less than 10 feet on both sides of the crossing.
  3. Maintain at least 10 feet horizontal separation between water mains and sewage force mains, and install in separate trenches. In areas where the above specified separation cannot be obtained, either the water main or force main shall be cased in a continuous casing.
  4. No waterline shall be located closer than 10 feet to any part of a sanitary sewer manhole.

### 3.02 JOINTING

- A. General Requirements:
1. Locate joint to provide for differential movement at changes in type of pipe embedment, impervious trench checks and structures.
    - a. Not more than 12 inches from structure wall, or

- b. Support pipe from wall to first joint with concrete cradle structurally continuous with base slab or footing.
    - c. As indicated or directed.
  - 2. Perform in accordance with pipe manufacturer's recommendations.
  - 3. Clean and lubricate all joint and gasket surfaces with lubricant recommended by pipe manufacturer.
    - a. Joint lubricant shall be stored in closed containers and kept clean.
  - 4. Utilize methods and equipment capable of fully homing or making up joints without damage or over-belling.
  - 5. Excavate bell holes at each joint to provide full length barrel support of the pipe and to prevent point loading at the bells.
- B. Special Requirements for Push-On Joints.
- 1. Joint preparation and jointing procedures shall conform with requirements of ASTM D2321 for PVC pipe and AWWA C600 for ductile iron pipe.
  - 2. Verify that each spigot is chamfered or beveled to facilitate assembly.
  - 3. Keep the joint straight while pushing the spigot end into the bell end of the pipe. Use timber header between pipe and pushing device. Take care to not over-bell the joint.

### 3.03 BUILDING SEWER CONNECTIONS

- A. Provide tee or wye fittings for connection to 4 inch or 6 inch building sewers as required and indicated.
  - 1. Shall be molded type reducing branch tee or wye fittings with elastomeric gasket joints same as pipe.
  - 2. Coordinate proper location with property owner and Engineer ahead of sewer pipe installations.
  - 3. Minimum installed distance between tees, wyes, or other special pieces shall be 2 feet. Locate at least 4 feet from manholes.
  - 4. Ascertain the exact location of all tees or wyes and other special pieces, before concealment by backfilling, by accurate measurement from the center of the nearest downstream manhole so that a true and exact record may be preserved for future use.
- B. Provide risers as required to extend service connections to a maximum depth of 6 feet below ground surface. Lay risers on a slope not to exceed 2 vertical to 1 horizontal.
- C. If sewer is being constructed in street right of way, extend service line to right of way line. Lay on a minimum slope of 1/4 inch per foot. Maintain 4 feet minimum cover.
- D. Terminate risers and service lines with a bell end and plug.
- E. Ascertain the exact location of the end of the service line, before concealment by backfilling, by accurate measurement from the centerline of the sewer and record with information required under PART 3.03 A.4.
- F. Place 2 inch by 2 inch wood stake at the end of each service line, extending to within 2 to 6 inches of ground surface. Place 6 inch long #4 rebar vertically next to each wood stake.

### 3.04 CUTTING PIPE

- A. Cut in neat manner without damage to pipe.
- B. Cut ductile iron pipe with Carborundum saw or other method recommended by pipe manufacturer.

- D. Remove burrs and sharp edges and bevel or chamfer end of pipe.
- C. Repair any damage to pipe lining and seal coat as required and approved.

### 3.05 CONNECTIONS TO EXISTING SEWER LINES AND STRUCTURES

- A. Connect sewer pipe to existing sewer line or structure as required or indicated.
- B. Conform to Specifications regarding joint locations, type of joints and pipe materials.
- C. Connect sewer pipe to existing sewer line with approved coupling designed and fabricated for intended purpose.
- D. Connect sewer pipe to new or existing structure using waterstop to ensure watertight seal between pipe and structure wall.
- E. Prepare structure by core drilling an opening with at least 3 inches clearance all around waterstop fitting to be installed.
- F. Repair opening with non-shrink grout.
- G. Provide cast-in-place wall sleeves in lieu of core drilling where required or indicated.

### 3.06 TEMPORARY PLUGS

- A. Furnish and install temporary plugs at contract separation points for removal by others to complete connection to piping laid under adjacent contract.
  - 1. Secure in place in a manner to facilitate removal when required to connect pipe.
- B. Remove temporary plugs from pipe as required to complete connections to existing pipe.
- C. Furnish and install test plugs as necessary to complete required acceptance tests.
  - 1. Tests plugs shall be as recommended by pipe manufacturer.
  - 2. Be watertight against heads up to specified test pressures.

### 3.07 PIPE ANCHORS

- A. Shall conform to the dimensions and details shown on the drawings.
- B. Place pipe anchors against unyielding, undisturbed earth or rock.
- C. Install at locations indicated on the drawings.

### 3.08 ACCEPTANCE TESTS

- A. Visual Inspection:
  - 1. Contractor shall clean pipe of excess mortar, joint sealant and other dirt and debris prior to inspection.
  - 2. Sewer shall be inspected by flashing a light between adjacent manholes or by physical passage where space permits.
  - 3. Determine from illumination or by physical inspection:
    - a. The presence of any misaligned, displaced, or broken pipe.
    - b. The presence of visible infiltration or other defects.
  - 4. Correct defects as required prior to conducting leakage tests.
- B. Leakage Tests:
  - 1. Conduct leakage test on the full length of all gravity sewer pipe installed, including service lines.



- a. All visible leaks shall be repaired regardless of the amount of leakage.
- 2. Conduct initial test on first section of pipe installed by each crew.
  - a. Include a minimum of 10 pipe lengths but not to exceed 400 feet.
  - b. Perform before backfilling.
  - c. Satisfactorily complete test before crew is permitted to continue pipe installation.
- 3. Test remaining pipe in sections as determined by Contractor and approved by Engineer.
- 4. Perform leakage test by infiltration method, exfiltration method or low pressure air method, as specified.
- 5. Obtain approval of equipment and acceptance of methods proposed for use.
- 6. In areas where groundwater is known to exist, verify groundwater elevation prior to conducting leakage test.
  - a. Determine ground water elevation by attaching a clear plastic manometer to opening through manhole wall, or by other method acceptable to the Engineer.

C. Infiltration Method:

- 1. May be used on all pipe sizes where the groundwater elevation is at least 2 feet above the crown of the pipe at the upper end of the test section.
- 2. Furnish all equipment necessary to conduct test.
- 3. Measure infiltration at lower end of test section with a specially fabricated V-notch weir that will properly fit the pipe.
- 4. Maintain test duration as necessary to locate all leaks and defects but not less than 2 hours.
- 5. Repeat as necessary after repair of leaks and defects until measured leakage does not exceed 100 gallons per inch of internal pipe diameter per day per mile of pipe length.

MAXIMUM ALLOWABLE INFILTRATION  
EXPRESSED IN GALLONS PER HOUR PER FOOT OF PIPE LENGTH

Sewer Diameter (Inches)	Infiltration (Gal./Hr./Ft.)	Sewer Diameter (Inches)	Infiltration (Gal./Hr./Ft.)
4	0.0032	15	0.0120
6	0.0048	18	0.0144
8	0.0064	21	0.0168
10	0.0080	24	0.0192
12	0.0096	27	0.0216

D. Exfiltration Method:

- 1. May be used for all pipe sizes.
- 2. Furnish water source and all facilities required to conduct exfiltration test including:
  - a. Pumping equipment.
  - b. Water meter.

- c. Temporary plugs.
  - d. All miscellaneous items required.
3. Perform at hydrostatic pressures specified as measured.
    - a. Minimum water depth at upper end of test section shall be at least 4 feet above crown of pipe or groundwater elevation, whichever is greater.
    - b. Maximum water depth at lower end of test section shall not exceed 20 feet.
  4. Protect manholes and other structures by means of bulkheads to prevent bursting pressures from being applied inside the structure.
  5. Maintain the test as necessary to locate all leaks but not less than 2 hours.
  6. Determine leakage by measuring the water elevation at upper end of test section at beginning and end of test period.
  7. Repeat as necessary after repair of leaks and defects until measured leakage does not exceed the specified limits in PART 3.06 C.5.
    - a. An additional allowance of 0.0384 gallons per hour per vertical foot for manholes in the test section may be added to the specified limits.

E. Low Pressure Air Method:

1. May be used for 24 inch and smaller pipe sizes.
2. Perform in accordance with ASTM F1417.
3. Furnish equipment and all facilities required to conduct low pressure air test including:
  - a. Air control equipment.
  - b. Pressure gauges.
  - c. Temporary plugs.
  - d. Pressure regulator to avoid over-pressurization.
  - e. All miscellaneous items required.
4. Pipe plug for introducing air to sewer line shall be equipped with two taps.
  - a. One tap will be used to introduce air into the line being tested, through suitable valves and fittings, so that the input air may be regulated.
  - b. The second tap will be fitted with valves and fittings to accept a pressure test gauge readable from ground level indicating internal pressure in the sewer pipe.
  - c. An additional valve and fitting will be incorporated on the tap used to check internal pressure so that a second test gauge may be attached to the internal pressure tap.
  - d. The pressure test gauge will also be used to indicate loss of air pressure due to leaks in the sewer line.
5. The pressure test gauge shall meet the following minimum specifications:
  - a. Size (diameter): 4-1/2 inches.
  - b. Pressure range: 0 - 15 psi.
  - c. Figure intervals: 1.0 psi increments.
  - d. Minor subdivisions: 0.5 psi.
  - e. Pressure tube: Bourdon Tube or diaphragm.
  - f. Accuracy:  $\pm 0.25\%$  of maximum scale reading.
  - g. Dial: White coated aluminum with black lettering, 270° Arc and mirror edge.
  - h. Pipe connection: Low male 1/2 inch N.P.T.

6. Supply calibration data with all pressure test gauges. Certification of pressure test gauge will be required from the gauge manufacturer. This certification and calibration data shall be available to the Engineer whenever air tests are performed.
7. Test each reach of sewer pipe between manholes after completion of the installation of pipe and appurtenances and the backfill of sewer trench.
8. Plug ends of line and cap or plug all connections to withstand internal pressure. After connecting air control equipment to air hose attached to pipe plug described in PART 3.06 E.4., monitor air pressure so that internal pressure does not exceed 5.0 psig. After reaching 4.0 psig, throttle air supply to maintain between 4.0 and 3.5 psig for at least 2 minutes in order to allow equilibrium between air temperature and pipe walls. During this time, check all plugs to detect any leakage. If plugs are found to leak, bleed off air, tighten plugs, and again begin supplying air. After temperature has stabilized, allow pressure to decrease to 3.5 psig. At 3.5 psig, begin timing to determine the time required for pressure to drop to 3.0 psig. If the time for the air pressure to decrease from 3.5 psig to 3.0 psig is greater than that shown in the table below, the pipe shall be presumed free of defects.

Pipe Diameter in.	Minimum Time Min & Sec.	Length for Minimum Time Ft.	Time for Longer Length Sec.	Minimum Time for Length (L) Shown Min. & Sec.			
				100 ft.	200 ft.	300 ft.	400 ft.
4"	1:53	597	0.190L	1:53	1:53	1:53	1:53
6"	2:50	398	0.427L	2:50	2:50	2:50	2:61
8"	3:47	298	0.760L	3:47	3:47	3:48	5:04
10"	4:43	239	1.187L	4:43	4:43	5:56	7:54
12"	5:40	199	1.709L	5:40	5:42	8:33	11:24
15"	7:05	159	2.671L	7:05	8:54	13:21	17:48
18"	8:30	133	3.846L	8:30	12:49	19:14	25:38
21"	9:55	114	5.235L	9:55	17:27	26:11	34:54
24"	11:20	99	6.837L	11:24	22:48	34:11	45:35

9. If low pressure air test fails to meet above requirements, repeat test as necessary after all leaks and defects have been repaired.
  - a. Segmented testing may be utilized solely to isolate the location of leaks and defects.
10. If the length of sewer to be tested is fully or partially submerged in groundwater, the test pressure shall be increased as required to overcome the actual static pressure exerted by the groundwater.
  - a. The height of groundwater in feet above the crown of the pipe at the lower end of the test section shall be multiplied by 0.43 to establish the pounds per square inch of pressure that will be added to all pressure readings specified in PART 3.06 E.8.
  - b. If a test pressure greater than 8 psig results, low pressure air method shall not be used.

F. Deflection Test:

1. Perform deflection test on all PVC sewer pipe after backfill has been in place at least 30

days.

2. Provide mandrel testing equipment, labor and all miscellaneous items required to perform test. Mandrel diameter shall not be less than 95% of the published average internal diameter of the pipe and have nine (9) or more odd number of flutes or points.
3. Obtain approval of equipment and acceptance of method proposed for use. Test shall be performed without mechanical pulling device.
4. Relay or replace all pipe having a diametrical deflection exceeding 5%. Repeat deflection test.
5. On-site re-rounding with internal expanding mole or other such devices will not be permitted.

END OF SECTION

SECTION 333416  
PRESSURE PIPE INSTALLATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section covers delivery, storage, handling, and installation of pressure pipe and related appurtenances as shown on the drawings.
- B. Related work:
  - 1. Section 312333 - Trenching and Backfilling for Utilities
  - 2. Section 330518 - Pressure Pipe and Fittings
- C. References
  - 1. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM D2855 - Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
  - 2. American Water Works Association (AWWA):
    - a. AWWA C600 - Installation of Gray and Ductile Iron Water Mains and Appurtenances.
    - b. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.

1.02 DELIVERY, STORAGE AND HANDLING

- A. Inspect all pipe, fittings, and appurtenances delivered to job site for damage in transit.
  - 1. Do not unload damaged material except upon the instruction of the official freight agent.
  - 2. Promptly remove any damaged materials that are unloaded from the job site so that rejected material will not be mistakenly used in the Work.
- B. Handle pipe, fittings and appurtenances in a manner to ensure installation in sound and undamaged condition.
  - 1. Do not drop or bump.
  - 3. Use slings, lifting lugs, hooks and other devices designed to protect pipe, joint elements and coatings.
  - 4. Ship, move and store in a manner to prevent movement or shock contact with adjacent units.
- C. Store all pipe, fittings and appurtenances in suitable places as approved by the Resident Engineer.

1.03 BASIS OF PAYMENT

- A. All Work under this Section shall be considered incidental to other related Work and no measurement or direct payment will be made.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Specified in related sections.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Utilize equipment, methods and materials ensuring installation to lines and grades indicated.
  - 1. Maintain alignment within a tolerance of  $\pm$  12 inches per 100 feet.
  - 2. Where grades are not shown or indicated, lay pipe to grade between control elevations shown.
  - 3. Unless otherwise indicated, maintain a minimum cover of 42 inches over top of pipe.
  - 4. Accomplish horizontal and vertical curve alignments with fittings and pipe deflections.
    - a. Limit joint deflection with ductile-iron pipe and fittings to conform to AWWA C600 ( $\leq$  3-degrees).
    - b. Limit joint deflections for PVC pipe joints to conform to AWWA C605 ( $\leq$ 1-degree).
  - 5. Do not lay pipe on block supports unless pipe is to receive total concrete encasement.
  - 6. Obtain acceptance of method proposed for transfer of alignment from control to the Work.
- B. Install pipe of size, materials, strength class, and joint type with embedment indicated for plan location.
- C. Insofar as possible, install pipe with spigot ends in direction of flow.
- D. Clean interior of pipe, fittings and joints prior to installation. Prevent entrance of foreign matter during installation and when work is suspended or stopped.
  - 1. Close open end of pipe with tight-fitting enclosure.
  - 2. Do not allow water to fill trench. Prevent floatation if water prevention measures prove inadequate.
  - 3. Remove water, mud and other undesirable material from trench before removing end closure.
- E. Brace or anchor as required to prevent displacement after establishing final alignment.
- F. Perform only when weather and trench conditions are suitable. Do not lay in water.
- G. Separation of water mains, sanitary sewers and sewage force mains:
  - 1. Parallel Installation: Maintain at least 10 feet horizontal separation, measured edge to edge, between water mains and existing or proposed sewer lines. In cases where it is impractical to maintain 10 feet separation, install water main in a separate trench or on an undisturbed shelf located on one side of the sewer line with at least 18 inches vertical separation between bottom of water main and top of sewer piping. In areas where the above specified separations cannot be obtained, the sewer line shall be constructed of slip-on or mechanical joint pressure rated pipe or cased in a continuous and be pressure tested to 150 pounds per square inch to assure water tightness.
  - 2. Crossings: Whenever water mains and sewer lines intersect, maintain at least 18 inches vertical separation, measured edge to edge, between the water main and sewer piping whether the water main is above or below the sewer line. Arrange crossing so that water main joints are equidistant and as far as possible from the sewer line but in no case less

than 10 feet. In areas where the above specified separation cannot be obtained, the sewer line shall be constructed of slip-on or mechanical joint pressure rated pipe or cased in a continuous casing that extends no less than 10 feet on both sides of the crossing and be pressure tested to 150 pounds per square inch to assure water tightness.

3. Maintain at least 10 feet horizontal separation between water mains and sewage force mains, and install in separate trenches. In areas where the above specified separation cannot be obtained, either the water main or force main shall be cased in a continuous casing.
4. No waterline shall be located closer than 10 feet to any part of a sanitary sewer manhole.

### 3.02 JOINTING

#### A. General Requirements:

1. Locate joint to provide for differential movement at changes in type of pipe embedment, impervious trench checks and structures.
  - a. Not more than 12 inches from structure wall, or as indicated or directed.
2. Perform in accordance with pipe manufacturer's recommendations.
3. Clean and lubricate all joint and gasket surfaces with lubricant recommended by pipe manufacturer. Joint lubricant shall be suitable for use with potable water, be stored in closed containers, and kept clean.
4. Utilize methods and equipment capable of fully homing or making up joints without damage or over-belling.
5. Excavate bell holes at each joint to provide full length barrel support of the pipe and to prevent point loading at the bells.

#### B. Special Requirements for Solvent-Cemented Joints:

1. Joint preparation, cutting and jointing procedures shall comply with ASTM D2855.
2. Chamfer or bevel pipe ends 10 to 15 degrees or as recommended by pipe manufacturer.
3. Block or restrain newly assembled joints to prevent movement during the setting time recommended by pipe manufacturer.
4. Pressure testing of solvent welded piping systems shall not be performed until the applicable curing time, as set forth in Table X2.1 of ASTM D2855, has elapsed.

#### C. Special Requirements for Push-On Joints:

1. Joint preparation and jointing procedures shall conform with requirements of AWWA C605 for PVC pipe and AWWA C600 for ductile iron pipe.
2. Verify that each spigot is chamfered or beveled to facilitate assembly.
3. Keep the joint straight while pushing the spigot end into the bell end of the pipe. Use timber header between pipe and pushing device. Take care to not over-bell the joint.
4. Make deflection after the joint is assembled.

#### D. Special Requirements for Mechanical Joints:

1. Joint preparation and jointing procedures shall conform with the requirements of AWWA C600.
2. Keep the joint straight during assembly.
3. Make deflection after joint assembly but before tightening bolts.
4. Tighten bolts to the torque values listed in Table 3 of AWWA C600.

5. If effective sealing is not obtained, the joint shall be disassembled, thoroughly cleaned and reassembled.
6. Over-tightening of bolts to compensate for poor installation practice will not be permitted.

E. Special Requirements for Flanged Joints:

1. When bolting flanged joints, avoid restraint on opposite end of pipe or fitting.
2. Tighten bolts gradually and uniformly to ensure uniform compression of the gasket.

### 3.03 CUTTING PIPE

- A. Cut in a neat manner without damage to pipe.
- B. Cut ductile iron pipe with Carborundum saw or other method recommended by pipe manufacturer.
- C. Remove burrs and sharp edges and bevel or chamfer end of pipe.
- D. Repair any damage to pipe lining and seal coat as required and approved.

### 3.04 CONNECTIONS TO EXISTING PIPELINES AND STRUCTURES

- A. Connect pipe to existing pipeline or structure as required or indicated.
- B. Conform to Specifications regarding joint locations, type of joints and pipe materials.
- C. Connect pipe to existing pipeline with approved coupling designed and fabricated for intended purpose.
- D. Connect pipe to new or existing structure using waterstop to ensure watertight seal between pipe and structure wall.
  1. Prepare structure by core drilling an opening with at least 3 inches clearance all around waterstop fitting to be installed.
  2. Repair opening with non-shrink grout.

### 3.05 TEMPORARY PLUGS

- A. Furnish and install temporary plugs at contract separation points for removal by others to complete connection to piping laid under adjacent contract.
  1. Secure in place in a manner to facilitate removal when required to connect pipe.
- B. Remove temporary plugs from pipe as required to complete connections to existing pipe.
- C. Furnish and install test plugs as necessary to complete required acceptance tests.
  1. Test plugs shall be as recommended by pipe manufacturer.
  2. Be watertight against heads up to specified test pressures.

### 3.06 PIPE ANCHORS AND THRUST BLOCKS

- A. Conform to the dimensions and details shown in the drawings.
- B. Place pipe anchors and thrust blocks against unyielding, undisturbed earth or rock.
  1. Install pipe anchors at locations indicated on the drawings
  2. Install thrust blocks at tees, elbows, bends, and dead ends as required.

### 3.07 CORROSION PROTECTION



- A. Surface preparation and finish painting exposed interior and exterior ductile iron piping and fittings are specified in Section 099100.
- B. Polyethylene Encasement: All buried ductile iron pipe, fittings and specials shall be provided with at least on wrap of polyethylene encasement. Where ductile iron pipe is also encased in concrete the polyethylene encasement shall extend at least 5-feet into each end of the concrete encasement.

### 3.08 ACCEPTANCE TESTS

- A. Perform hydrostatic pressure and leakage tests on the full length of all pressure pipe installed.
  - 1. Conform with AWWA C600 procedures.
  - 2. Perform after backfilling.
- B. Test in progressive sections as determined by Contractor and approved by Engineer.
- C. Furnish water source and all facilities required to conduct tests including:
  - 1. Pumping equipment.
  - 2. Water meter.
  - 3. Temporary plugs.
  - 4. Anchors, braces and other devices required to withstand hydrostatic pressure on plugs.
- D. Limit fill rate of line to available venting capacity. Regulate fill rate to limit velocity in lines when flowing full to not more than 1/2 fps.
- E. Before applying the specified test pressure, air shall be completely expelled from the pipe line. If hydrants or blow-offs are not located at all high points, Contractor shall install saddle and corporation cocks at such high points so that the air can be expelled as the test section is filled with water.
- F. Conduct test at a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing subject to the following restrictions:
  - 1. Not less than 1.25 times the working pressure at the highest point along the test section.
  - 2. Not less than 150 psi.
  - 3. Be of at least 2-hour duration.
  - 4. Not vary by more than  $\pm 5$  psi for the duration of the test.
- G. Apply test pressure by means of a pump connected to the pipe in a manner satisfactory to the Engineer.
- H. Any exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the test for damage or defects.
- I. Conduct leakage test concurrently with the pressure test.
  - 1. Leakage is defined as the quantity of water that must be supplied into the test section to maintain the test pressure within  $\pm 5$  psi of the specified test pressure.
  - 2. Leakage shall not be measured by a drop in pressure in a test section over a period of time.
  - 3. Leakage measurement shall not be started until the system has stabilized and a constant test pressure is established.
  - 4. Leakage shall be measured by means of a suitable water meter installed in the pressure supply piping on the line side of the force pump or by drawing water from a container of known volume.
- J. Test section will be accepted if measured leakage does not exceed that determined by the

following formula:

$L = SD (P)^{1/2} / 133,200$ , in which  
L = maximum permissible leakage in gallons per hour  
S = length of pipe tested in feet  
D = nominal diameter of pipe being tested in inches  
P = average test pressure in psig

MAXIMUM ALLOWABLE LEAKAGE  
EXPRESSED IN GALLONS PER HOUR PER 1000 FEET OF PIPE LENGTH

Avg. Test Pressure (psig)	Nominal Pipe Diameter (inches)						
	2	4	6	8	10	12	14
100	0.15	0.30	0.45	0.60	0.75	0.90	1.05
125	0.17	0.34	0.50	0.67	0.84	1.01	1.18
150	0.18	0.37	0.55	0.74	0.92	1.10	1.29
175	0.20	0.40	0.59	0.80	0.99	1.19	1.39
200	0.21	0.43	0.64	0.85	1.06	1.28	1.49

- K. Repeat tests as necessary after location of leaks and repair or replacement of defective pipe, fittings, valves, hydrants and joints. All visible leaks shall be repaired regardless of the amount of leakage.

END OF SECTION

SECTION 334100  
STORM DRAINAGE PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes material and installation requirements for storm drainage piping and related appurtenances as shown on the drawings.
- B. Related Work:
  - 1. Section 312333 - Excavation and Backfilling for Utilities
  - 2. Section 313700 - Riprap
- C. References
  - 1. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM A48 - Standard Specification for Gray Iron Castings.
    - b. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
    - c. ASTM C94 - Specification for Ready-Mixed Concrete.
    - d. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants.
  - 2. Corps of Engineers:
    - a. CRD-C621 - Specification for Nonshrink Grout.
  - 3. Federal Specifications (FS):
    - a. FS SS-S-00210A - Sealing Compound, Preformed Plastic for Expansion Joints for Pipe Joints, Type 1, Rope Form.

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data:
  - 1. For pipe and fittings, manufacturer's data and drawings detailing the following:
    - a. Details of joint.
    - b. Gasket material.
    - c. Pipe length.
    - d. Details of fittings and couplings.
    - e. Details of protective coatings and linings.
  - 2. For precast concrete sections and related appurtenances: Manufacturer's drawings and product data.
- C. Material Certifications: For each product, certification from manufacturer that product conforms to the applicable requirements of the specified standard.

### 1.03 DELIVERY, STORAGE AND HANDLING

- A. Inspect all pipe, fittings, drainage structures and appurtenances delivered to job site for damage in transit.
  - 1. Do not unload damaged material except upon the instruction of the official freight agent.
  - 2. Promptly remove any damaged materials that are unloaded from the job site so that rejected material will not be mistakenly used in the Work.
- B. Handle pipe, fittings, drainage structures and appurtenances in a manner to ensure installation in sound and undamaged condition.
  - 1. Do not drop or bump.
  - 2. Use slings, lifting lugs, hooks and other devices designed to protect pipe, joint elements and coatings.
  - 3. Ship, move and store in a manner to prevent movement or shock contact with adjacent units.
- C. Store all pipe, fittings, drainage structures and appurtenances in suitable places as approved by the Engineer.
- D. Place pipe along the intended alignment of the trench with the bell ends facing the direction in which the work will proceed (upstream) unless otherwise directed.

### 1.04 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items Included: As indicated and required for a complete installation.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Pipe and Pipe Fittings: Schedule 40 PVC. Specified in Section 330518.
- B. Precast Concrete Junction Boxes:
  - 1. Circular reinforced concrete pipe shall conform to the requirements of ASTM C76. Strength class as indicated, but not less than Class 3, Wall B. See Detail C/C509.
  - 2. Concrete for poured-in-place base and invert shall conform to ASTM C94, minimum 4,000 psi compressive strength, air entrained.
  - 3. Joint sealant shall conform to ASTM C990 and FS SS-S-00210A. Cross sectional area as recommended by manufacturer.
  - 4. Iron castings shall conform to ASTM A48 Class 35B or better.
    - a. Specific pattern as noted on the drawings.
    - b. Frames and covers shall have machined horizontal bearing surfaces to provide even seating.
    - c. Stamped inscription consistent with intended use.
  - 5. Non-shrink grout: Factory pre-mixed, non-metallic grout complying with CRD-C621.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

#### A. Piping:

1. Utilize equipment, methods and materials ensuring installation to lines and grades indicated.
  - a. Maintain alignment and grade within a tolerance of  $\pm 1$  inch per 100 feet.
  - b. No more than one alignment or grade correction between adjacent structures will be permitted.
  - c. Do not lay on block supports unless pipe is to receive total concrete encasement.
  - d. If laser beam equipment is used, include provisions to prevent thermal deflection of the laser beam.
  - e. Obtain acceptance of method proposed for transfer of alignment and grade from control to the Work.
2. Install pipe of size, materials, strength class and joint type with embedment indicated for plan location.
3. Insofar as possible, commence laying at downstream end of line and install pipe with spigot ends in direction of flow.
4. Clean interior of all pipe, fittings and joints prior to installation. Prevent entrance of foreign matter during installation and when work is suspended or stopped.
  - a. Close open end of pipe with tight-fitting closure.
  - b. Do not allow water to fill trench. Prevent floatation if water prevention measures prove inadequate.
  - c. Remove water, mud and other undesirable material from trench before removing end closure.
5. Brace or anchor as required to prevent displacement after establishing final alignment and grade.
6. Perform only when weather and trench conditions are suitable. Do not lay in water.

#### B. Jointing:

1. Perform in accordance with pipe manufacturer's recommendations.
2. Clean and lubricate all joint and gasket surfaces with lubricant recommended by pipe manufacturer. Store joint lubricant in closed containers and keep clean.
3. Utilize methods and equipment capable of fully homing or making up joints without damage. Use timber header between pipe and pushing device.
4. Excavate bell holes at each joint to provide full length barrel support of the pipe and to prevent point loading at the bells.
5. Special Requirements for Solvent-Cemented Joints:
  - a. Joint preparation, cutting and jointing procedures shall comply with ASTM D2855.
  - b. chamfer or bevel pipe ends 10 to 15 degrees or as recommended by pipe manufacturer.
  - c. Block or restrain newly assembled joints to prevent movement during the setting time recommended by pipe manufacturer.

- d. Pressure testing of solvent welded piping systems shall not be performed until the applicable curing time, as set forth in Table X2.1 of ASTM D2855, has elapsed.

C. Cutting Pipe:

1. Cut in neat manner without damage to pipe.
2. Cut pipe by method recommended by pipe manufacturer.
3. Remove burrs and sharp edges and bevel or chamfer end of pipe.
4. Repair any damage to pipe lining and seal coat as required and approved.

D. Connections to Existing Storm Sewers and Structures:

1. Connect new pipe to existing pipe or structure as required or indicated.
2. Conform to Specifications regarding type of joints and pipe materials.
3. Connect new pipe to existing pipe with approved coupling designed and fabricated for intended purpose.
4. Prepare existing structure by core drilling an opening that will provide at least 3 inches clearance all around pipe to be installed.
5. Repair opening with non-shrink grout.

E. Temporary Plugs:

1. Furnish and install temporary plugs at contract separation points for removal by others to complete connection to piping laid under adjacent or future contract. Secure in place in a manner to facilitate removal when required to connect pipe.
2. Remove temporary plugs from pipe as required to complete connections to existing pipe.

### 3.02 PRECAST JUNCTION BOXES

A. Design and Manufacture:

1. RCP sections shall be used and shall conform to the dimensions and details shown in drawings and specified herein.
2. Base sections shall be provided with inverted u-shaped openings for connecting piping to be grouted in.

B. Construction:

1. Construct junction boxes on unyielding, undisturbed subgrade.
2. Set base sections on a leveling course of granular embedment material not less than 4" in thickness.
3. Construct inverts concurrently with poured-in-place base. Provide u-shaped invert channels having a minimum depth equal to 1/2 the connecting pipe diameter.
  - a. Make changes in flow direction with smooth curves of as large a radius as structure size permits.
  - b. Make changes in size and grade gradually and evenly.
4. Fill space between connecting pipes and structure wall with non-shrink grout.
5. Riser sections and castings shall be joined with a layer of joint sealant to obtain a pliable joint.

- a. Place joint sealant strips end to end. Do not overlap ends.
  - b. Joint surfaces shall be clean and dry.
6. All castings, frames and covers shall be set true to line and proper grade on a layer of joint sealant.

### 3.03 FIELD QUALITY CONTROL

#### A. Inspection and Rejection:

1. The quality of material, the process of manufacture and the finished precast drainage structures shall be subject to inspection and approval by the Engineer.
2. Structures 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:
  - a. Fractures or cracks passing through the structure wall.
  - b. Defects that indicate imperfect proportioning, mixing and molding.
  - c. Surface defects indicating honeycombed or open texture.
  - d. Damaged or cracked ends where such damage would prevent making a satisfactory joint.

### 3.04 ACCEPTANCE TESTS

#### A. Visual Inspection:

1. Contractor shall clean pipe of excess mortar, joint sealant and other dirt and debris prior to inspection.
2. Storm sewer shall be inspected by flashing a light between adjacent drainage.
3. Determine from illumination or by physical inspection:
  - a. The presence of any misaligned, displaced, or broken pipe.
  - b. The presence of visible infiltration or other defects.
4. Correct defects as required prior to conducting deflection tests.

END OF SECTION

SECTION 400559.13  
STOP GATES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers material and installation requirements for furnishing and installing stop gates for flow control. Principal components include the following:
  - 1. Guiderail.
  - 2. Slide.
  
- B. Related Work:
  - 1. Division 3 - Concrete
  
- C. References:
  - 1. American Society for Testing and Materials (ASTM).
    - a. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes
    - b. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications

1.02 SUBMITTALS

- A. Submit as specified in Section 013300. Include the following:
- B. Manufacturer's data and illustrations showing principal components and materials of construction.
- C. Installation instructions and drawings showing layout and anchorage of equipment and accessories.

1.03 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items included: As indicated and required for a complete installation.

PART 2 - PRODUCTS

2.01 STOP GATES

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide stop gates manufactured by one of the following:
  - 1. Waterman Industries, Inc.
  - 2. Golden Harvest, Inc.
  - 3. Northcoast Valve & Gate, Inc.
  - 4. Approved equal.
  
- B. Design and Construction Features:
  - 1. Provide embedded sides and face mounted bottom frame.
  - 2. Materials:
    - a. Frames and slides: Stainless steel, ASTM A276, Type 304 or 316.
    - b. Fasteners and anchor bolts: Stainless steel, ASTM A276, Type 304 or 316.
    - c. Flush bottom seals: Rubber, ASTM D2000 BC 610/615, or other suitable composition

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- for extended use in sanitary sewage.
- d. Finish: Standard mill finish on all stainless steel.
3. Fabrication:
- a. Shop fabrication of structural members shall be in accordance with the requirements of AWS D1.1 "Structural Welding Code - Steel".
  - b. All welded connections shall develop the full strength of the connected elements and all joined or lapped surfaces shall be completely seal welded with a minimum 3/16-inch fillet weld.
4. Guides: Gate frame shall be a rigid, welded unit with a clear opening the same size as the waterway, unless otherwise indicated.
- a. Construct of stainless-steel shapes.
  - b. Guide length as required.
  - c. Provide additional members as required for flush bottom closure.
5. Slide: Slide shall be plate, reinforced with structural shapes welded to the plate. Slide shall not deflect more than 1/360 of the span of the gate under maximum head.
6. Flush bottom closure: Equip gate with flush bottom seal arrangement.
- a. Provide resilient neoprene seal securely attached to the frame along the invert, extending to the depth of the guide groove.
5. Polymer seats: Equip gates with ultra-high molecular weight polymer seats which contact the slide face. Polymer bearing strips shall be mechanically retained to lock seat in place.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install stop gates as indicated and in accordance with manufacturer's recommendations.
- B. Provide all necessary materials, components, and adjustments as required for a complete installation.
- C. Coat all stainless-steel bolt and nut threads with a non-seizing compound prior to assembly.

END OF SECTION

SECTION 407113  
MAGNETIC FLOW METER

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers equipment, material and service requirements for furnishing, installing, and acceptance testing magnetic flow meter and appurtenances. The principal items shall include the following:
  - 1. Flow tube.
  - 2. Flow transmitter.
  - 3. Sensor and power cables.
- B. Related work:
  - 1. Section 330518 - Pressure Pipe and Fittings
  - 2. Division 26 - Electrical
- C. References:
  - 1. American National Standards Institute (ANSI).
    - a. ANSI B16.1 - Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Manufacturer's catalog data and illustrations showing principal dimensions, parts and materials. Include technical description and specifications.
- C. Corrosion protection system details.
- D. Application performance guarantee.
- E. Installation/operating instructions and service manuals for the specific equipment provided.

1.03 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Firms regularly engaged in the design and manufacture of electromagnetic flow meters and related appurtenances of size and type specified.
- B. Electromagnetic flow meter and related appurtenances shall be coordinated by a single source of supply and responsibility.

1.04 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items Included: As indicated and required for a complete installation.

PART 2 - PRODUCTS

2.01 MAGNETIC FLOW METER

A. Acceptable Manufacturers:

1. The Foxboro Company.
2. ABB, Inc.
3. Approved equal.

B. General:

1. Flow meter shall be of the electromagnetic type and provide for transmitting of flow in full pipes.
2. Flow meter shall operate by means of pulsed D.C. coil excitation and be auto-zeroing.
3. Flow meter shall be obstructionless and installed between two pipe flanges having the same nominal diameter as the flow meter end connections. Size as indicated on the drawings.
4. Capable of functioning over an ambient temperature range of -5° F to 120° F.
5. Capable of indicating and totalizing.
6. Provide relay outputs as required for alarm conditions, sampling or pulsing external devices.

C. Flow Tube:

1. Construct flow tube of type 304 stainless steel with carbon steel flanges conforming to ANSI B16.1 Class 125 standard and welded steel coil enclosure.
2. Provide Polyurethane or Neoprene liner.
3. Provide grounding by means of 316 stainless steel grounding electrodes or grounding rings.
4. Capable of indefinite submergence up to 30 feet without degradation.
5. Provide coal tar epoxy protective coating on sensor exterior, applied in accordance with the coating system manufacturer's recommendations.

D. Flow Transmitter:

1. Provide flow transmitter with all necessary circuitry to utilize the signal from the flow tube and produce a 4-20 mADC isolated output proportional to flow over a measurement range of 0 to 3.0 mgd.
2. Suitable for wall mounting as indicated.
3. Equip with an LCD display showing actual flow in GPM and totalized flow in gallons. Display shall also indicate settings and faults.
4. Provide with an automatic zero setting, an autorange function and low flow cut-off.
5. Capable of detecting the following fault conditions:
  - a. Loss of current to the coil.
  - b. Load on the current output.

E. Signal and Power Cables:

1. Shall be provided or approved by the flow meter manufacturer.

F. Operating Parameters:

1. Flow range: 80-125 gpm.
2. Flow signal shall be an isolated 4-20 mADC signal operating into a maximum of 850

- ohms. Accuracy shall be  $\pm 0.25\%$  of rate.
3. Low-flow cut-off 0 - 10% of maximum flow.
  4. Accuracy of unit shall be unaffected by temperature changes within the specified ambient temperature range.
  5. Unit shall operate on 115 VAC electric service.
  6. All user wiring connections shall be made via well-marked terminal blocks.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install flow tube and transmitter as indicated on the drawings and as recommended by the manufacturer. Maintain a minimum straight pipe length of 5 pipe diameters upstream and 3 pipe diameters downstream of flow tube.
- B. Make all electrical and control connections.
- C. Provide all necessary materials and components as required for a complete installation.

### 3.02 FIELD TESTING

- A. Manufacturer's Services:
  1. Provide equipment manufacturer's services at the job site to check installation, to perform initial start-up and operational test, and to instruct Owner's personnel in the proper operation and maintenance of the equipment. Coordinate with startup services for Submersible Sludge Pumps specified in Section 444629.13.
  2. Services to be performed by an authorized representative of the flow meter manufacturer.
- B. Operational Test:
  1. Prior to acceptance, an operational test of the flow meter shall be performed to determine if the installed equipment meets the purpose and intent of the specifications. Operational test shall demonstrate that the equipment is not electrically, mechanically, structurally, or otherwise defective; is in safe and satisfactory operating condition; and conforms with the specified operating conditions.
  2. Make all necessary equipment adjustments and corrective work indicated by tests. Repeat testing as necessary.
  3. Submit two copies of written report stating operations performed and results obtained.

END OF SECTION

SECTION 412223.16  
PORTABLE DAVIT CRANE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes requirements for providing a portable davit crane and accessories.
- B. Related Work:
  - 1. Section 444629.13 - Sludge Pumps (Submersible Type)

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Provide manufacturer's catalog data and illustrations showing materials of construction, principal dimensions and component parts.
- C. Manufacturer's operating instructions.

1.03 BASIS OF PAYMENT

- A. Measurement: Complete product is place per lump sum.
- B. Items Included: As indicated and required for a complete installation.

PART 2 - PRODUCTS

2.01 PORTABLE DAVIT CRANE

- A. Acceptable Manufacturers:
  - 1. Thern Commander 1000 Series Model 5PT10X-M2X
  - 2. L.K. Goodwin Company
  - 3. Oz Lifting ProductsTele-Pro
  - 4. Approved equal.
- B. Design and Construction Materials:
  - 1. Lifting capacity of 1200 pounds.
  - 2. Adjustable reach and height up to 66-inches and 85-inches, respectively.
  - 3. Adjustable boom angle with adjustment ratchet jack.
  - 4. Telescopic boom extension with quick-release pin.
  - 5. Quick connect inch mounting plate with clevis pin connection.
  - 6. Provide static hook connected to auxiliary attachment hole.
  - 7. Equip crane with rotation handle and roller/ball bearing at top of base for easy 360 degree rotation under load.
  - 8. Mast, boom and base epoxy finish for corrosion resistance.
  - 9. Stainless steel fasteners.
  - 10. Winch: Worm gear hand winch.
    - a. Totally enclosed gearing.
    - b. Automatic internal brake for positive load control.
    - c. Epoxy finish for corrosion resistance.

- d. Anchor hole in drum for securing cable anchor, allowing rapid attachment or removal of cable.
- C. Accessories:
- 1. Provide four (4) pedestal and one (1) wall mount base(s).
  - 2. Provide 20-foot length of 1/4 inch stainless steel wire rope assembly with swaged ball fitting and stainless-steel latch type hook.
  - 3. Provide drill kit for winch operation.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Mount crane bases with 316 stainless steel anchors, at locations indicated on the drawings.

END OF SECTION

SECTION 444413  
LIQUID CHEMICAL FEED EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes equipment, materials and service requirements for furnishing, installing and testing of chemical feed equipment and related appurtenances. The principal items to be provided include the following:
  - 1. Peristaltic metering pump.
  - 2. Suction strainer.
  - 3. Retractable injection quill.
  - 4. Wall bracket mounting system.
  - 5. Accessories and ancillary equipment.
- B. Related Work:
  - 1. Division 16 - Electrical
- C. References:
  - 1. American National Standards Institute (ANSI).
  - 2. National Science Foundation (NSF).

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Furnish manufacturer's catalog information and descriptive literature showing pump features, pump output data, materials of construction, principal dimensions and component parts.
- C. Furnish installation and operating instructions.

1.03 QUALITY ASSURANCE

- A. Pump models furnished under this specification shall be tested by Water Quality Association to conform to ANSI/NSF Standard 61.

1.04 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items included: As indicated and required for a complete installation.

PART 2 - PRODUCTS

2.01 PERISTALTIC METERING PUMP AND ACCESSORIES

- A. Acceptable Manufacturers:
  - 1. Stenner Pump Company
  - 2. Blue-White Industries
  - 3. Chem-Tech

4. Approved equal

B. Operational Requirements:

- 1. Application ..... Chemical Precipitation of Phosphorus
- 2. Chemical Solution ..... Ferric Chloride or Aluminum Sulfate
- 3. Number of Pumps ..... 2 (1-Duty & 1-Spare)
- 4. Pump Output ..... 8 gpd average and 40 gpd peak
- 5. Maximum Back Pressure ..... 25 psi
- 6. Maximum Suction Lift .....25 ft vertical lift, based on water

C. Design and Materials of Construction:

- 1. Pump shall be designed for external control via a 4-20 mA analog input signal for speed control.
- 2. Pump shall incorporate a digital keypad with menu driven software and backlit color LCD display that shows motor speed, input signal values, service and alarm status.
- 3. Motor speed adjustment range: 1.0% to 100% in 0.1% increments.
- 4. Motor:
  - a. Type ..... Variable speed DC
  - b. Duty Cycle..... Continuous
  - c. Voltage..... 115V, 60 Hz
- 5. Materials of construction:
  - a. All housings.....Polyester powder coated aluminum or Polycarbonate
  - b. Pump tube.....Compatible with specified chemical solution
  - c. All fasteners ..... Stainless steel
  - d. Suction strainer ..... Type 1 rigid PVC body & cap, NSF listed; ceramic weight
  - e. Retractable injection quill..... Type 316 stainless steel w/integral check valve
  - f. Wall mounting bracket/shelf.....Stainless steel including hardware
- 6. Pump accessories and ancillary items:
  - a. Three (3) each ..... Connecting nuts and ferrules
  - b. Two (2)..... Pump tube
  - c. Two (2)..... Suction strainer
  - d. Two (2)..... 80-foot roll suction/discharge tubing, 3/8-inch
  - e. One (1)..... Installation/operating manual

2.02 SPARE PARTS

A. Provide the following spare parts:

- 1. One (1) metering pump
- 2. One (1) .....metering pump accessory kit

B. Packaged for long term storage and properly labeled for easy identification.

2.03 ANCILLARY EQUIPMENT



A. Retractable Corporation Stop Injection Quill:

1. Quantity Required ..... Two (2)
2. Construction Features:
  - a. Lever operated brass corporation stop.
  - b. Protection chain to prevent withdrawals before Corporation Stop is closed.
  - c. Process Connection.....3/4 in. NPT
  - d. Inlet Connection .....1/2 in. NPT
  - e. Quill Material ..... Type 316 stainless steel

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install chemical metering pump equipment as indicated and required. Conform with manufacturer's instructions
- B. Provide all necessary materials and ancillary equipment as required for a complete installation.
- C. Make all piping connections.

3.02 FIELD SERVICES

- A. Provide equipment manufacturer's services at the jobsite to check installation, perform initial startup and testing, and instruct Owner's personnel in the operation and maintenance of the equipment.
- B. Calibrate and perform operational test of metering pump and controls to determine if installation meets the purpose and intent of the drawings and specifications. Test shall demonstrate that equipment is not electrically, mechanically, structurally or otherwise defective; is in safe and satisfactory operating condition; and conforms with specified operating characteristics.
- C. If any deficiencies are revealed during operational testing, such deficiencies shall be corrected, and the tests repeated.
- D. Submit two copies of written report stating operations performed and results obtained. ....

END OF SECTION

SECTION 444616  
SLUDGE DEWATERING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. This Section covers equipment, material and service requirements for furnishing and installing a sludge dewatering system that utilizes geotextile bags that fit into a solid waste roll-off container and produces a bagged residue suitable for sanitary landfill disposal. The principal components shall include, but not be limited to, the following:

1. Roll-off containers.
2. Geotextile bags and drainage mat assembly.
3. Polymer blending and injection system.
4. Sludge mixing manifold.
5. System electrical controls.

B. Related Work:

1. Section 444629.13 - Sludge Pumps (Submersible Type)
2. Section 445126.13 - Solid Waste Containers (Roll-Off Type)

C. References:

1. ASTM International (Formally American Society for Testing and Materials)
  - a. ASTM D4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc-Type Apparatus
  - b. ASTM D4491 - Standard Test Method for Water Permeability of Geotextiles by Permittivity
  - c. ASTM D4533 - Standard Test Method for Trapezoidal Tearing Strength of Geotextiles
  - d. ASTM D4595 - Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
  - e. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
  - f. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile
  - g. ASTM D4833 - Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
  - h. ASTM D6241 - Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe
2. National Electrical Manufacturer's Association (NEMA)

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Manufacturer's catalog data and illustrations showing materials of construction, principal dimensions, and component parts.
- C. Complete description of electrical system controls including:

1. Control panel layout and dimensioning.
2. Schematic diagram of control panel circuitry.
3. Component data sheets.
4. Narrative description of operation.

- D. Installation instructions and drawings showing layout, piping and mounting of equipment and appurtenances.
- E. Operating instructions and service manuals for the specific equipment provided.

### 1.03 QUALITY ASSURANCE

- A. The complete sludge dewatering package including principal components and ancillary appurtenances shall be coordinated by a single source of supply and responsibility (System Supplier).

### 1.04 BASIS OF PAYMENT

- A. Measurement: Complete system in place per lump sum.
- B. Items included: As indicated and required for a complete installation.

## PART 2 - PRODUCTS

### 2.01 GEOTEXTILE SLUDGE DEWATERING SYSTEM

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide geotextile sludge dewatering system as marketed by one of the following:
1. Blue River Technologies, Inc.
  2. Approved equal.
- B. Equipment named in Part 2.01 A.1. above was used as the basis for design. Any design changes and associated costs required to incorporate approved product substitutions into the Work shall be the responsibility of the Contractor.
- C. System Requirements: The system shall be capable of dewatering aerobically digested activated sludge having an initial solids content of 0.5% to 1.5% and produce a residue with little or no free water and capable of passing the EPA Paint Filter Test Method 9095b within seven (7) days following the final bag filling operation.

### 2.02 ROLL-OFF CONTAINERS

- A. Specified in Section 445126.13.

### 2.03 GEOTEXTILE BAGS

- A. Geotextile dewatering bags shall be constructed from woven polypropylene geotextile fabric conforming to the following.

Property	Test Method	Minimum Average Roll Value (MARV)		
		MD**	CD***	Units
Grab Tensile Strength*	ASTM D4632	600*	700	lbs

Grab Tensile Elongation*	ASTM D4632	20*	15	%
Wide Width Tensile Ultimate	ASTM D4595	400	600	lbs/in
Wide Width Elongation	ASTM D4595	17	13	%
Trapezoidal Tear	ASTM D4533	280	300	lbs
CBR Puncture*	ASTM D6241	2950*		lbs
Puncture	ASTM D4833	250		lbs
Permittivity	ASTM D4491	0.26		Sec <sup>-1</sup>
Apparent Opening Size (A.O.S.)	ASTM D4751	40		U.S. Sieve
UV Resistance (1200 hrs)	ASTM D4355	70		%
Water Flow Rate	ASTM D4491	20		gpm/sf

\* Typical value rather than MARV

\*\* Machine Direction

\*\*\* Cross Direction

B. Bag Construction:

1. Bags shall be sewn in a breadbox shape 22-feet long by 88-inches wide by 44-inches high. Bag seams shall be "J" style with a minimum of three (3) full length stitches with polyester thread type STC-1000/5#6.5.
2. Provide six (6) handling straps located at the top side seams, one at each corner and one at midpoint of each side. Straps shall be 1-inch-wide polypropylene.
3. Provide bags with fill-port located top center of bag. Construct fill-port of woven polyester fabric having a minimum tensile strength of 175 pounds in both directions. Fabric fill-port shall be sewn into a cylindrical shape large enough to pass a 6-inch PVC pipe to the inside of the bag and have a minimum length of 48-inches. Seam shall be "J" style with a minimum of two (2) full length stitches with a polyester thread type STC-1000/5#6.5. Attach fabric fill-port to the bag with a double stitch "J" style seam.

2.04 DRAINAGE MAT ASSEMBLY

- A. Specified in Section 445126.13.

2.05 POLYMER BLENDING AND INJECTION SYSTEM

- A. Subject to requirements, provide polymer dilution, blending and injection system as recommended by System Supplier.

B. System Requirements:

1. Provide integrated equipment package capable of automatically metering, diluting, aging, activating, and pumping a liquid polymer and water mixture to a sludge mixing manifold.
2. System shall be capable of blending neat polymer with dilution water at a rate of 5-15 gpm with a solution concentration up to 1.5% at 10 gpm.

C. Design and Construction Materials:

1. System shall be designed to mix a liquid polymer solution with water, automatically produce

- a diluted and aged polymer solution and convey the solution to the application point.
2. Provide an integrated package, pre-piped and pre-wired.
  3. Primary mixing energy shall be provided by a high energy hydraulic mixing head for initial dispersion and dilution of the neat polymer with dilution water followed by a secondary static mixer for additional mixing.
  4. Mixing head and static mixer housing shall be transparent PVC, capable of 100 psi working pressure. All polymer wetted parts of plastic or stainless steel.
  5. Equip system with the following equipment and features:
    - a. Peristaltic metering pump capable of handling viscosities up to 12,000 Centipoise. Equal to Blue-White® Flex-Pro® Model A2.
    - b. Check valve in polymer feed line between the metering pump and water line. Equal to Swagelok CH Series.
    - c. Electrically operated solenoid valve for on/off control of dilution water supply.
    - d. Stainless steel liquid-filled pressure gage, 0-50 psi, on water supply line between the electric solenoid valve and primary mixing head.
    - e. Calibration column and valve assembly.
    - f. 1-inch FNPT water inlet and solution out connections with stainless steel cam-lock couplings.
  6. Provide polypropylene or stainless-steel frame/base assembly with shelf and wall brackets for mounting of all components. Arrange components in such a manner to provide unobstructed access for servicing.
  7. Provide 1-inch I.D. PVC braided hose at least 5-feet in length to deliver water to the polymer blending system. Include 1-inch female cam-lock coupling on inlet end and 1-inch male cam-lock adapter on discharge end. Cam-lock fittings to be stainless steel.
  8. Provide 1-inch I.D. PVC braided hose at least 50-feet in length to deliver the water/polymer solution to the sludge mixing manifold. Include 1-inch male cam-lock adapter on inlet end and 1-inch female cam-lock coupling on discharge end. Cam-lock fittings to be stainless steel.

## 2.06 SYSTEM ELECTRICAL CONTROLS

- A. Provide NEMA 4X electrical control panel complete with all necessary control components to permit manual operation of the polymer blending and injection system.
- B. Equip panel with the following devices and functions:
  1. Terminal block for 115-volt, 60 Hz power supply sized for #12 AWG wire.
  2. Fused main power "On-Off" switch with indicator light.
  3. Two-pole "Run-Off" switch with indicator light to start Polymer metering pump and open solenoid valve on dilution water supply line.
  4. Time delay relay to allow the solenoid valve to remain open so dilution water continues to flow for a timed period to flush out the mixing head and piping.
    - a. Solid state plug-in type.
    - b. Adjustable timing range.
    - c. Up to 60 seconds off-delay.
  5. Receptacle for metering pump.
  6. Engraved bolted-on nameplates for all functions.

## 2.07 SLUDGE MIXING MANIFOLD

- A. Mixing Tube: Provide floc mixing tube (static mixer) to mix the prepared flocculant solution with the sludge stream to cause the solids to separate from the water and coagulate into clumps.
  - 1. Mixing tube shall be a non-clogging design that will pass a 2-inch solid.
  - 2. Mixing tube shall be fabricated from 4-inch Sch 80 clear PVC with flanged end connections and incorporate a series of at least five (5) sets of stainless-steel mixing elements arranged in such a way to reverse the rotational direction of flow at each set to blend the sludge with the flocculant.
- B. Injection Quill: Provide 1-inch AISI Type 316 stainless steel MNPT injection quill on the mixing manifold immediately upstream of the floc mixing tube to introduce the flocculant. Include a 1-inch built-in stainless steel check valve to prevent back flow into the flocculant injection line and 1-inch cam-lock adapter for connection of the braided hose specified in Part 2.05 C.8.
- C. Sampling Valve: Provide 2-inch PVC ball valve on the discharge end of the mixing manifold to permit collection of sludge samples to verify proper flocculation. Full port with Viton O-rings, Teflon seats, and socket end connections.

## 2.08 SLUDGE FILL TUBE ASSEMBLY

- A. Provide 4-inch diameter fill tube assembly to direct flow from the sludge mixing manifold into the geotextile bag as indicated in Detail 2/C506. Include all necessary components including, but not limited to, the following:
  - 1. PVC lay flat hose.
  - 2. Polypropylene cam-lock couplings and adapters.
  - 3. Schedule 80 PVC fill tube.

## 2.09 SPARE PARTS AND SUPPLIES

- A. Provide the following spare parts and supplies:
  - 1. Ten (10) geotextile bags.
  - 2. One (1) metering pump service kit.
  - 3. Four (4) 5-gallon pails recommended polymer.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install sludge dewatering system as indicated on the drawings and in accordance with System Supplier's recommendations.
- B. Make all piping connections.
- C. Make all electrical and control connections.
- D. Provide all necessary materials and components as required for a complete installation.

### 3.02 FIELD TESTING

- A. System Supplier's Services:
  - 1. Provide system Supplier's services at the job site to supervise installation, to perform initial start-up and operational test, and to instruct Owner's personnel in the proper operation and maintenance of the system.

2. Services to be performed by an authorized representative of the System Supplier.
3. Coordinate with start-up services for Submersible Pump specified in Section 444629.13.

B. Operational Test:

1. Prior to acceptance, an operational test of sludge dewatering system shall be performed to determine if the system meets the purpose and intent of the specifications. Operational test shall demonstrate that the system is not structurally, mechanically, electrically or otherwise defective; is in safe and satisfactory operating condition; and conforms with the specified requirements.
2. Make all necessary adjustments and corrective work indicated by tests. Repeat testing as necessary.
3. Submit two copies of written report stating operations performed and results obtained.

END OF SECTION

SECTION 444629.13  
SLUDGE PUMP (Submersible Type)

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section covers equipment, material, and service requirements for furnishing and installing submersible sewage pump and related appurtenances. The principal items shall include, but not be limited to the following:
1. Submersible centrifugal pump.
  2. Pump discharge elbow.
  3. Guide rail system.
  4. Motor control panel.
- B. Related Work:
1. Section 444616 - Sludge Dewatering Equipment
  2. Section 330516 - Pressure Pipe and Fittings
  3. Division 26 - Electrical
- C. References:
1. American National Standards Institute (ANSI):
    - a. ANSI B16.1 - Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
  2. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM A48 - Standard Specification for Gray Iron Castings
  3. National Electrical Code (NEC).
  4. National Electrical Manufacturer's Association (NEMA).
  5. Underwriter's Laboratories, Inc. (UL).

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Manufacturer's catalog data and illustrations showing principal dimensions, parts, and materials.
1. Pump performance curves showing:
    - a. Capacity in gpm.
    - b. Total developed head.
    - c. Required brake horsepower.
    - d. Pump efficiency.
    - e. Required NPSH.
    - f. Minimum recommended submergence.
  2. Complete submersible motor nameplate data.
  3. Corrosion protection system details.
- C. Complete description of motor control panel including:



1. Control panel layout and dimensioning.
2. Schematic diagram of control panel circuitry.
3. Component data sheets.
4. Narrative description of operation.

- D. Installation instructions and drawings showing layout and anchorage of equipment and appurtenances.
- E. Operating instructions and service manuals for the specific equipment provided.

### 1.03 QUALITY ASSURANCE

- A. Pumps and related appurtenances shall be coordinated by a single source of supply and responsibility.

### 1.04 BASIS OF PAYMENT

- A. Measurement: Complete product in place per Lump Sum.
- B. Items included: As indicated and required for a complete installation.

## PART 2 - PRODUCTS

### 2.01 SUBMERSIBLE NON-CLOG PUMP

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide submersible pumps and accessories as manufactured by one of the following:

1. F. E. Myers
2. ITT Flygt
3. Homa Pump Technology
4. Approved equal.

- B. Equipment named in Part 2.01 A.1. above was used as the basis for design. Any design changes and associated costs required to incorporate other named manufacturer's equipment or approved substitute into the Work shall be the responsibility of the Contractor.

- C. Operational Requirements:

1. Select pumps in accordance with the following design requirements:

- a. Design Pumping Rate ..... 100 gpm
- b. Static Head ..... 15.8 ft
- c. Friction Head..... 2.4 ft
- d. Total Dynamic Head (TDH) ..... 18.2 ft
- e. Maximum Speed ..... 1,200 rpm
- f. Maximum Motor Size ..... 3 hp
- g. Electric Service ..... 3-phase, 115/208V, 60 Hz
- h. Operating Range ..... 80 gpm @ 22.1 ft TDH to 125 gpm @ 14.7 ft TDH
- i. Number of Pumps ..... 2 (1-Duty & 1-Spare)

2. Pumps shall be designed to handle raw, unscreened sewage and wastewater, waste activated sludge up to 2% solids concentration, and be capable of passing 3-inch spherical solids.
3. Pumps shall be non-overloading throughout the specified operating range without employing the motor service factor.

- D. Design and Construction Materials:

1. Pumps shall be centrifugal, non-clog, solids handling, submersible, wastewater type.

- Pumps shall be automatically connected to the discharge piping when lowered into place on a guide rail system, requiring no bolts, nuts or fasteners to effect sealing to the discharge connection.
2. Major pump components including motor housing, pump casing, and impeller shall be constructed of cast iron conforming to ASTM A48, Class 30, 35B or Class 40. Castings shall have smooth surfaces devoid of blow holes or other casting irregularities.
  3. All mating surfaces of major components shall be machined and fitted with Nitrile or Viton rubber O-rings where watertight sealing is required.
  4. All exposed bolts and nuts shall be 300 series stainless steel.
  5. Casing:
    - a. End suction volute type with centerline discharge and flat face flange. Flange shall conform to ANSI B16.1, Class 125.
    - b. Provide bronze or stainless-steel replaceable wear ring if equipped with enclosed type impeller.
  6. Impeller:
    - a. May be two or three vane non-clog enclosed type, or vortex type. Provide vortex type for sludge pumping applications.
    - b. Provided with pump out vanes on backside to prevent solids from accumulating in the seal area.
    - c. Balanced statically and dynamically to eliminate vibration and minimize hydraulic end thrust.
    - d. Slip fit to a tapered shaft and key driven. Secured to shaft with 300 series stainless steel washer and bolt.
  7. Bearings and Shaft:
    - a. Pump shaft shall be machined and polished, solid stainless steel and rotate on two permanently lubricated bearings.
    - b. Bearings shall be rated for a minimum B-10 life of 40,000 hours.
  8. Shaft Seal:
    - a. Shall be tandem mechanical seals located in an oil filled seal chamber. Each seal interface shall be held in contact by its own spring system.
    - b. Upper seal faces shall be made of tungsten carbide versus carbon, or carbon versus ceramic.
    - c. Lower seal faces shall be made of tungsten carbide, silicon carbide or silicon carbide versus tungsten carbide.
    - d. The seal assembly shall not require routine maintenance or adjustment.
    - e. All mechanical seal hardware shall be stainless steel.
  9. Seal Failure Detection System: Provide a moisture detection system to indicate seal failure or potential seal failure.
    - a. System will incorporate control panel components and either capacitance probe(s) mounted in the seal chamber, or electrical sensors and/or float switches mounted in the motor housing.
    - b. When moisture is detected, the system will signal the control panel components and activate a seal failure alarm. Systems with sensors and/or float switches located in the motor housing shall also shut down the pump.
  10. Motors: Motors shall be squirrel-cage induction, shell type design, housed in a watertight chamber, NEMA B type, connected for indicated electric service, and suitable for use in NEC Class 1, Division 1, Group C and D hazardous locations.

- a. Motor shall be designed for continuous duty while operating in a liquid temperature up to 104° F, and capable of up to 10 evenly spaced starts per hour.
- b. Stator windings and leads shall be insulated with moisture resistant Class F insulation rated for 155° C.
- c. Combined service factor (combined effect of voltage frequency and specific gravity) shall be a minimum of 1.15.
- d. Motors shall be equipped with thermal protectors attached to or embedded in the motor windings and connected in series. These thermal protectors shall be used in conjunction with external thermal overload protection and shall be connected to the control panel. The tripping of any one protector will shut down the motor and activate an alarm. The thermal protectors shall automatically reset once the stator temperature returns to normal.

11. Cables:

- a. Power and control cables shall be SOW type construction suitable for use in sewage. Sizing shall conform to NEC.
- b. Provide power and control cables which are sealed at the motor and continuous from the motor to the control panel or intermediate junction box as indicated on the drawings.
- c. The cable entry seal design shall preclude specific torque requirements to require a watertight and submersible seal.
- d. Strain relief shall be provided at each cable entry into the pump.

12. Corrosion protection:

- a. Pumps shall be shop painted after assembly for corrosion protection.
- b. Pump manufacturer's standard coating system will be acceptable, provided it is suitable for the service intended.
- c. Submit details of proposed coating system with compliance submittal drawings and data.

2.02 PUMP ACCESSORIES

A. Pump Discharge Connection:

- 1. Designed to permit removal and installation of pump without the need for personnel to enter the wet well.
- 2. Permanently anchored to wet well floor.
- 3. Pump shall be automatically and firmly connected to the discharge connection elbow when lowered into place. No portion of the pump shall bear directly on the wet well floor.
- 4. Quick disconnect connection shall provide leak-proof seal at all operating pressures.
- 5. Flanges shall conform to ANSI B16.1, Class 125.
- 6. All exposed hardware shall be 300 series stainless steel.
- 7. Provide corrosion protection as specified in PART 2.01 C.12.

B. Guide Rail System:

- 1. Two rail system designed to guide the pump from the surface to the discharge connection. Weight of pump shall bear solely on discharge base and not the guide rails.
- 2. Guide rails shall be Schedule 40 stainless steel pipe, sized per pump manufacturer's recommendations.
- 3. Guide rails shall mount directly to the discharge connection at the wet well floor and to a guide rail bracket at the top of the wet well. Intermediate guide brackets shall be provided for rail lengths over 15 feet.
- 4. Brackets and hardware shall be 300 series stainless steel.

C. Pump Lifting Chain/Cable

1. Provide positive recovery system for each pump consisting of an adequate length of stainless-steel chain attached to pump lifting bail extending to the top of the structure, and a cast stainless steel lifting cog provided separately for connection to the lifting chain and pump lifting device. Equal to KJI Hydro's "Smart Lift".
2. Designed to raise and lower pump with additional safety factor for overcoming force of pump hang-ups.
3. Provide stainless steel hook for chain when not in use.

D. Power and Control Cable Bracket:

1. Provide bracket and grip holders for power and control cables.
2. Designed to permit easy adjustment of cables without splices.
3. All 300 series stainless steel construction, including bracket and mounting hardware.

## 2.03 CONTROLS

A. Pump control panel shall be manufactured by a UL panel builder and the assembly shall bear a serialized UL label for "Enclosed Industrial Control Panels".

B. Control panel shall be provided by the pump supplier.

C. Control Logic:

1. Control system shall provide for manual starting and stopping of pump motor and include provisions for manual adjustment of speed.
2. The following conditions will cause an alarm which will be indicated on the enclosure door.

a. Seal Failure

D. Panel Enclosure:

1. Shall be NEMA 4 stainless steel, suitable for wall mounting as indicated. Enclosure door shall be hinged with a continuous stainless steel hinge pin and secured with fast-operating clamp assembly.
2. Specified operator controls and instruments shall be accessible without opening the panel door. Include bolted-on engraved name plates indicating functions of all operating controls and instruments.
3. Provide removable back panel of 14-gauge steel with white enamel finish attached to enclosure with collar studs, to accommodate specified control components. Mount components securely to back panel utilizing screws and washers. Tap back panel to accept mounting screws. Do not use self-tapping screws to mount any components.

E. Panel shall be equipped with the following devices and features, logically arranged with separate power and control sections. Conform to applicable requirements of Sections 260500 and 262816, except as modified herein.

1. Circuit Breakers:

- a. Provide properly sized heavy duty thermal-magnetic trip circuit breakers for branch circuit disconnect service and short circuit protection of all motor, control and auxiliary circuits.
- b. Circuit breaker operating handles shall be operable without opening the panel door.

2. Motor Starter:

- a. Provide properly sized UL rated adjustable frequency drive (ADF) designed for variable

torque centrifugal pump applications. Drive to be 3-contactor style to allow motor operation from either the drive or across-the-line. Equal to Schneider Electric Altivar 61.

3. Phase Monitor:
  - a. Equip panel to monitor incoming power and shut down pump when required to protect motor from damage caused by phase reversal, phase loss and voltage imbalance.
  - b. Motor shall automatically restart when power conditions return to normal.
4. Control Power Transformer: Required for 3 phase, 3-wire incoming power supplies only.
  - a. Open core and coil type, fused primary and secondary.
  - b. Properly sized for connected load, 3 KVA minimum.
  - c. External mount to prevent excessive heat in panel enclosure.
5. Ventilation:
  - a. Equip panel with intake and exhaust louvers and fan to minimize effects of excessive heating.
  - b. Louver positions and fan size as recommended by control panel manufacturer.
6. Pump Selection Mode:
  - a. Provide UL rated, heavy duty, oil-tight "Off-On" selector switch for each motor.
  - b. "On" position not to override motor overload shutdown.
  - c. Provide device to permit manual adjustment of motor speed.
7. Elapsed Time Meter:
  - a. Equip panel with elapsed time meter for each pump motor.
  - b. Connect to each motor starter to indicate total running time.
  - c. Six-digit, non-resettable type reading in hours and tenths of hours.
  - d. Mount in inner panel swing door.
8. Pilot Lights: Equip panel with UL rated, heavy duty, oil-tight pilot light indicators for each pump as follows:
  - a. Run, green light.
  - b. Off, Red light.
  - c. Seal Failure, amber light.
9. Lugs and Terminal Blocks:
  - a. Provide tin- or silver-plated copper lugs for connection of incoming power supply and pump power leads.
  - b. Provide terminal blocks suitable for use with locking fork or ring tongue connectors for control inputs/outputs.
  - c. Mount lugs and terminal blocks to allow wire bending space in accordance with NEC.
  - d. Locate such that no field wiring will cross factory wiring.
10. Wiring:
  - a. Control panel shall be completely factory wired, except for field connections. All wiring, workmanship, and schematic wiring diagrams shall conform to applicable NEC standards.
  - b. All user serviceable wiring shall be type THHN/THWN, 600 volts, stranded copper, color coded as follows:

- 1) Line and Load Circuits, AC or DC power ..... Black
- 2) AC Control Circuits Less Than Line Voltage..... Red
- 3) DC Control Circuits..... Blue
- 4) Equipment Grounding Conductor..... Green
- 5) Current Carrying Ground..... White
- 6) Hot with Circuit Breaker Open..... Orange

c. Wire Identification and Sizing:

- 1) Control circuit wiring inside panel, except internal wiring of individual components, shall be 14 gauge minimum. Power wiring shall be 12 gauge minimum.
- 2) Wires shall be clearly numbered at each end in accordance with the schematic wiring diagram.

d. Wire Bundles:

- 1) All internal wiring shall be neatly routed in bundles and tied in accordance with good commercial practice.
- 2) Bundles routed to components mounted on inner swing panel shall be made flexible at the hinged side. Provide adequate length and flex to allow swing panel to fully open without undue stress or abrasion on the wire or insulation. Secure bundles in place on each side of hinge with mechanical fastening devices.

e. Schematic Wiring Diagrams:

- 1) Provide a laminated electrical schematic diagram of the pump controls including terminal block connections.
- 2) Permanently mount on the inside of the enclosure door.

## 2.04 SPARE PARTS

A. Provide the following spare parts:

1. Two Mechanical Seal Assemblies
2. Two Casing Wear Rings
3. Two Discharge Connection O-ring Seals (As Applicable)
4. One Control Relay (Each Type Used)

B. Packaged for long term storage and properly labeled for easy identification.

## PART 3 - EXECUTION

### 3.01 EQUIPMENT INSTALLATION

- A. Pumping equipment and appurtenances shall be installed as indicated and in accordance with the manufacturer's written instructions.
- B. Provide all necessary materials, components, and adjustments as required for a complete and operating pumping system.
- C. Make all electrical and control connections.
- D. Provide all necessary lubrication for initial start-up, testing, and as required for successful operation.

### 3.02 FIELD TESTING

A. Manufacturer's Services:

1. Provide equipment manufacturer's services at the jobsite to check installation, to perform initial start-up and operational test, and to instruct Owner's personnel in the proper operation and maintenance of the equipment.
2. Services to be performed by an authorized representative of the pump manufacturer.
3. Coordinate with startup services for Sludge Dewatering System. See Section 444616.

B. Operational Test:

1. Prior to acceptance, an operational test of all pumps and control systems shall be performed to determine if the installed equipment meets the purpose and intent of the specifications. Operational test shall demonstrate that the equipment is not electrically, mechanically, structurally, or otherwise defective; is in safe and satisfactory operating condition; and conforms with the specified operating conditions.
2. Prior to applying electrical power to any motor driven equipment, the drive train shall be rotated by hand to demonstrate free operation of all mechanical parts.
3. Operational test shall include checks for excessive vibration, leaks in all piping and seals, correct operation of control systems and equipment, proper alignment, and excessive noise levels.
4. Check motors for proper voltage and running amperage.
5. Make all necessary equipment adjustments and corrective work indicated by tests. Repeat testing as necessary.
6. Submit two copies of written report stating operations performed and results obtained.

END OF SECTION

SECTION 445126.13  
SOLID WASTE CONTAINERS (ROLL-OFF TYPE)

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes material, fabrication, and customization requirements for roll-off type solid waste containers to be used in a geotextile sludge dewatering process. The principal items shall include, but not be limited to the following:
1. Rectangular roll-off containers.
  2. Drainage mat assembly.
  3. Tarpaulin cover kit.
- B. Related Work:
1. Section 099100 - Painting
  2. Section 444616 - Sludge Dewatering System
- C. References:
1. American Steel and Iron Institute (AISI).
  2. ASTM International (Formerly American Society for Testing and Materials):
    - a. ASTM A36 - Specification for Structural Steel
    - b. ASTM D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique
    - c. ASTM D4218 - Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
    - d. ASTM D4716 - Standard Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
    - e. ASTM D5199 - Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
    - f. ASTM D7179 - Standard Test Method for Determining Geonet Breaking Force
  3. American Welding Society (AWS):
    - a. AWS D1.1 - Structural Welding Code - Steel
  4. Occupational Health and Safety Administration (OSHA).

1.02 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Include manufacturer's product data and illustrations showing materials of construction, principal dimensions, and component parts.
- C. Provide Certifications that welders have satisfactorily passed qualification tests in accordance with AWS D1.1.
- D. Include details for corrosion protection system.

1.03 QUALITY ASSURANCE



- A. Roll-off containers shall be provided by or coordinated with and approved by the Sludge Dewatering System Supplier. See Section 444616.

#### 1.04 BASIS OF PAYMENT

- A. Measurement: Complete product in place per lump sum.
- B. Items included: As indicated and required for a complete installation.

### PART 2 - PRODUCTS

#### 2.01 ROLL-OFF CONTAINERS

##### A. Design Requirements:

1. Provide heavy duty rectangular containers meeting ANSI safety specifications and dimensional standards for local haulers.
2. Number of containers required: Two (2)
3. Container capacity: 30 cubic yards
4. Provide containers with the following design features:
  - a. Heavy-duty, greaseable, fully welded wheel assemblies.
  - b. Greaseable wheel rollers.
  - c. Gussets welded to floor and cross members.
  - d. Front sheet bent 90 degrees to allow for overlap on side wall, for extra strength to seam.
  - e. V-notched weep hole at bottom of each side post to allow for drainage.
  - f. Gusseted front corners for extra strength.
  - g. Rugged tarpaulin hooks on front and door, hooks or tie down rail on sides.
  - h. Mitered corners to protect tarpaulins.
  - i. OSHA compliant ladder.
  - j. Safety chain with hook to hold door open.
  - k. Wheel lock bars.
  - l. Box type for hookup to truck: Cable or universal.

##### B. Materials of Construction: Carbon Steel Shapes and Plates conforming to ASTM A36.

1. Floor: 1/4-inch plate.
2. Main rails: One piece 6" × 2" × 1/4" structural tube, no splits or joints.
3. Cross members: 3" structural channel on 18" centers.
4. Sides: 12-gauge sheet.
5. Top rails: 3" × 3" structural tubing.
6. Side posts: 3" × 5" structural tubing on 24" centers.
7. Hook/Hook Plate: 1-1/4" Hi-Tensile steel, inserted through 1" hook plate, locked-in and full welded both sides. Hook and hook plate shall carry a Lifetime Guarantee.
8. Wheels: Four (4)-8" diameter × 10" long, heavy duty construction.
9. Rail Rollers: 4" diameter × 6" long with grease fitting.
10. Door: 12-gauge sheet with four (4) horizontal and two (2) vertical 3" × 5" structural tubes, no splits or joints.
11. Latches: Standard slam latch with heavy-duty handle that allows easy door closure by a single operator.
12. Hinges: Heavy-duty greaseable hinges with 1/2" plate and 1-1/4" O.D. × 1-1/8" I.D. round

tube for 1-3/32" pin.

C. Shop Surface Preparation and Painting: Conform to applicable provisions of Section 099100 and the following:

1. Exterior and Interior Surfaces:

- a. Surface Preparation: Solvent-cleaned per SSPC-SP1 followed by commercial blast cleaning per SSPC-SP6.
- b. Prime Coat: Polyamide Epoxy, 3 to 5 mils dry film thickness.
- c. Finish coat: Aliphatic Acrylic Polyurethane, applied to a minimum dry film thickness of 3 to 5 mils, for a total dry film thickness of 6 to 10 mils.

2. Container Bottom: Coated with automotive under-seal.

2.02 DRAINAGE MAT ASSEMBLY

A. Drain Piping: Corrugated dual wall (smooth inner surface) 4" HDPE pipe with slotted perforations equal to ADS N-12.

B. Drainage Netting: Synthetic geonet material manufactured from a premium grade HDPE resin conforming to the following:

Property	Test Method	Frequency	Minimum Average Roll Value (MARV)
Geonet Thickness	ASTM D5199	1/50,000 ft <sup>2</sup>	200 mil
Transmissivity	ASTM D4716	1/540,000 ft <sup>2</sup>	9.6 gal/min/ft
Density	ASTM D1505	1/50,000 ft <sup>2</sup>	0.94 gm/cm <sup>3</sup>
Tensile Strength (MD)	ASTM D7179	1/50,000 ft <sup>2</sup>	45 lb/in
Carbon Black Content	ASTM D4218	1/50,000 ft <sup>2</sup>	2.0 %
Nominal Roll Width			15 ft
Nominal Roll Length			330 ft
Nominal Roll Area			4,950 ft <sup>2</sup>

C. Drainage Mat Installation:

1. Install drainage netting down the front and both sidewalls of the container interior.
2. Secure the netting to the front and sidewalls at top, midpoint and bottom with 2" x 1/4" aluminum bars, 15-18" long, spaced on maximum 4'-0" centers using 3/8" diameter carriage bolts and wingnuts.
3. Cover bottom of roll-off container with a "drainage mattress" comprised of 4" corrugated drainpipes placed side by side running lengthwise, encased in a geotextile bag, terminating 6-10" from the end of the roll-off.
4. Drainage mattress geotextile bag shall have a different weave than the geotextile sludge bag specified in Section 44416 Part 2.03 to prevent the two fabrics from locking together as the sludge bag slides out of the roll-off container when dumping.

5. Provide a minimum of four (4) - 3" x 2" x 1/4" x 12" long steel angle backstops with long leg bolted to container floor using 1/2" diameter bolts to prevent the drainage mattress from being pulled out of the container when the sludge bag is dumped.
6. Provide 3" x 1/4" steel and 2" x 1/4" aluminum clamp bars bolted to the steel angle backstops using 1/2" diameter bolts and securely clamp the back of the mattress bag between the two clamp bars using 3/8" diameter carriage bolts and wingnuts.
7. All hardware AISI Type 316 stainless steel. Provide insulating washers where necessary to separate dissimilar metals.

### 2.03 TARPAULIN COVER KIT

- A. Provide hand-thrown type tarpaulin system.
  1. Material: 22-ounce Vinyl, waterproof and fire retardant.
  2. Reinforced webbing and brass grommets every 24" on all edges.
  3. Secured to container using bungee straps.
- B. Provide rib kit for extra protection against heavy rain and snow.
  1. Rib and bracket system shall be quick to assemble and install.
  2. Designed to be completely portable from one container to another.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install roll-off containers as indicated on the drawings and in accordance with System Supplier's recommendations.
- B. Provide all necessary materials and components as required for a complete installation.
- C. Perform operational test as specified in Section 444616.

END OF SECTION

**APPENDIX 1**  
**HAZARDOUS MATERIALS SURVEY**



ENVIRONMENTAL WORKS

## Hazardous Materials Survey

**Ozarks Correction Center Dewatering Building  
929 Honor Camp Road  
Fordland, Webster County, Missouri**

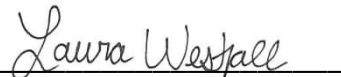
**Prepared For:**  
White River Engineering  
Springfield, Missouri

**Submitted By:**  
Environmental Works, Inc.  
Springfield, Missouri

EWI Project #191250, A1

August 14, 2019

Prepared by:



Ms. Laura Westfall  
Associate Scientist  
MoDNR Asbestos Inspector  
MoDNR Lead-Based Paint Inspector

Reviewed by:



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## **1.0 INTRODUCTION**

Environmental Works, Inc. (EWI) performed a Hazardous Materials Survey on the Ozarks Correctional Center Dewatering Building located at 929 Honor Camp Road in Fordland, Webster County, Missouri (subject property or Site). The Hazardous Materials Survey included an asbestos inspection and lead-based paint (LBP) survey. Ms. Laura Westfall of EWI conducted the survey activities on July 10, 2019.

### **1.1 Survey Objectives**

The purpose of the survey was to determine the presence, location, condition, and quantity of asbestos containing materials (ACM) and LBP within the building, so that they can be managed properly during daily activities and future demolition activities. The asbestos survey was conducted in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations by a State of Missouri licensed inspector. The LBP survey was conducted generally in accordance with the procedures specified in the Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing by a State of Missouri licensed Lead Inspector.

### **1.2 Building Description**

The subject property consists of a one story dewatering building. The building consists of concrete masonry unit (CMU) block walls, concrete floor, drywall ceiling and shingled roof.

### **1.3 Previous Reports and Documentation**

Prior to conducting the inspection, EWI requested documentation of previous inspections, sampling, or abatement activities conducted at the Site. No records were available for review.



## 2.0 ASBESTOS SURVEY

The inspection was completed by a State of Missouri licensed and Asbestos Hazard Emergency Response Act (AHERA) accredited inspector. Copies of the inspector's licenses are provided in Appendix A. The inspection was conducted following the US Environmental Protection Agency (US EPA) NESHAP and Missouri Department of Natural Resources (MoDNR) standards and asbestos requirements for inspections.

### 2.1 Purpose

The air toxics provisions of the Clean Air Act (CAA) require US EPA to develop and enforce regulations to protect the public from exposure to airborne contaminants that are known to be hazardous to human health. In accordance with Section 112 of the CAA, US EPA established the Asbestos NESHAP (40 CFR Part 61, Subpart M) to include specific compounds or hazardous air pollutants (HAP) that are known or suspected to cause cancer or other serious health effects. Asbestos was one of the first HAPs regulated under the air toxics program and were amended to cross-reference citations to US Occupational Safety and Health Administration (US OSHA), US Department of Transportation (US DOT) and US EPA requirements for disposal of asbestos waste.

NESHAP regulations require a thorough inspection where demolition or renovation operation will occur and the owner or operator of a commercial building to notify the regulatory authority before permanent removal (abatement) of certain thresholds and types of regulated asbestos-containing materials (RACM). The MoDNR is delegated authority by US EPA to regulate and enforce renovation and demolition projects involving RACM. The US EPA and MoDNR require a thorough inspection of all regulated structures that will be subject to renovation or demolition by a Missouri certified asbestos inspector to determine if any ACMs are present. Additionally, the US EPA requires building inspectors be accredited under the AHERA.

US EPA and MoDNR define ACM as any material containing more than 1% asbestos. Materials containing <1% asbestos do not meet the definition of ACM under US EPA NESHAP; however, are regulated by US OSHA.

ACMs are distinguished between friable or non-friable forms. Friable ACMs are materials that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. Non-friable ACMs can release fibers when damaged or disturbed, therefore EPA has defined two categories of non-friable ACM. RACM includes friable ACMs, Category I nonfriable ACM (including packings, gaskets, resilient floor covering, roofing products, sealants, and mastics) that has become friable, Category I nonfriable is ACM that will be or has been subjected to sanding, grinding, cutting or abrading, or Category II

nonfriable ACM (materials excluding Category I non-friable ACM) that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

## **2.2 Inspection Activities**

EWI conducted a visual survey of building prior to sampling to determine the presence, location, and condition of suspect ACMs. The suspect ACMs were grouped into homogeneous sampling areas, which are defined as an area of suspect materials that appear to be similar throughout in appearance, color, texture and material construction/application dates.

EWI inspected the accessible areas of the interior and exterior of the buildings where suspect asbestos materials may be present. The inspection included accessible rooms and utility spaces including mechanical rooms, attics, and special use areas and including areas above ceilings in pipe chases.

## **2.3 Sample Protocol**

EWI collected bulk samples of homogenous suspect ACMs identified during the visual reconnaissance to confirm or deny the presence of asbestos and provide a comprehensive understanding of quantities, condition and locations of ACMs throughout the building. The number of samples collected for each homogenous material was dependent on the type of material, estimated quantity of the material and material locations, and inspector judgment.

Based on the nature of this inspection, EWI used destructive sampling methods to complete the inspection. Care was taken to prevent cross-contamination of collected samples.

The bulk samples were placed into individual sample containers, and labeled with individual laboratory identification numbers. A unique sample identification number was assigned to each sample. The sample identification numbers, notes pertaining to the material description, condition, and sample location of the suspect materials were recorded on the field forms. The samples were shipped via overnight carrier under proper chain-of-custody protocol and analyzed for asbestos by Environmental Microbiology Laboratory, Inc., Aerotech Laboratories, Inc., (EMLab P&K) of Phoenix, Arizona, a National Voluntary Laboratory Accreditation Program (NVLAP)-certified laboratory.

## 2.4 Laboratory Analytical Method

Bulk samples were analyzed using Polarized Light Microscopy (PLM) in conjunction with Dispersion Staining (DS) techniques, as outlined in USEPA Method, 600/R-93-116.

The PLM Summary Report from the laboratory provides the type and percentage of asbestos (if any), as well as the type and percentage of other non-asbestos fibers. The PLM Summary Report is included in Appendix C.

## 2.5 Suspect Asbestos-Containing Materials

EWI identified two (2) homogenous suspect materials and collected 3 samples for laboratory analysis.

## 2.6 Sample Results

An Asbestos Sample Summary is provided in the table below and includes the complete list of suspect ACMs observed and sampled, sample ID numbers, material descriptions, sample locations, and analytical results. Sample Locations are provided on Figure 2.0. Based on the analytical results, samples were identified as non-detect (ND) for asbestos.

Sample ID	Material	Sample Location	Analytical Result - Asbestos Material	Material locations	Friable
1-1	Drywall System	Ceiling	ND-Off-White Drywall with Brown Paper	Ceiling	No
2-1	Roofing Shingles	Roof	ND-Black Roofing Shingle with Tan Pebbles ND-Black Roofing Felt	Roof	No
2-2	Roofing Shingles	Roof	ND-Black Roofing Shingle with Tan Pebbles ND-Black Roofing Felt	Roof	No

### **3.0 LEAD-BASED PAINT SURVEY**

The testing protocol utilized during this survey focused on a surface investigation for the presence of LBP. The survey was conducted in general accordance with the HUD Guidelines for the Evaluation and Control of Lead-Based Paint in Housing (June 1995), updated Chapter 7 (July 2012). The LBP survey was performed by an inspector certified by the State of Missouri, which requires certification of lead-based paint inspectors of any type of structure (Appendix A).

#### **3.1 Inspected Areas**

EWI conducted a visual survey of all accessible painted surfaces throughout the Subject Site to evaluate the extent and condition of paint, substrates, paint color, and collection of representative paint-chip samples for analysis to determine lead content. The survey included accessible interior surfaces of the building. Surfaces that displayed the same paint colors were grouped into homogeneous material sets. The sample number, substrate, component, color, and location for each homogeneous material were recorded in field notes. Photographs were taken of representative sample locations.

#### **3.2 Sample Collection Procedures/Methodology**

Bulk sampling was conducted of suspected LBP and analyzed to determine abatement requirements for renovation activities. One representative paint-chip sample from each homogenous material was collected. Appropriate precautions were taken to prevent exposure to those present in or around the Subject Site during the collection of samples. Care was taken to prevent cross-contamination of the collected samples. The paint chip samples were at least one gram and had no preservation requirements. The samples were placed in Ziploc plastic bags at the time of collection. Clean disposable nitrile gloves were worn to collect each sample. Samples were collected using a sharp knife to score an area and then chisel to pry under the paint to remove all layers, excluding the substrate. Care was taken to capture all layers of paint without removing substrate beneath the paint.

The samples were shipped by overnight courier and delivered to QuanTEM Laboratories in Oklahoma City, Oklahoma, an Environmental Lead Laboratory Accreditation Program (ELLAP) certified laboratory for analysis by US EPA Method 7000B for lead.

### 3.3 LBP Sample Results

According to the US EPA and HUD, positive detections of LBP is defined in paint chip samples as containing lead equal to or in excess of 0.5 percent by weight, which is equal to 5,000 milligrams per kilogram (mg/kg) or parts per million (ppm). Four unique paint materials were identified and samples collected for analysis during the survey. The sample results and descriptions of the testing combinations including colors, locations, substrates, and conditions obtained during this LBP survey are summarized in the table below. The environmental chemistry analysis report for the paint samples collected is included in Appendix C.

It should be kept in mind that samples may represent multiple layers of paint. Although descriptions are based on the visible surface paint, the chemical analysis does not separate the paint layers, so the LBP may actually be present in older paint layers beneath the surface. This may affect both the evaluation of the paint condition and the accuracy of areal estimate.

The sample locations are provided in Figure 2.0. No LBP was identified in the samples collected.

**LBP Paint Chip Sample Summary**

Sample Number	Location	Result			
		Non-Detect	<i>Lead-Containing Paint</i>	LBP*	Lead Value (ppm)
L-1-1	South Interior Wall	X			<50
L-1-2	East Interior Wall	X			<50
L-1-3	Ceiling	X			<50
L-2-1	Exterior	X			159

## **4.0 CONCLUSIONS AND RECOMMENDATIONS**

Environmental Works, Inc. (EWI) performed a Hazardous Materials Survey including an asbestos inspection and LBP inspection on the Ozarks Correction Center Dewatering Building located at 929 Honor Camp Road in Fordland, Missouri.

### **4.1 Asbestos Survey**

No asbestos containing materials were identified during this inspection.

### **4.2 Lead-Based Paint Survey**

No lead based paint was identified during this inspection.

## **5.0 LIMITATIONS**

### **5.1 ACM Survey Limitations**

This assessment was conducted by an AHERA-Certified Asbestos Inspector. The conclusions presented in this report are based solely upon the reported analytical results from an independent laboratory. It is possible that ACMs may be concealed in wall cavities and other inaccessible areas. If these areas are exposed during demolition activities these areas should either be tested or treated as asbestos-containing.

### **5.2 LBP Survey Limitations**

This assessment was conducted by a Lead Inspector licensed in the state of Missouri. The conclusions presented in this report are based solely upon the reported analytical results from the labs. It is possible that LBP may be concealed in wall cavities and other inaccessible areas. If these areas are exposed during construction, remodeling, or demolition, these areas shall either be tested or treated as lead-containing.

This report was prepared based on interpretation of information obtained during the survey of the Site. The conclusions of this report are professional opinions based solely upon those visual site observations, information supplied by the client during the time of the Survey and interpretations of sample findings as described in our report. Locations where sampling was performed were described as approximate locations. The data collected during the limited inspection and short term sample collection only allows us to determine if the results correspond to the characteristics of a building at the time of the survey. Our opinions and recommendations are intended exclusively for client use. Additionally, the opinions presented herein apply to the Site conditions existing at the time of our

inspection. Therefore, our opinions may not apply to future conditions that may develop at the Site, which we have not had the opportunity to evaluate.

This assessment was performed at the request of White River Engineering utilizing methods and procedures consistent with good commercial or customary practices designed to conform with acceptable industry standards and is not for use of other parties without the expressed written authorization of EWI. The independent conclusions represent Environmental Works, Inc.'s best professional judgment based on the conditions that existed and the information and data available to us during the course of this assignment. Factual information regarding operations, conditions, and test data provided to Reliant Parties, or their representative has been assumed to be correct and complete.

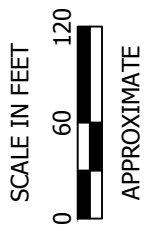
## FIGURES





CHECKED BY:  
L. WESTFALL

E.W.I. # 191250  
DRAWN BY: SBH  
August 14, 2019



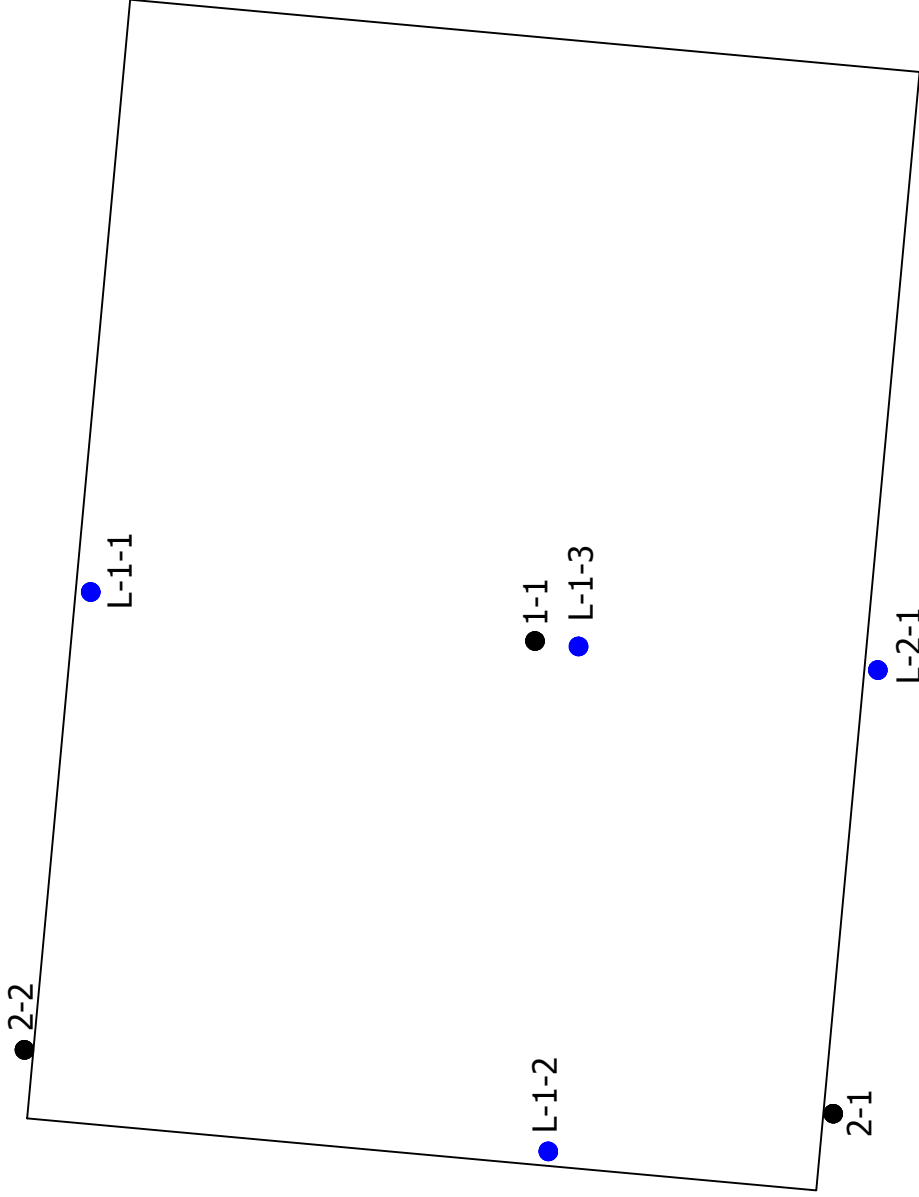
Kansas City Office Location:  
1731 Locust Street  
Kansas City, MO 64108  
Phone: (816) 285-8410

### SITE DIAGRAM

OZARKS CORRECTION CENTER DEWATERING BUILDING  
929 HONOR CAMP ROAD  
FORDLAND, WEBSTER COUNTY, MISSOURI

FIGURE

1.0

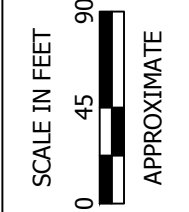


LEGEND	
●	= NEGATIVE SAMPLE LOCATION
●	= SAMPLE DID NOT CONTAIN LEAD BASED PAINT (LBP)



CHECKED BY:  
L. WESTFALL

E.W.I. # 191250  
DRAWN BY: SBH  
August 14, 2019



Kansas City Office Location:  
1731 Locust Street  
Kansas City, MO 64108  
Phone: (816) 285-8410

**SAMPLE LOCATION MAP**

OZARKS CORRECTION CENTER DEWATERING BUILDING  
929 HONOR CAMP ROAD  
FORDLAND, WEBSTER COUNTY, MISSOURI

FIGURE  
**2.0**

## **APPENDIX A**

### **Inspector Certifications**

CERTIFICATION NUMBER:  
**7011112918MOIR18243**

THIS CERTIFIES  
**Laura N Westfall**  
HAS COMPLETED THE CERTIFICATION  
REQUIREMENTS FOR  
**Inspector**



APPROVED: **01/17/2019**  
EXPIRES: **11/29/2019**

TRAINING DATE: **11/29/2018**

  
Director of Air Pollution Control Program



**STATE OF MISSOURI**  
**DEPARTMENT OF HEALTH AND SENIOR SERVICES**

**LEAD OCCUPATION LICENSE REGISTRATION**

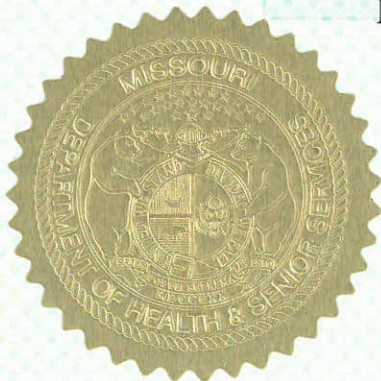
Issued to:

**Laura N. Westfall**

The person, firm or corporation whose name appears on this certificate has fulfilled the requirements for licensure as set forth in the Missouri Revised Statutes 701.300-701.338, as long as not suspended or revoked, and is hereby authorized to engage in the activity listed below.

Lead Inspector  
Category of License

Issuance Date: **10/29/2018**  
Expiration Date: **10/29/2020**  
License Number: **181029-300005647**



A handwritten signature in black ink, appearing to read "Randall W. Williams".

Randall W. Williams, MD, FACOG  
Director  
Department of Health and Senior Services

## **APPENDIX B**

### **PLM Summary and Chain of Custody**



Report for:

**Laura Westfall**  
**Environmental Works**  
1455 E. Chestnut Expy  
Springfield, MO 65802

---

Regarding:      Project: 191250-OCC  
                         EML ID: 2202880

Approved by:

Dates of Analysis:  
Asbestos PLM: 07-15-2019

A handwritten signature in cursive script that reads "Renee Luna-Trepczynski".

Approved Signatory  
Renee Luna-Trepczynski

Service SOPs: Asbestos PLM (EPA 40CFR App E to Sub E of Part 763 & EPA METHOD 600/R-93-116, SOP EM-AS-S-1267)

---

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. The results relate only to the samples as received. The results include an inherent uncertainty of measurement associated with estimating percentages by polarized light microscopy. Measurement uncertainty data for sample results with >1% asbestos concentration can be provided when requested.

EMLab P&K ("the Company") shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.



Client: Environmental Works  
 C/O: Laura Westfall  
 Re: 191250-OCC

Date of Sampling: 07-10-2019  
 Date of Receipt: 07-11-2019  
 Date of Report: 07-15-2019

**ASBESTOS PLM REPORT**

<b>Total Samples Submitted:</b>	3
<b>Total Samples Analyzed:</b>	3
<b>Total Samples with Layer Asbestos Content &gt; 1%:</b>	0

**Location: 1-1, Drywall System**

Lab ID-Version‡: 10467191-1

Sample Layers	Asbestos Content
Off-White Drywall with Brown Paper	ND
<b>Composite Non-Asbestos Content:</b>	10% Cellulose < 1% Glass Fibers
<b>Sample Composite Homogeneity:</b>	Moderate

**Location: 2-1, Roofing Shingles**

Lab ID-Version‡: 10467192-1

Sample Layers	Asbestos Content
Black Roofing Shingle with Tan Pebbles	ND
Black Roofing Felt	ND
<b>Composite Non-Asbestos Content:</b>	25% Cellulose 5% Glass Fibers
<b>Sample Composite Homogeneity:</b>	Moderate

**Location: 2-2, Roofing Shingles**

Lab ID-Version‡: 10467193-1

Sample Layers	Asbestos Content
Black Roofing Shingle with Tan Pebbles	ND
Black Roofing Felt	ND
<b>Composite Non-Asbestos Content:</b>	25% Cellulose 5% Glass Fibers
<b>Sample Composite Homogeneity:</b>	Moderate

The test report shall not be reproduced except in full, without written approval of the laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by any agency of the federal government. EMLab P&K reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified.

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.

‡ A "Version" indicated by "-x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".





2033 HERITAGE PARK DR, OKLAHOMA CITY, OK 73120 | 1.800.822.1650

## Environmental Chemistry Analysis Report

**Quantem Set ID:** 311935  
**Date Received:** 07/11/19  
**Received By:** Elena LaFarge  
**Date Sampled:**  
**Time Sampled:**  
**Analyst:** CA  
**Date of Report:** 07/16/19

**Client:** Environmental Works, Inc  
1455 E. Chestnut Expressway  
Springfield, MO 65802

**Acct. No.:** B801

**Project:** 191250-OCC

**Location:** N/A

**Project No.:** N/A

AIHA-LAP, LLC: 101352

Quantem ID	Client ID	Matrix	Parameter	Results	Reporting Limits	Units	Date/Time Analyzed	Method
001	L-1-1	Paint	Lead	<50.00	50	ppm	07/15/19 11:21	P EPA 7000B (1)
002	L-1-2	Paint	Lead	<50.00	50	ppm	07/15/19 11:21	P EPA 7000B (1)
003	L-1-3	Paint	Lead	<50.00	50	ppm	07/15/19 11:21	P EPA 7000B (1)
004	L-2-1	Paint	Lead	159	7.14	ppm	07/15/19 11:21	P EPA 7000B (1)

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

Chanell Alaniz, Chemist

Note: Sample results have not been corrected for blank values.

This report applies only to the standards or procedures indicated and to the specific samples tested. It is not indicative of the qualities of apparently identical or similar products or procedures, nor does it represent an ongoing assurance program unless so noted. These reports are for the exclusive use of the client and are not to be reproduced without specific written permission. Quantem is not responsible for user-supplied data used in calculations.

Unless otherwise noted, upon receipt the condition of the sample was acceptable for analysis.

Wipe materials must meet ASTM E1792 criteria. Method detection limits and resultant reporting limits may not be valid for non-ASTM E1792 wipe material.

EPA Method 7000B (1) = EPA 600/R-93/200 Preparation Modified. EPA 7000B Analysis Modified

EPA Method 7082 (2) = EPA 600/R-93/200 Preparation Modified. EPA 7082 Analysis Modified

## QAQC Results

QA ID: 17785

Date: 7/15/2019

Approved By: Chanell Alaniz

Test: Lead

Matrix: Paint

Date Approved: 7/15/2019

Notes:

**Blank Data:**

Type of Blank	Blank Value
FCB	0
Matrix Blank	0

**Samples:**

311935-001	311935-002
311935-003	311935-004
LCS-P1	MB-P1
RLVS-P	

**Standards Data:**

Standard	Low Limit	Obtained	High Limit
CCV	4.5	5.3	5.5
FCV	4.5	5	5.5
ICV	0.9	1.1	1.1
RLVS	0.05	0.06	0.15

**Duplicate Data:**

**Recovery Data:**

Sample Number	Result	Spike Level	Result + Spike	% Recovery	Dup. Result + Spike	% Dup. Recovery	% Spike RPD
311950-004	0.000	2.000	2.220	111.0			
LCS-P1	0.000	1.992	0.029	1.5	2.237	112.3	194.9

Chanell Alaniz 7/15/19



# LEAD CHAIN OF CUSTODY

2033 Heritage Park Drive, Oklahoma City, OK 73120-7502  
 (800) 822-1650 • (405) 755-7272 • Fax: (405) 755-2058

## LEGAL DOCUMENT - PLEASE PRINT LEGIBLY

For Lab Use Only  
 Lab No. 31935  
 Accept  Reject

Report Results  one box  
**Quantem Website**  
 Email \_\_\_\_\_  
 Other \_\_\_\_\_

Project Information  
 Project Name: 19256-Occ  
 Project Location: \_\_\_\_\_  
 Project ID: \_\_\_\_\_  
 P.O. Number: \_\_\_\_\_

Contact Information  
 Company: Environmental Works  
 Contact: Laura Westfall  
 Account #: \_\_\_\_\_  
 Name: Laura Westfall  
 Phone: 417-616-6550  
 Cell Phone: \_\_\_\_\_  
 E-mail: westfall@environ.com  
 Date: \_\_\_\_\_

RELINQUISHED BY	DATE & TIME	VIA	RECEIVED BY	DATE & TIME
<u>Laura Westfall</u>	<u>7/10/19 1700</u>	<u>Drop Box</u>		<u>07-11-19</u>
				<u>(8:00AM) 07-15-2019</u>

REQUESTED SERVICES (Please  the Appropriate Boxes)

No.	Sample ID (10 Characters Max)	Sample Description	Volume (Liters)	Volume Area (Length x Width)	Sample Matrix (see matrix code box)	Analysis				Units ( <input checked="" type="checkbox"/> ONE box only)				Sample Matrix Codes	
						Pb	PPM	mg / l	Hg / ft <sup>2</sup>	Hg / m <sup>3</sup>	mg / cm <sup>2</sup>	A	B		C
1	L-1-1	interior west wall				X	X	X	X	X	X	X	X	X	Soil
2	L-1-2	interior south wall				X	X	X	X	X	X	X	X	X	Paint Chips
3	L-1-3	exterior				X	X	X	X	X	X	X	X	X	Surface / Dust Wipes
4	L-2-1	ceiling				X	X	X	X	X	X	X	X	X	Bulk Miscellaneous
5															Air Cassette
6															
7															
8															
9															
10															
11															
12															

\* TAT via phone 12:10 pm 07/11  
 \* per Laura via phone 13:36 7-11-2019  
 \* 3-Day Change  
 \* 5-Day  
 \* Paint Chips

**APPENDIX 2**

**STORMWATER POLLUTION PREVENTION PLAN  
(SWPPP)**

Stormwater Pollution Prevention Plan (SWPPP)

For Construction Activities At:

Replace Sewer Lines and Infrastructure  
Ozark Correctional Center (OCC)  
929 Honor Camp Lane  
Fordland, Webster County, MO 65652

Project No. C1907-01  
Site No. 7003  
Facility Nos. 9327003071; 9327003073; 9327003081

SWPPP Prepared For:

State of Missouri - Office of Administration  
Division of Facilities Management, Design and Construction  
PO Box 809  
Jefferson City, MO 65102

SWPPP Prepared By:

Allgeier, Martin and Associates, Inc.  
Thomas Hancock, PE  
600 W. College St., Ste 104  
Springfield, MO 65806  
417-862-3355  
Tom.hancock@amce.com

SWPPP Preparation Date:

01/06/2023

Estimated Project Dates:

Project Start Date: 09/25/23 (TBD)

Project Completion Date: 03/13/24 (TBD)



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---

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## SECTION 1: CONTACT INFORMATION/RESPONSIBLE PARTIES

### 1.1 Property Owner & Contractor(s)

**Instructions:**

- List the general contractor and subcontractors expected to work on-site. Notify contractors of stormwater requirements applicable to their work.
- The general contractor and subcontractors must sign the Contractor Agreement included in Appendix E.

**Property Owner:**

Office of Administration Facilities Management, Design & Construction  
Eric Hibdon, Project Manager  
P.O. Box 809  
Jefferson City, MO 65102  
573-522-0322  
Eric.Hibdon@oa.mo.gov

**General Contractor:**

Contractor No. 1  
**(TBD)**

**(TBD)**

**Subcontractor (s):** Attach signed Contractor Agreement for each (see Appendix E)

**(TBD by General Contractors)**

INSERT COMPANY OR ORGANIZATION NAME

INSERT TELEPHONE NUMBER

INSERT AREA OF CONTROL

INSERT COMPANY OR ORGANIZATION NAME

INSERT TELEPHONE NUMBER

INSERT AREA OF CONTROL

[Repeat as necessary.]

**Emergency 24-Hour Contact:**

**(TBD by General Contractors)**

## 1.2 Stormwater Team

### Instructions:

- The Missouri State Operating Permit MORA00000 for land disturbance requires the following: (1) The permittee must designate a person responsible for environmental matters that has a thorough and demonstrable knowledge of the site's SWPPP and erosion and sediment control practices in general. This person is responsible for day-to-day operation and maintenance of erosion and sediment control practices. (2) The individual responsible for environmental matters or a designated inspector knowledgeable in erosion, sediment and stormwater control principles shall conduct the required inspections. The permittee is responsible for ensuring that the person who conducts inspections is a "qualified person", defined in MORA00000 as "a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the skills to assess conditions at the construction site that could impact stormwater quality, and the skills to assess the effectiveness of any stormwater controls selected to control the quality of stormwater discharges from the construction activity."

**Person responsible for environmental matters: (TBD by General Contractors)**

INSERT NAME AND TELEPHONE NUMBER

**Designated Inspector (if different): (TBD by General Contractors)**

INSERT COMPANY OR ORGANIZATION NAME

INSERT NAME AND TELEPHONE NUMBER

## SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

### 2.1 Nature of Construction Activity

#### Instructions:

- Section C.3.a Subpart 1 of the Missouri State Operating Permit MORA00000 for land disturbance requires a description of the function of the project. Section C.3.a Subpart 3 requires estimates of the total area expected to be disturbed by excavation, grading, or other construction activities, including, but not limited to, off-site borrow and fill areas.
- Provide a general description of the nature of the construction activities at your project.
- Describe the size of the property (in acres) and the total area expected to be disturbed by the construction activities (in acres).

#### General Description of Project

Provide a general description of the construction project: [The Work includes replacement of approximately 2,605 linear feet of existing water main, renovation of approximately 2,865 linear feet of gravity sewer and 16 manholes; a new outfall sewer and discharge structure; a geotextile sludge dewatering system including](#)



flocculant mixing/injection system, mixing manifold, and solid waste roll-off containers; sludge holding tank and dewatering building modifications; submersible sludge transfer pumping system; chemical phosphorus removal system modifications; precast and cast-in-place concrete structures, PVC and ductile iron piping systems, electrical system modifications, and related appurtenances.

**Size of Construction Project**

What is the size of the property (in acres), the total area expected to be disturbed by the construction activities (in acres), and the maximum area expected to be disturbed at any one time?

Total area of property: ~65.44 Acres (OCCC facility and staff housing tract)

Total area of disturbance: 2.06 Acres

Total area to be disturbed at one time: **TBD by General Contractors**

Preconstruction Phase - x Acres

Phase II Construction - x Acres

Phase III Construction - x Acres

Final Stabilization Phase - x Acres

**Construction Support Activities**

Will there be any construction support activities for the project (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas)?

Yes  No

Description of construction support activity: [Material storage area.](#)

Contact name, Telephone number, Email address: [INSERT CONTACT INFORMATION FOR CONSTRUCTION SUPPORT ACTIVITY \(Name, Telephone No., Email Address\)](#)

Location of construction support activity: **TBD by General Contractors**

[\[Repeat as necessary.\]](#)

**Borrow/fill sites** (excavated material disposal areas, borrow areas) Will excess soil be disposed of on-site or off-site? Will any borrow areas be used for fill material?

[Excavated materials will be retained on-site for backfill purposes. Any excess excavated materials will be disposed of on-site or off-site as directed by the affected property owner. Any off-site disposal areas will be stabilized following construction. Borrow material will not be needed for this project.](#)

Yes  No

	Address of borrow site	Address of disposal site	State permit	City permit
If yes,				

(Note (1): Indicate borrow/fill sites in Appendix A.)

(Note (2): The off-site area can be covered under this project's Land Disturbance Permit, given it will be stabilized following construction.)

(Note (3): If off-site area will not be stabilized following construction, a separate permit is needed.)

**2.2 Sequence and Estimated Dates of Construction Activities**

**Instructions:**

- Section C.3.a Subpart 2 of the Missouri State Operating Permit MORA00000 requires a description of the intended sequence and timing of activities that disturb soils at the site.
- For each phase of construction, include the following information:
  - ✓ Installation of stormwater controls, and when they will be made operational;
  - ✓ Commencement and duration of earth-disturbing activities, including clearing and grubbing, mass grading, site preparation (i.e., excavating, cutting and filling), final grading, and creation of soil and vegetation stockpiles requiring stabilization;
  - ✓ Cessation, temporarily or permanently, of construction activities on the site, or in designated portions of the site;
  - ✓ Final or temporary stabilization of areas of exposed soil. The dates for stabilization must reflect the applicable deadlines to which you are subject to in Section C.3.h; and
- The construction sequence must reflect the following requirements as described in Missouri State Operating Permit MORA00000:
  - ✓ Section C.3.h (stabilization deadlines).

<b>Phase</b> <i>(Pre-construction, grading, stabilization, etc.)</i>	<b>Construction Activities</b> <i>(Mass grading, building construction, utilities, concrete-pouring, landscaping, etc.)</i>	<b>Best Management Practices Installed</b> <i>(For BMPs described in Sections 4.1 – 5.7)</i>	<b>Estimated Start &amp; End Dates</b> <i>(To be estimated by engineer.)</i>	<b>Actual Dates</b> <i>(Complete in field.)</i>
<b>Pre-construction</b>	<ul style="list-style-type: none"> <li>• Install primary BMPs</li> </ul>	<ul style="list-style-type: none"> <li>• Construction Entrance</li> <li>• Construction Parking</li> <li>• Chemical Toilet</li> <li>• Dumpster</li> <li>• Compost Filter Socks</li> <li>• Ditch Checks</li> <li>• Inlet Protection Devices</li> </ul>	Estimated Start Date: <u>TBD</u>  Estimated End Date: <u>TBD</u>	START DATE: _____  END DATE: _____
<b>Phase 2</b>	<ul style="list-style-type: none"> <li>• Clear &amp; grub Outfall Sewer pipeline construction corridor and WWTP site</li> <li>• Strip &amp; store topsoil</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize to only that necessary to permit utility construction</li> <li>• Proceed in increments as needed to conduct utility construction in</li> </ul>	Estimated Start Date: <u>TBD</u>  Estimated End Date: <u>TBD</u>	START DATE: _____  END DATE: _____

	<ul style="list-style-type: none"> <li>• Install underground utilities</li> <li>• Excavate &amp; construct WWTP and Outfall Sewer Discharge structures</li> <li>• Stabilize denuded areas &amp; stockpiles</li> </ul>	<p>a continuous operation</p> <ul style="list-style-type: none"> <li>• Preservation of Existing Vegetation</li> <li>• Additional Compost Filter Socks</li> <li>• Temporary Turf Reinforcement Mats</li> <li>• Riprap</li> <li>• Temporary Seeding</li> <li>• Dust Control</li> </ul>		
<b>Phase 3</b>	<ul style="list-style-type: none"> <li>• Continue to clear &amp; grub site, strip &amp; stockpile topsoil</li> <li>• Continue to install underground utilities</li> <li>• Conduct WWTP site grading operations</li> <li>• Install underground utilities at WWTP site</li> <li>• Construct concrete structures and pavement.</li> <li>• Construct Aggregate Surfacing.</li> <li>• Install WWTP equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Additional Compost Filter Socks</li> <li>• Additional Temporary Turf Reinforcement Mats</li> <li>• Concrete Washout</li> </ul>	<p>Estimated Start Date: <u>TBD</u></p> <p>Estimated End Date: <u>TBD</u></p>	<p>START DATE: _____</p> <p>END DATE: _____</p>

<b>Final Stabilization</b>	<ul style="list-style-type: none"> <li>• Complete acceptance testing, final cleanup, finish grading, seed and mulching</li> <li>• Remove all temporary BMPs upon completion of final stabilization</li> </ul>	<ul style="list-style-type: none"> <li>• Hydroseeding</li> </ul>	Estimated Start Date: <u>TBD</u>  Estimated End Date: <u>TBD</u>	START DATE: _____  END DATE: _____
----------------------------	---	--	--	--

(Note (1): Make sure that the phases for installation of each BMP are consistent with installation dates in individual BMP sections.

(Note (2): You determine how many phases are appropriate. Delete or add rows as necessary.)

### 2.3 Receiving Waters

**Instructions:**

- Section C.2.a of the Missouri State Operating Permit MORA00000 for land disturbance requires listing all outfalls and receiving waters associated with the project.
- List the name of the first surface water that receives discharges from your site. If your site has discharges to multiple surface waters, indicate the names of all such waters.

**Names of Receiving Waters**

Outfall #	Name(s) of the first surface water that receives stormwater directly from your site and/or from the MS4 (note: multiple rows provided where your site has more than one point of discharge that flows to different surface waters)
1	WWTP & Outfall Sewer Site - Unnamed Tributary to Davis Branch

**Floodplain**

Will land disturbance activities take place within a Special Flood Hazard Area (mapped floodplain)?

Yes  No

If yes, a Floodplain Development Permit will also be required.

**Corps of Engineers**

Will this project require a permit from the Corps of Engineers?

Yes  No

If yes, a copy of the Corps permit must be submitted with this SWPPP.

**2.4 Allowable Non-Stormwater Discharges**

**Instructions:**  
 Identify all allowable sources of non-stormwater discharges. The allowable non-stormwater discharges identified in Section A.2 of Missouri State Operating Permit MORA00000 include:

- ✓ De-watering activities if there are no contaminants other than sediment present in the discharge, and the discharge is treated as specified in Section C.3.m of the permit;
- ✓ Flushing water hydrants and potable water lines;
- ✓ Water only (i.e., without detergents or additives) rinsing of streets and buildings; and
- ✓ Site watering to establish vegetation.

**List of Allowable Non-Stormwater Discharges Present at the Site**

Type of Allowable Non-Stormwater Discharge	Likely to be Present at the Site?
Fire hydrant flushings	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Landscape irrigation	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Potable water including uncontaminated water line flushings	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Routine external building wash down	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Pavement wash waters	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Construction dewatering water	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

## 2.5 Site Maps

### Instructions:

- Attach site map(s) in Appendix A of the Template. For more complicated sites, a series of maps showing the major phases of development, as described in Section 2.4, is recommended.

### As set forth in Section C.3.b of the Missouri State Operating Permit MORA00000, these maps must include the following features:

- Boundaries of the site;
- Labeled outfall(s);
- Direction(s) of stormwater flow and approximate slopes anticipated after grading activities;
- Areas of soil disturbance and areas that will not be disturbed;
- Location of major structural and non-structural BMPs identified in the SWPPP;
- Location of temporary sanitary facility and trash receptacles;
- Locations where stabilization practices are expected to occur;
- Locations of off-site material, waste, borrow or equipment storage areas;
- Locations of all waters of the State (including wetlands);
- Locations where stormwater discharges to a surface water; and
- Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

**Reference Project Plan Sheet Nos. G-001, & C-101 thru C-106.**

**CONTRACTOR TO REDLINE MARK ADDITIONAL BMPs, CONSTRUCTION PARKING, CONSTRUCTION ROADWAYS, STOCKPILES, CHEMICAL TOILET, DUMPSTER, CONCRETE WASHOUT PIT, ETC. AS LOCATED IN THE FIELD ON ABOVE NOTED PROJECT PLAN SHEETS**

## SECTION 3: DOCUMENTATION OF COMPLIANCE WITH OTHER FEDERAL REQUIREMENTS

### 3.1 Endangered Species Protection

#### Instructions:

- This SWPPP does not supersede compliance with the Endangered Species Act. Before commencing construction, determine whether endangered or threatened species or their critical habitats are on or near your site
- Projects must be reviewed on U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Conservation (IPaC) website (<http://ecos.fws.gov/ipac/>) AND Missouri Department of Conservation's (MDC) Natural Heritage Review website (<https://naturalheritagereview@mdc.mo.gov>).
- For suitable habitat definitions refer to USFW IPaC report.
- If disturbances may affect, describe BMPs used to minimize impact
- If there are listed species in the county or township, check to see if critical habitat has been designated and if that area overlaps or is near the project area. Critical habitat designations and associated requirements may also be found at 50 CFR Parts 17 and 226. Use the mapview tool at <http://criticalhabitat.fws.gov/crithab/> to find data specific to your project.

Are there any endangered species or critical habitats on or near the project?

Yes  No

If YES, describe the species and/or critical habitat: Indiana bats (*Myotis sodalis*, federal- and state-listed endangered) and Northern long-eared bats (*Myotis septentrionalis*, federal-listed threatened) may occur near the project area. Both species of bats hibernate during winter months in caves and mines. During the summer months, they roost and raise young under the bark of trees in wooded areas, often riparian forests and upland forests near perennial streams. The project location is outside of the mapped critical habitat for the Indiana Bat. There are no known hibernacula or maternity roost trees for the NLEB in the project area.

If YES, describe steps taken to address the impact of construction: During project activities, avoid degrading stream quality and where possible leave snags standing and preserve mature forest canopy. Limit clearing to limits indicated on project plans. Do not enter caves known to or that may harbor Indiana bats or Northern long-eared bats, especially from September to April. If any maternity roost trees or potential hibernacula are encountered, please contact the U.S. Fish and Wildlife Service (Ecological Services, 101 Park Deville Drive, Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132 ext. 100 for Ecological Services) for further coordination under the Endangered Species Act.

**Reference Appendix K – Missouri Department of Conservation – Heritage Results for Webster County**

### 3.2 Historic Preservation

**Instructions:**

- NPDES permittees must be in compliance with the Historic Preservation Act.
- To view National Register Listings for Webster County, please visit the Missouri Department of Natural Resources website: <https://dnr.mo.gov/shpo/webster.htm>. You may also contact the State Historic Preservation Office (SHPO) at 573-751-7858 or by email at [mshpo@dnr.mo.gov](mailto:mshpo@dnr.mo.gov).

Are there any historic sites on or near the construction site?

Yes  No

If YES, describe steps taken to address the impact of construction: \_\_\_\_\_

**Reference Appendix L – State Historic Preservation Office – Webster County National Register Listings**

**NO HISTORIC PROPERTIES LOCATED WITHIN LIMITS OF DISTURBANCE**

Other

INSERT COPIES OF LETTERS, EMAILS, OR OTHER COMMUNICATION BETWEEN YOU AND THE APPLICABLE SHPO, THPO, OR OTHER TRIBAL REPRESENTATIVE



## SECTION 4: EROSION AND SEDIMENT CONTROLS

### General Instructions:

- Describe the erosion and sediment controls that will be installed and maintained at your site.

### 4.1. Natural Buffers

#### Instructions:

- Section C.3.e of the Missouri State Operating Permit MORA00000 requires that existing vegetation is preserved where practical. In addition, section C.3.e requires a minimum of a 25-foot buffer of undisturbed natural vegetation to be provided between disturbed portions of the site and surrounding surface waters.
- On the site map(s), label any surface waters on or adjacent to the project and indicate the area to be dedicated as a buffer.
- If applicable, indicate any additional areas where vegetation will be preserved on the sediment and erosion control site plan.

### Will any areas of vegetation, which are not associated with surface water buffers, be preserved during construction?

Yes.

This project will practice preservation of existing vegetation as a non-structural BMP.

(Note (1): Indicate preservation of existing vegetation by including boundaries on site map.)

#### Best Management Practice # 1

Description:

- All vegetated areas outside limits of disturbance will be preserved.
- Reference Project Plan Sheet Nos C-101 thru C-106 – Limits of Disturbance Boundary denoted by turf & surface replacement hatching.
- Reference Appendix M – Page 4 for narrative description, installation standards and maintenance requirements.

No

No existing vegetation that is not associated with surface water buffers will be preserved.

- INSERT RATIONALE FOR CONCLUDING THAT IT IS IMPRACTICAL TO PRESERVE EXISTING VEGETATION.

### Are there any surface waters within 25 feet of project's earth disturbances?

Yes  No

(Note: If no, no further documentation is required for the SWPPP Template.)

Check the compliance alternative that will be implemented:

Option 1

Provide and maintain a 25-foot undisturbed natural buffer.

(Note (1): Show the 25-foot boundary line of the natural buffer on site map.)

(Note (2): Show on site map how all discharges from construction disturbances through the natural buffer area will first be treated by the site's erosion and sediment controls. Also, show on the site map any velocity dissipation devices used to prevent erosion within the natural buffer area.)

Option 2

It is infeasible to provide and maintain an undisturbed natural buffer of any size.

- **Outfall Sewer "A" Channel construction will terminate upstream of intermittent stream and includes streambank stabilization work.**

Option 3

Buffer disturbances are authorized as part of in-stream work under a CWA Section 404 permit.

(Note (1): If this exception applies, no further documentation is required for Section 4.1 of the Template. Attach CWA Section 404 Permit.)

(Note (2): This exception only applies to the limits of disturbance authorized under the Section 404 permit and does not apply to any upland portion of the construction project.)

Option 4

Buffer disturbances will occur for the construction of a water-dependent structure or water access area (e.g., pier, boat ramp, and trail). **INSERT DESCRIPTION OF ANY EARTH DISTURBANCES THAT WILL OCCUR WITHIN THE BUFFER AREA**

(Note (1): If this exception applies, no further documentation is required for Section 4.1 of the Template.)

## 4.2 Tree and Vegetation Preservation

### Instructions:

- Section C.3.e lists tree preservation as an example of non-structural BMPs. Please determine if any trees will be preserved during this project.
- If applicable, include a tree preservation plan with Appendix A.

Will any trees be preserved during construction?

Yes

This project will practice tree preservation as a non-structural BMP.

(Note (1): Indicate trees that are to be preserved on erosion control site map or on a separate tree preservation plan within Appendix A.)

- All trees outside limits of disturbance will be preserved.
- Reference Project Plan Sheet Nos C-101 thru C-106 – Limits of Disturbance Boundary denoted by turf & surface replacement hatching.
- Reference Key Note No. 2, Project Plan Sheet No. C-103 for Clearing and Grubbing Limits and Key No. 3 for trees to be removed.
- Reference Appendix M – Page 5 for narrative description, installation standards and maintenance requirements

No

No trees will be preserved during this project.

#### **4.3 Perimeter Controls**

**Instructions:**

- Describe sediment controls that will be used to meet the requirement to install sediment controls along those perimeter areas of your site that will receive stormwater from earth-disturbing activities.

Check box if Section 4.3 is not applicable to this project.

##### Best Management Practice #1

Description:

- Compost Filter Socks – Reference Project Plan Erosion & Sediment Control Detail I/C509.
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 31, for narrative description, installation standards and maintenance requirements.

Installation:

- Phase I (Pre-Construction), Phase II, & Phase III

##### Best Management Practice #2

Description:

- Ditch Check – Reference Project Plan Erosion & Sediment Control Detail I/C509
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 36 for narrative description, installation standards, maintenance, and removal requirements.

Installation:

- Phase 1 (Pre-Construction)

##### Best Management Practice #3

Description:

- Inlet Protection – Reference Project Plan Erosion & Sediment Control Detail I/C509
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 40 for narrative description, installation standards and maintenance requirements.

Installation:

- Phase I (Pre-Construction)

#### 4.4 Sediment Track-Out

**Instructions:**

- Describe stormwater controls that will be used to minimize the track-out of sediment onto off-site streets, other paved areas, and sidewalks from vehicles exiting your construction site.

Check box if Section 4.4 is not applicable to this project.

Best Management Practice # 1

Description:

- [Construction Entrance/Exit](#)
- [Reference Appendix M – Erosion and Sediment Control Guidelines, page 28 for narrative description, installation standards and maintenance requirements.](#)

Installation:

- [Phase I](#)

#### 4.5 Stockpiled Sediment or Soil

**Instructions:**

- Describe stormwater controls and other measures you will take to minimize the discharge of sediment or soil particles from stockpiled sediment or soil. Include a description of structural practices (e.g., diversions, berms, ditches, storage basins), including design, installation, and maintenance specifications, used to divert flows from stockpiled sediment or soil, retain or detain flows, or otherwise limit exposure and the discharge of pollutants from stockpiled sediment or soil.

Check box if Section 4.5 is not applicable to this project.

Best Management Practice # 1

Description:

- [Compost Filter Socks](#)
- [Reference Appendix M – Erosion and Sediment Control Guidelines, page 31 for narrative description, installation standards and maintenance requirements.](#)

Installation:

- [Phase I \(Pre-Construction\), Phase II, & Phase III](#)

Best Management Practice # 2

Description:

- [Seeding](#)

- Reference Appendix M – Erosion and Sediment Control Guidelines, page 14 for narrative description, installation standards and maintenance requirements. Also, reference Project Specification Section 329200 – Turfs and Grasses.

Installation:

- Phase II, Phase III, & Final Stabilization

Best Management Practice # 3

Description:

- Hydroseeding
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 13 for narrative description, installation standards and maintenance requirements. Also, reference Project Specification Section 329200 – Turfs and Grasses.

Installation:

- Phase III & Final Stabilization

#### 4.6 Minimize Dust

**Instructions:**

Describe controls and procedures you will use at your project/site to minimize the generation of dust.

Check box if Section 4.6 is not applicable to this project.

Best Management Practice # 1

Description:

- Dust (Wind Erosion Control)
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 25 for narrative description, installation standards and maintenance requirements.

Installation:

- Phase II thru Final Stabilization

#### 4.7 Minimize the Disturbance of Steep Slopes

**Instructions:**

- Describe how you will minimize the disturbance to steep slopes. Section C.3.h of the Missouri State Operating Permit MORA00000 describes a steep slope as being greater than 3:1 (three feet horizontal to one foot vertical) or greater than 3% AND greater than 150 feet in length.
- Describe controls (e.g., erosion control blankets, tackifiers), including design, installation and maintenance specifications, that will be implemented to minimize sediment discharges from slope disturbances.

Check box if Section 4.7 is not applicable to this project.

Best Management Practice # 1

Description:

- Seeding
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 14, for narrative description, installation standards and maintenance requirements. Also, reference Project Specification Section 329200 – Turfs and Grasses.

Installation:

- Phase III & Final Stabilization

Best Management Practice #2

Description:

- Hydroseeding
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 13 for narrative description, installation standards and maintenance requirements. Also, reference Project Specification Section 329200 – Turfs and Grasses.

Installation:

- Phase III & Final Stabilization

Best Management Practice #3

Description:

- Temporary Turf Reinforcement Mat. Install per manufacturer's recommendations.
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 11 for narrative description, installation standards and maintenance requirements.

Installation:

- Phase II, Phase III & Final Stabilization

**4.8 Topsoil**

**Instructions:**

- Describe how topsoil will be preserved and identify these areas and associated control measures on your site map(s).
- If it is infeasible to preserve topsoil on the site, provide an explanation for why this is the case.

Check box if Section 4.8 is not applicable to this project.

Topsoil will be stripped and stockpiled for use in finish grading and site restoration

#### 4.9 Soil Compaction

**Instructions:**

- In areas where final vegetative stabilization will occur or where infiltration practices will be installed, describe the controls, including design, installation, and maintenance specifications that will be used to restrict vehicle or equipment access or condition the soil for seeding or planting.

Check box if Section 4.9 is not applicable to this project.

Best Management Practice # 1

Description:

- Compacted soils will be loosened to a depth of 4-inches prior to seeding.
- Seeded areas will be protected from vehicular and foot traffic.
- Reference Project Specification Section 329200 – Turfs and Grasses.

Installation:

- Phase III & Final Stabilization

[Repeat as needed for individual BMPs.]

#### 4.10 Storm Drain Inlets

**Instructions:**

- Describe controls that will be implemented to protect all inlets that will receive stormwater from your construction activities, and that you have authority to access.

Check box if Section 4.10 is not applicable to this project.

Best Management Practice # 1

Description:

- Inlet Protection
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 40 for narrative description, installation standards and maintenance requirements.

Installation:

- Phase I (Pre-Construction), Phase II, & Phase III

#### 4.11 Constructed Stormwater Conveyance Channels

**Instructions:**

If you will be installing a stormwater conveyance channel, describe control practices (e.g., velocity dissipation devices) that will be implemented at the construction site.

Check box if Section 4.11 is not applicable to this project.

Best Management Practice # 1

Description:

- ATTACH NARRATIVE DESCRIPTION OF BMP, INCLUDING INSTALLATION STANDARDS AND MAINTENANCE REQUIREMENTS.
- ATTACH COPY OF TYPICAL DRAWING ON FOLLOWING PAGE.

Installation:

- INSERT PHASE OF EROSION CONTROL PLAN IN WHICH THE BMP WILL BE INSTALLED. THIS MUST CORRESPOND WITH THE PHASE LISTED IN SECTION 2.4: SEQUENCE AND ESTIMATED DATES OF CONSTRUCTION ACTIVITIES.

[Repeat as needed for individual BMPs.]

**4.12 Sediment Basins**

**Instructions:**

- Section C.3.j of the Missouri State Operating Permit MORA00000 requires that a sedimentation basin be provided for each drainage area with 10 or more acres disturbed at one time. The basin shall be sized to contain a volume of at least 3,600 cubic feet per each disturbed acre draining thereto. Please include design specifications for each basin, including volume, dimensions, and outlet structure.
- Sediment ponds must also utilize outlet structures that withdraw water from the surface, unless infeasible.
- Temporary and permanent sedimentation basins must have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.
- Accumulated sediment shall be removed from the basin when the basin is 50% full. The basin shall be maintained until final stabilization of the disturbed area served by the basin.
- If use of a sediment basin is impractical, similarly effect BMPs must be chosen and employed to control erosion and sediment delivery. These similarly effective BMPs must provide equivalent water quality protection to achieve compliance with the Missouri State Operating Permit MORA00000.

Check box if Section 4.12 is not applicable to this project.

Best Management Practice # 1

Description:

- ATTACH NARRATIVE DESCRIPTION OF BMP, INCLUDING INSTALLATION STANDARDS AND MAINTENANCE REQUIREMENTS.
- ATTACH COPY OF TYPICAL DRAWING ON FOLLOWING PAGE.

Installation:

- INSERT PHASE OF EROSION CONTROL PLAN IN WHICH THE BMP WILL BE INSTALLED. THIS MUST CORRESPOND WITH THE PHASE LISTED IN SECTION 2.4: SEQUENCE AND ESTIMATED DATES OF CONSTRUCTION ACTIVITIES.



[Repeat as needed for individual BMPs.]

#### 4.13 Chemical Treatment

**Instructions:**

If you are using treatment chemicals (polymers, flocculants, etc.) at your site, provide details for each of the items below.

Check box if Section 4.13 is not applicable to this project.

##### Treatment Chemicals

List all treatment chemicals that will be used at the site: [INSERT TEXT HERE](#)

Describe the dosage of all treatment chemicals you will use at the site or the methodology you will use to determine dosage: [INSERT TEXT HERE](#)

Provide information from any applicable Material Safety Data Sheets (MSDS): [INSERT TEXT HERE](#)

Describe how each of the chemicals will be stored: [INSERT TEXT HERE](#)

##### Schematic Drawings of Stormwater Controls/Chemical Treatment Systems

Provide schematic drawings of any chemically enhanced stormwater controls or chemical treatment systems to be used for application of treatment chemicals: [INSERT TEXT HERE](#)

##### Training

Describe the training that personnel who handle and apply chemicals have received prior to permit coverage, or will receive prior to the use of treatment chemicals: [INSERT TEXT HERE](#)

#### 4.14 Dewatering Practices

**Instructions:**

If you will be discharging stormwater that is removed from excavations, trenches, foundations, vaults, or other similar points of accumulation, include design specifications and details of all dewatering practices.

Check box if Section 4.14 is not applicable to this project.

##### Best Management Practice # 1

Description:

- [Dewatering Operations](#)
- [Reference Appendix M – Erosion and Sediment Control Guidelines, page 46 for narrative description, installation standards, maintenance requirements and typical drawing.](#)

Installation:

- Phase II & Phase III

#### 4.15 Washing of Applicators and Containers used for Paint, Concrete or Other Materials

**Instructions:**

- Describe how you will comply with the requirement in C.3.k to minimize the discharge of pollutants from wash waters.

Check box if Section 4.15 is not applicable to this project.

##### Best Management Practice # 1

Description:

- Non-Sediment Pollution Control
- Reference Appendix M – Erosion Control Guidelines, page 55 for Pollution Prevention Procedures

Installation:

- Phase III & Final

##### Best Management Practice #2

Description:

- Concrete Washout Pit
- Reference Appendix M – Erosion Control Guidelines, page 56 for narrative description, installation standards and maintenance requirements.

Installation:

- Phase II & Phase III

#### 4.16 Site Stabilization

**Instructions:**

- Section C.3.h of the Missouri State Operating Permit MORA00000 requires that interim stabilization must be initiated immediately and completed within 7 calendar days where soil disturbing activities have temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Interim stabilization shall consist of well-established and maintained BMPs. Final stabilization of disturbed areas must be initiated immediately and completed within 7 calendar days whenever any clearing, grading, excavating or other earth disturbing activities have permanently ceased on any portion of the site.
- Allowances to the 7-day completion period for temporary and final stabilization may be made due to weather and equipment malfunctions. Use of allowances shall be documented in the SWPPP.
- Describe the specific vegetative and/or non-vegetative practices that will be used to stabilize exposed soils where construction activities have temporarily or permanently ceased.

#### Temporary stabilization

Describe the vegetative and/or non-vegetative practices that will be used to stabilize exposed soils where construction activities have temporarily ceased.

Stabilization practices selected (select all that apply):

- Seed and Straw
- Hydroseed
- Tackifier/ Soil Binder
- Other:  
    Turf Reinforcement Mat (TRM)

Best Management Practice # 1

Description:

- Seeding
- Reference Appendix M – Erosion Control Guidelines, page 14 for narrative description, installation standards and maintenance requirements. Also, reference Project Specification Section 329200 – Turfs and Grasses.

Installation:

- Phase II & III

Best Management Practice # 2

Description:

- Mulching
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 17 for narrative description, installation standards and maintenance requirements.

Installation:

- Phase II & III

Best Management Practice #3

Description:

- Turf Reinforcement Mat
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 11 for narrative description, installation standards and maintenance requirements.

Installation:

- Phase II & Phase III

[Repeat as needed for individual BMPs.]

**Final stabilization**

Describe the vegetative and/or non-vegetative practices that will be used to stabilize exposed soils where construction activities have permanently ceased.

Stabilization practices selected (select all that apply):

- Concrete/asphalt
- Mulch
- Seed and Straw

Hydroseed

Sod

Other:

Turf Reinforcement Mat & Granular Surfacing

Best Management Practice # 1

Description:

- Seeding
- Reference Appendix M – Erosion Control Guidelines, page 14 for narrative description, installation standards and maintenance requirements. Also, reference Project Specification Section 329200 – Turfs and Grasses.

Installation:

- Phase III & Final

Best Management Practice # 2

Description:

- Mulching
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 17 for narrative description, installation standards and maintenance requirements.

Installation:

- Phase III & Final

Best Management Practice # 3

Description:

- Hydroseeding
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 13 for narrative description, installation standards and maintenance requirements. Also, reference Project Specification Section 329200 – Turfs and Grasses.

Installation:

- Phase III & Final

Best Management Practice # 4

Description:

- Turf Reinforcement Mat
- Reference Appendix M – Erosion and Sediment Control Guidelines, page 11 for narrative description, installation standards and maintenance requirements.

Installation:

Phase III

[Repeat as needed for individual BMPs.]

**4.17 Explanation for Delayed Completion of Stabilization**

**Instructions:**

- Only use this page if uncontrollable circumstances have delayed the initiation or completion of stabilization.

Justification

- Insert a description of circumstances that prevent you from meeting the deadlines required in Section C.3.H, as well as the schedule you will follow for initiating and completing stabilization.

Write explanation here:

Stabilization practice selected:

- Tackifier/ Soil Binder
- Sod
- Concrete/asphalt
- Mulch
- Seed and Straw
- Hydroseed
- Other:

INSERT OTHER STABILIZATION PRACTICE

Description:

- ATTACH NARRATIVE DESCRIPTION OF BMP, INCLUDING INSTALLATION STANDARDS AND MAINTENANCE REQUIREMENTS.
- ATTACH COPY OF TYPICAL DRAWING ON FOLLOWING PAGE.

Installation:

- INSERT PHASE OF EROSION CONTROL PLAN IN WHICH THE BMP WILL BE INSTALLED. THIS MUST CORRESPOND WITH THE PHASE LISTED IN SECTION 2.4: SEQUENCE AND ESTIMATED DATES OF CONSTRUCTION ACTIVITIES.

[Repeat as needed for individual BMPs.]

## SECTION 5: POLLUTION PREVENTION STANDARDS

### 5.1 Potential Sources of Pollution

**Instructions:**

- Section C.3.k of the Missouri State Operating Permit MORA00000 requires that all pollutant-generating activities at the site be identified and described (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal).
- For each pollutant-generating activity, include an inventory of pollutants or pollutant constituents associated with that activity (e.g., sediment, fertilizers, and/or pesticides, paints, solvents, fuels), which could be exposed to rainfall or snowmelt, and could be discharged from the construction site.

**Construction Site Pollutants**

INSERT TEXT OR USE TABLE BELOW

<b>Pollutant-Generating Activity</b>	<b>Pollutants or Pollutant Constituents</b> (that could be discharged if exposed to stormwater)	<b>Location on Site</b> (or reference SWPPP site map where this is shown)
Trenching, Backfilling & Grading	Sediment	Throughout limits of utility construction
Concrete	Concrete Wash-out	Wash-out pit, see Site Plan
Sanitary Waste	Bacteria	Chemical Toilets, see Site Plan
Construction Debris	Windblown trash & debris	Dumpster, see Site Plan
Fueling & Maintenance of Construction Equipment	Petroleum	See Site Plan

[Include additional rows as necessary.]

**5.2 Spill Prevention and Response**

**Instructions:**

- Section C.3.k of the Missouri State Operating Permit MORA00000 requires that the discharge of pollutants from wash waters, exposed building materials (construction wastes, trash, fertilizers, pesticides, detergents, etc.), and from spills and leaks be minimized.
- ✓ Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
- ✓ Minimize exposure of any materials which may contribute pollution to stormwater;
- ✓ Implement chemical spill and leak prevention and response procedures. These procedures include but are not limited to maintenance of spill kits, installation of containment berms, and use of drip pans at petroleum product and liquid storage tanks and containers.

Spill Prevention and Control

- Keep a spill kit on-site with equipment necessary for spill clean-up. Equipment and materials include, but are not limited to: brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sawdust, and trash containers.
- Location of construction site's spill kit: **(TBD by General Contractors)**

Hazardous substances and oil spill reporting

Petroleum products spilled should be immediately cleaned up and disposed of properly. Any such spills or petroleum or other chemicals are to be reported as soon as possible to the Missouri Department of Natural Resources. Call the Southwest Regional Office at (417) 891-4300 or the Department's 24-hour Environmental Emergency Response number at (573) 634-2436.

In Missouri, state law requires the responsible party to report petroleum product releases greater than 50 gallons to the Missouri Department of Natural Resources at the earliest practical moment after discovery. If the release is from an underground storage tank, or UST, or piping, the reportable quantity is 25 gallons or more. Reports are also required for above ground storage tanks, or AST, that have released 50 gallons or greater. Further, federal law requires the responsible party to report any release of oil if the oil reaches or threatens any waterway.

**5.3 Fueling and Maintenance of Equipment or Vehicles**

**Instructions:**

- Section C.5 of the Missouri State Operating Permit MORA00000 requires that all fueling facilities present adhere to applicable federal and state regulations concerning underground storage, above ground storage and dispensers.

Best Management Practice #1

Description:

- No fueling, servicing, maintenance or repair of equipment or machinery should be done within 100 feet of a stream, or within 150 feet of a classified stream, losing stream, or sinkhole. Tarps or drop cloths and drip pads should be used when servicing, repairing, or performing maintenance on

construction equipment in the field. When work is complete, the contaminated materials should be disposed of appropriately.

[Repeat as needed for individual BMPs.]

#### 5.4 **Washing of Equipment and Vehicles**

**Instructions:**

- Describe equipment/vehicle washing practices that will be used to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of washing (e.g., locating activities away from surface waters and stormwater inlets or conveyances and directing wash waters to a sediment basin or sediment trap, using filtration devices, such as filter bags or sand filters, or using other similarly effective controls).

Check box if Section 5.4 is not applicable to this project.

Best Management Practice # 1

Control Description:

- ATTACH NARRATIVE DESCRIPTION OF BMP, INCLUDING INSTALLATION STANDARDS AND MAINTENANCE REQUIREMENTS.
- ATTACH COPY OF TYPICAL DRAWING ON FOLLOWING PAGE.

Installation:

- INSERT PHASE OF EROSION CONTROL PLAN IN WHICH THE BMP WILL BE INSTALLED. THIS MUST CORRESPOND WITH THE PHASE LISTED IN SECTION 2.4: SEQUENCE AND ESTIMATED DATES OF CONSTRUCTION ACTIVITIES.

[Repeat as needed for individual BMPs.]



## 5.5 Storage, Handling, and Disposal of Construction Products, Materials, and Wastes

### Instructions:

- For any of the types of construction products, materials, and wastes that are expected to be used or stored at the construction site, provide the specific practices that will be employed.
- Section C.4 of the Missouri State Operating Permit MORA00000 requires that solid waste and hazardous waste be managed using trash containers and regular site clean-up for proper disposal of solid waste (scrap metal, shipping waste, food containers, etc.). Containers for proper disposal of waste paints, solvents and cleaning compounds shall be provided. Portable toilets for proper disposal of sanitary sewage and the storage of construction materials should be kept away from drainage courses and low areas.
- Section C.6 of the Missouri State Operating Permit MORA00000 requires that all hazardous wastes that are transported, stored, or used for maintenance, cleaning, or repair be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations.
- Section C.7 of the Missouri State Operating Permit MORA00000 requires that all paint, solvents, petroleum waste products and storage containers such as drums, cans, or cartons be stored according to BMPs. Materials exposed to precipitation shall be stored in watertight, structurally sound, closed containers. All containers shall be inspected for leaks or spillage during the once per week inspection of BMPs.

### 5.5.1 Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials

INSERT MATERIALS TO BE STORED AND/OR USED ON-SITE (TBD by General Contractors)

- Exposure of these chemicals to precipitation and stormwater on-site should be minimized.

### 5.5.2 Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

INSERT MATERIALS TO BE STORED AND/OR USED ON-SITE (TBD by General Contractors)

- All fueling facilities present on the site shall adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers. All fuel, oil, and other fluids exposed to precipitation shall be stored in watertight, structurally sound, closed containers. Minimize the discharge of fluids from spills and leaks by implementing chemical spill and leak prevention and response procedures, including, but not limited to, installation of containment berms and use of drip pans. Machinery should be kept out of the waterway as much as possible.

### 5.5.3 Hazardous or Toxic Waste

INSERT MATERIALS TO BE STORED AND/OR USED ON-SITE (TBD by General Contractors)

- *Examples include: paints, solvents, petroleum-based products, wood preservatives, additives, curing compounds, acids, etc.*
- Hazardous wastes shall be Missouri Hazardous Waste Laws and Regulations. Post guidelines for proper handling, storage and disposal of materials, and emergency spill cleanup on site. An accurate, up-to-date inventory of materials delivered and stored on-site should be kept. Retain original labels and material safety data sheets. All paint, solvents, petroleum products, petroleum waste products and storage containers such

as drums, cans, or cartons shall be stored using best management practices. Materials exposed to precipitation shall be stored in watertight, structurally sound, closed containers with proper labels. Store bagged and boxed materials on pallets. Cover bagged and boxed materials during non-working days and prior to rain events. Incompatible materials, such as ammonia and chlorine, must not be stored in the same temporary containment facility. Containers for proper disposal of waste paints, solvents, and cleaning compounds shall be provided. All hazardous wastes that are transported, stored, or used for maintenance, cleaning, or repair shall be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations. For guidance, contact 1-800-361-4827.

#### 5.5.4 Construction and Domestic Waste

##### INSERT MATERIALS TO BE STORED AND/OR USED ON-SITE (TBD by General Contractors)

- Examples include packaging materials, scrap construction materials, masonry products, timber, pipe, and electrical cuttings, plastics, Styrofoam, concrete, and other trash or building materials.)
- Place waste receptacles (empty on a regular basis) near area of work. Storage and collection areas shall be located onsite in an area that does not receive a substantial amount of runoff from upland areas and does not drain directly to the City's stormwater system or a natural waterway.

#### 5.5.5 Sanitary Waste

##### INSERT MATERIALS TO BE STORED AND/OR USED ON-SITE (TBD by General Contractors)

- Provide sufficient temporary toilet facilities to serve the number of workers on the site. Do not place temporary sanitary facilities on top of storm inlets or near waterways. Avoid locating sanitary facilities on impervious surfaces.

#### 5.6 Other Pollution Prevention Practices

**Instructions:**

Describe any additional pollution prevention practices that do not fit into the above categories.

Check box if Section 5.6 is not applicable to this project.

#### General

- INSERT GENERAL DESCRIPTION OF THE PROBLEM THIS CONTROL IS DESIGNED TO ADDRESS

#### Specific Pollution Prevention Practices

##### Best Management Practice # 1

##### Description:

- ATTACH NARRATIVE DESCRIPTION OF BMP, INCLUDING INSTALLATION STANDARDS AND MAINTENANCE REQUIREMENTS.
- ATTACH COPY OF TYPICAL DRAWING ON FOLLOWING PAGE.

##### Installation:

- INSERT PHASE OF EROSION CONTROL PLAN IN WHICH THE BMP WILL BE INSTALLED. THIS MUST CORRESPOND WITH THE PHASE LISTED IN SECTION 2.4: SEQUENCE AND ESTIMATED DATES OF CONSTRUCTION ACTIVITIES.

[Repeat as needed for individual BMPs.]

## SECTION 6: INSPECTION AND CORRECTIVE ACTION

### 6.1 Inspection Personnel and Procedures

#### Instructions:

- Describe the procedures you will follow for conducting inspections and how they will meet the requirements set forth in Section C.10 of the Missouri State Operating Permit MORA00000.

#### Designated Inspector:

INSERT NAME OF PERSONNEL WHO WILL BE CONDUCTING SITE INSPECTIONS.  
**(TBD by General Contractors)**

#### Inspection Schedule

Inspections will be done at least once per seven calendar days. If a rainfall causes stormwater runoff to occur on-site, the BMPs must be inspected within a reasonable time period after the rainfall event has ceased. These inspections must occur within 48 hours after the rain event has ceased during a normal workday and within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday. Areas on-site that have been finally stabilized must be inspected at least once per month.

Rain Gauge Location (if applicable)

INSERT THE LOCATION OF THE RAIN GAUGE, IF ONE IS USED FOR DETERMINING RAINFALL EVENTS.  
**(TBD by General Contractors)**

#### Inspection Report Forms

See sample inspection report form in Appendix C.

## 6.2 Corrective Action

### Instructions:

- Describe the procedures you will follow for corrective action and how they will meet the requirements set forth in Section C.10 of the Missouri State Operating Permit MORA00000.

### Personnel Responsible for Corrective Actions

INSERT NAME(S) AND CONTACT INFORMATION OF PERSONNEL WHO WILL BE RESPONSIBLE FOR CORRECTIVE ACTIONS

**(TBD by General Contractors)**

Any structural or maintenance problems shall be noted in an inspection report and corrected within seven calendar days of the inspection. If weather conditions prevent correction of BMPs within 7 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 7-day time period. The documentation must be filed with the regular inspection reports, and the problem shall be corrected as soon as weather conditions allow.

## 6.3 Delegation of Authority

### Instructions:

- Identify the individual(s) or positions within the company who have been delegated authority to sign inspection reports.
- The name on this page must match with the individual/position delegated in Appendix G.
- Attach a copy of the signed delegation of authority (see example in Appendix G of the Template).

**Duly Authorized Representative(s) or Position(s):** To be determined at the project's pre-construction meeting.

Insert Company or Organization Name:

Insert Name:

Insert Position:

Insert Address:

Insert City, State, Zip Code:

Insert Telephone Number:

Insert Fax/Email:

**SECTION 7: TRAINING**

**Instructions:**

- The following personnel, at a minimum, must be trained, and therefore should be listed out individually in the table below:
  - ✓ Person responsible for environmental matters
  - ✓ Designated inspector (if different than above)
- The Missouri State Operating Permit MORA00000 for land disturbance requires the following: (1) The permittee must designate a person responsible for environmental matters that has a thorough and demonstrable knowledge of the site's SWPPP and erosion and sediment control practices in general. (2) The permittee is responsible for ensuring that the person who conducts inspections is a "qualified person", defined in MORA00000 as "a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the skills to assess conditions at the construction site that could impact stormwater quality, and the skills to assess the effectiveness of any stormwater controls selected to control the quality of stormwater discharges from the construction activity."
- Training at the time of the pre-construction meeting should be documented in this section. If the designated personnel have already attended this training, indicate the date that training was held.

**Table 7-1: Documentation for Completion of Training**

Name	Training Completed
INSERT NAME OF PERSONNEL HERE	INSERT COMPLETION DATE HERE
INSERT NAME OF PERSONNEL HERE	INSERT COMPLETION DATE HERE
INSERT NAME OF PERSONNEL HERE	INSERT COMPLETION DATE HERE
INSERT NAME OF PERSONNEL HERE	INSERT COMPLETION DATE HERE
INSERT NAME OF PERSONNEL HERE	INSERT COMPLETION DATE HERE
INSERT NAME OF PERSONNEL HERE	INSERT COMPLETION DATE HERE
INSERT NAME OF PERSONNEL HERE	INSERT COMPLETION DATE HERE
INSERT NAME OF PERSONNEL HERE	INSERT COMPLETION DATE HERE

**SECTION 8: CERTIFICATION AND NOTIFICATION**

**Instructions**

- The following certification statement must be signed and dated by the owner or legally authorized representative (see example in Appendix G of the Template).
  - ✓ For a corporation, this could be a president, secretary, treasurer, or vice president, or any other person who performs similar policy or decision-making functions for the corporation.
  - ✓ For a partnership or sole proprietorship, this could be a general partner or the proprietor.
  - ✓ For a municipality, state, federal or other public agency, this could be a principal executive officer or ranking elected official.
- This certification must be re-signed in the event of a SWPPP Modification.

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 knowing violations.

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

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

[Repeat as needed for multiple construction operators at the site.]

## **SWPPP APPENDICES**

Attach the following documentation to the SWPPP:

***Appendix A – Site Maps***

***Appendix B – Copy of Missouri State Operating Permit***

***Appendix C – Inspection Form***

***Appendix D – SWPPP Amendment Log***

***Appendix E – Subcontractor Certifications/Agreements***

***Appendix F – Grading and Stabilization Activities Log***

***Appendix G – Delegation of Authority***

***Appendix H – Not Used***

***Appendix I – Not Used***

***Appendix J – Not Used***

***Appendix K – Missouri Department of Conservation – Heritage Results for Webster County***

***Appendix L – State Historic Preservation Office – Webster County National Register Listings***

***Appendix M – Erosion and Sediment Control Guidelines***

***Appendix N – Not Used***

## Appendix A – General Location Map

**Instructions:**

- See Requirements as discussed in Section 2.6.

**Reference Project Location Map on Project Plan Sheet No. G-001**



## Appendix A – Sediment and Erosion Control Site Plan

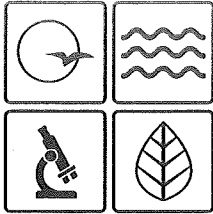
### Instructions:

- See Requirements as discussed in Section 2.6.
- Include Tree Preservation Plan, if required by Section 4.2

**Reference Project Plan Sheet Nos. G-001, & C-101 thru C-106**

**Appendix B – Copy of Missouri State Operating Permit**

INSERT A COPY OF YOUR STATE OPERATING PERMIT AS ISSUED BY THE MISSOURI DEPARTMENT OF NATURAL RESOURCES.



Missouri Department of dnr.mo.gov

# NATURAL RESOURCES

Eric R. Greitens, Governor

Carol S. Comer, Director

JUL 11 2017

OA-Facilities Mgmt, Design, and Construction  
301 West High Street, Hst Rm 370  
Jefferson City, MO 65101

Dear OA-Facilities Mgmt,

Enclosed please find your Missouri State Operating Permit which authorizes land disturbance activities for Office of Administration. This permit has been issued at your request and is based upon information submitted in your application to the Missouri Department of Natural Resources.

Please note that prior to the beginning of land disturbance activities other permits may also be required. Especially note the requirements for a Missouri Department of Natural Resources 401 Water Quality Certification and the U.S. Army Corps of Engineers 404 permit. A 401 Certification is needed when placing material, or fill, into the jurisdictional waters of the United States. Examples are culverts under road crossings, riprap along stream banks and storm water outfall pipes. The term 'jurisdictional waters' refers to large lakes, rivers, streams and wetlands, including those that don't always contain water.

The permitting and certification process is shared between the department and the U.S. Army Corps of Engineers. More details can be found at the US Army Corps of Engineer's Website at <http://www.usace.army.mil/>. Some of these activities are also described on page 2, item 3 of the enclosed permit.

This permit contains several requirements and should be thoroughly read and understood by you. If your permit requires environmental monitoring, copies of the necessary forms have been enclosed. In all future correspondence regarding your permit please reference your permit number as shown on page 1 of the permit.

Please contact the Water Pollution Enforcement and Compliance Unit if you would like to schedule an Environmental Assistance Visit (EAV) at 573-751-1300. During the visit, staff will review the requirements of the permit and answer any questions that you may have. Staff will also be available to walk the site to advise on Best Management Practices required by the permit. The department's regional office staff may also contact you to schedule an EAV.



Recycled paper

If you were adversely affected by this decision, you may be entitled to an appeal before the administrative hearing commission pursuant to 10 CSR 20-1.020 and Sections 644.051.6 and 621.250, RSMo. To appeal, you must file a petition with the administrative hearing commission 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 Administrative Hearing Commission. Contact information for the AHC is as follows: Administrative Hearing Commission, Third Floor, 131 West High Street, Jefferson City, MO 65101 (Mailing address: PO Box 1557, Jefferson City, MO 65102-1557), Phone: 573-751-2422, Fax: 573-751-5018, Website: [www.oe.mo.gov/ahc](http://www.oe.mo.gov/ahc).

Please be aware that this facility may also be subject to any applicable county or other local ordinances or restrictions.

Sincerely,

WATER PROTECTION PROGRAM

A handwritten signature in cursive script, appearing to read "David J. Lamb".

David J. Lamb  
Acting Director

DJL/sm

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 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 681, Cole County  
UTM Coordinates: 571840.000/4270368.000  
Receiving Stream: Various State Wide (U)  
First Classified Stream - ID#: Missouri R. (P) 701.00  
USGS# and Sub Watershed#: 10300102 - 1305

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)

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.

July 01, 2017

Issue Date

Edward B. Galbraith, Director  
Division of Environmental Quality

June 22, 2022

Expiration Date

David J. Lamb, Acting Director  
Water Protection Program

## APPLICABILITY

1. This general 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. This general permit also authorizes the discharge of stormwater and certain non-stormwater discharges from smaller projects where the Missouri Department of Natural Resources (department) has exercised its discretion to require a permit [10 CSR 20-6.200(1)(B)].
2. This general permit is issued to a city, county, state or federal agency or other governmental jurisdiction for land disturbance projects performed by or under contract to the permittee.
3. A general stormwater control plan or stormwater pollution prevention plan (SWPPP) must be developed prior to issuance of this permit. These plans must include a narrative of the types and appropriate uses of Best Management Practices (BMPs) for erosion and sediment control and stormwater management. All water pollution controls on land disturbance sites shall conform to the storm water control program and/or SWPPP of the city, county or other governmental jurisdiction in which the land disturbance activity is occurring. The requirements of the stormwater control program and/or SWPPP must be at least as stringent as those described in this permit and 10 CSR 20-6.200.
4. 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 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 legal owner of the property, right-of-way or the holder of an easement on the property, and operator on which the site is located are responsible for compliance with this permit.
5. This permit authorizes discharges from construction support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided that appropriate stormwater controls are designed, installed, maintained and provided:
  - 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; and
  - c. The support activity does not continue to operate beyond the completion of the construction activity at the project it supports.The permittee is responsible for compliance with this permit for any construction support activities.
6. This permit authorizes non-stormwater discharges from the following activities provided that these discharges are addressed in the permittee's specific SWPPP required by this general permit:
  - a. Dewatering activities if there are no contaminants other than sediment present in the discharge, and the discharge is treated as specified in Requirements, Section 10.o. of this permit;
  - b. Flushing water hydrants and potable water lines;
  - c. Water only (i.e., without detergents or additives) rinsing of streets and buildings; and
  - d. Site watering to establish vegetation.
7. This general permit does not authorize the:
  - a. placement of fill materials in waters or floodplains
  - b. obstruction of stream flow,
  - c. redirection of stormwater across private property not owned or operated by the permittee, or

d. Changing the channel of a defined drainage course.

These actions may be regulated by other federal, state, or local entities, such as the U.S. Army Corps of Engineers or Federal Emergency Management Agency. This general permit addresses only the quality of the stormwater runoff and the minimization of off-site migration of sediments and other water contaminants.

8. This permit does not authorize land disturbance activity in jurisdictional waters of the United States, unless the permittee has obtained the required Clean Water Act Section 404 Department of the Army permit from the U.S. Army Corps of Engineers and its associated Section 401 Water Quality Certification from the department. Land disturbance activities may not begin in the affected waters of the United States until the required §404 permit and §401 water quality certification have been obtained.
9. This general permit prohibits any discharge of wastewater generated from air pollution control equipment or the containment of scrubber water in lined ponds to waters of the state.
10. This general permit prohibits any discharge of sewage or pollutants to waters of the state including but not limited to:
  - a. Any hazardous material, oil, lubricant, solid waste or other non-naturally occurring substance from the site, including fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;
  - b. Soaps or solvents used in vehicle and equipment washing;
  - c. Hazardous substances or petroleum products from an on-site spill or handling and disposal practices;
  - d. Wash and/or rinse waters from concrete mixing equipment including ready mix concrete trucks, unless managed by an appropriate control. Any such pollutants must be adequately treated and addressed in the SWPPP, and cannot be discharged to waters of the state;
  - e. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
  - f. Domestic wastewaters, including gray waters; or
  - g. Industrial stormwater runoff.
11. The department reserves the right to revoke or deny coverage under this general permit to applicants for stormwater discharges from land disturbance activities at sites that have contaminated soils that will be disturbed by the land disturbance activity or where such materials are brought to the site to use as fill or borrow. A site-specific permit may be required to cover such activities.
12. If at any time the department determines that the quality of waters of the state may be better protected by requiring the owner/operator of the permitted site to apply for a site-specific or different general permit, the department may do so [10 CSR 20-6.010(13)(C)]. Examples of when this may occur:
  - a. The permittee is not in compliance with the conditions of this general permit;
  - b. The discharge no longer qualifies for this general permit due to changed site conditions and/or regulations; or
  - c. Information becomes available that indicates water quality standards have been or may be violated.

The permittee will be notified in writing of the requirement to apply for a site-specific permit or a different general permit. When issued to the authorized permittee, the applicability of this general permit to the permittee is automatically terminated upon the effective date of the site-specific or different general permit.
13. Any owner/operator authorized by a general permit may request to be excluded from the coverage of the general permit and apply for a site-specific permit [10 CSR 20-6.010(13)(D)].

14. 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; or the Resource Conservation and Recovery Act. Determination of applicability for the above mentioned acts is the responsibility of the permittee.
15. This permit does not supersede any requirement for obtaining project approval under an established local authority.
16. This permit is not transferable to other owners or operators.

#### EXEMPTIONS FROM PERMIT REQUIREMENTS

1. Facilities that discharge all stormwater runoff directly to a combined sewer system are exempt from stormwater permit requirements.
2. Land disturbance activity as described in 10 CSR 20-6.010(1)(B) and 10 CSR 20-6.200(1)(B).
3. Oil and gas related activities as listed in 40 CFR 122.26(a)(2)(ii).

#### REQUIREMENTS

1. Electronic Discharge Monitoring Report (eDMR) Submission System.  
Per 40 CFR Part 127 National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, reporting shall be submitted by the permittee via an electronic system to ensure timely, complete, accurate, and nationally-consistent set of data about the NPDES program. All general permit covered facilities under this master general permit shall comply with the department's requirements for electronic reporting.
  - a. Reporting Requirements.
    - (1) Application to participate in the department's eDMR system is required as part of the application for general permit coverage in order to constitute a complete permit application and may be accessed at [dnr.mo.gov/env/wpp/edmr.htm](http://dnr.mo.gov/env/wpp/edmr.htm).
    - (2) The permittee must electronically submit quarterly reports via the eDMR system.
  - b. Other actions. The following shall be submitted electronically after such a system has been made available by the department:
    - (1) General Permit Applications/Notices of Intent to discharge (NOIs);
    - (2) Notices of Termination (NOTs);
    - (3) No Exposure Certifications (NOEs); and
    - (4) Low Erosivity Waivers and Other Waivers from Stormwater Controls (LEWs).
  - c. Electronic Submissions. To access the eDMR system, use the following web link: <https://edmr.dnr.mo.gov/edmr/E2/Shared/Pages/Main/Login.aspx>.
  - d. Waivers from Electronic Reporting.
    - (1) The permittee must electronically submit reports unless a waiver is granted by the department in compliance with 40 CFR Part 127.
    - (2) The permittee may obtain a temporary or permanent electronic reporting waiver by first submitting an eDMR Waiver Request Form (Form 780-2692: <http://dnr.mo.gov/forms/780-2692-f.pdf>), by contacting the appropriate permitting office or emailing [edmr@dnr.mo.gov](mailto:edmr@dnr.mo.gov). The department will either approve or deny this electronic reporting waiver request within 120 calendar days of receipt.
    - (3) Only permittees with an approved waiver request may submit reports on paper to the Department for the period that the approved electronic reporting waiver is effective.
2. Quarterly Reports: 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;
- 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 to the department quarterly via the department's eDMR system. When a permittee terminates permit coverage, the permittee shall submit with the request for termination, the final quarterly report for the current calendar quarter. The permittee shall submit quarterly reports according to Table A.

<b>Table A 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

3. This permit is to ensure the design, installation and maintenance of effective erosion and sediment controls minimize the discharge of pollutants by:
  - a. Controlling stormwater volume and velocity within the site to minimize soil erosion;
  - b. Controlling 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 in the immediate vicinity of discharge points;
  - c. Minimizing the amount of soil exposed during construction activity;
  - d. Minimizing the disturbance of steep slopes;
  - e. Addressing factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle size expected to be present on the site to minimize sediment discharges from the site;
  - f. Providing and maintaining natural buffers around surface waters as detailed in 10.f,
  - g. Directing stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration and filtering, unless infeasible; and
  - h. Minimizing soil compaction and, unless infeasible, preserve topsoil. Minimizing soil compaction or preserving topsoil is not required where the intended function of a specific area of the site dictates that it be compacted or the topsoil be disturbed or removed.
4. Installation of Best Management Practices (BMPs) necessary to prevent soil erosion at the project boundary must be complete prior to the start of all phases of construction.
5. Install sediment controls along any perimeter areas of the site..
  - a. Remove any sediment per the manufacturer's instructions or before it has accumulated to one-half of the above-ground height of any perimeter control.
  - b. For sites where perimeter controls are infeasible, other practices shall be implemented to minimize discharges to perimeter areas of the site.
6. BMPs shall be maintained and remain in effective operating condition during the entire duration of the project, with repairs made within the timeframe specified in the Requirements Section 9 of this permit, until final stabilization has been achieved.
7. Minimize sediment track-out from the site.
  - a. Restrict vehicle traffic to properly designed exit points such as an aggregate stone with an underlying geotextile or non-woven filter fabric.

- b. Use appropriate stabilization techniques at all points that exit onto paved roads.
  - c. Remove any sediment that has been tracked out within the same business day or by the end of the next business day if track-out occurs on a non-business day.
8. **SWPPP Development and Implementation:** 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. The permittee shall fully implement the provisions of the SWPPP required under this part as a condition of this general permit throughout the term of the land disturbance project. **The SWPPP must be developed prior to issuance of the permit and must be updated with details specific to the land disturbance site prior to conducting any land disturbance activities at the site.** Either an electronic copy or a paper copy of the SWPPP must be accessible to anyone on-site at all times when land disturbance operations are in progress, or other operational activities that may affect the maintenance or integrity of the BMP structures and made available as specified under the Records Section of this permit.
9. The SWPPP must:
- a. List and describe all points of discharge to receiving water(s);
  - b. Incorporate required practices identified below;
  - c. Incorporate erosion control practices specific to site conditions;
  - d. Provide for maintenance and adherence to the plan;
  - e. Discuss whether or not additional authorizations, such as a Section 404 permit and associated Section 401 Water Quality Certification are required for the project; and
  - f. Name the person responsible for inspection, operation and maintenance of BMPs.

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; compliance with the Missouri Water Quality Standards; and compliance with the terms and conditions of this general permit.

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/npdes/developing-stormwater-pollution-prevention-plan-swppp>; and 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 is available on the department's internet site at <http://www.dnr.mo.gov/env/wpp/wpcp-guide.htm>.

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 should be described and justified in the SWPPP.

10. **SWPPP Requirements:** The following information and practices shall be provided for in the SWPPP:
- a. **Nature of the Construction Activity:** The SWPPP briefly must describe the nature of the construction activity, including:
    - (1) The function of the project (e.g., low density residential, shopping mall, highway, etc.);
    - (2) The intended sequence and timing of activities that disturb the soils at the site;
    - (3) Estimates of the total area expected to be disturbed by excavation, grading, or other construction activities including off-site borrow and fill areas; and
    - (4) A general map (e.g., United States Geological Survey quadrangle map, a portion of a city or county map, or other map) with enough detail to identify the location of the construction site and waters of the state within one mile of the site.

- b. Site Map: The SWPPP must contain a legible site map showing the site boundaries and points of discharge to receiving water(s) and identifying:
- (1) Direction(s) of stormwater flow and approximate slopes for all phases of construction activities;
  - (2) 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);
  - (3) Location of permanent and temporary structural and non-structural BMPs identified in the SWPPP;
  - (4) Locations where stabilization practices are expected to occur;
  - (5) Locations of off-site material, waste, borrow or equipment storage areas;
  - (6) Locations of all waters of the state (including wetlands);
  - (7) Locations where stormwater discharges to a surface water; and
  - (8) Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.
- c. Site Description: In order to identify the site, the SWPPP shall include facility and points of discharge to receiving water(s) information. 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.
- d. Selection of Temporary and Permanent BMPs: The permittee shall select, install, use, operate and maintain appropriate BMPs for the permitted site and list them in the SWPPP.
- e. Preservation of trees and vegetation: The SWPPP shall require existing vegetation and trees to be preserved where practical.
- f. Surface Water Buffers: For surface waters of the state, defined 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, located on or adjacent to the site,” the permittee must comply with (1)-(3), except as noted in (4):
- (1) Provide and maintain a 50-foot undisturbed natural buffer;
  - (2) 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
  - (3) 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.
  - (4) The permittee is not required to comply with (1), (2) or (3) above if one of the following exceptions apply and documentation is provided in the SWPPP:
    - (a) As authorized per Clean Water Act Section 404 Department of the Army permit and its associated Section 401 Water Quality Certification from the department.
      1. The angle of any crossing shall be as perpendicular as feasible to the water course or natural stream buffer to minimize adverse impacts.
    - (b) 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 your site. This includes situations where you have implemented permanent control measures that will prevent such discharges, such as a berm or other barrier.
    - (c) 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.
      1. 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, you are required to comply with (1), (2), or (3) above.
    - (d) For linear projects where site constraints make it infeasible to implement a buffer or equivalent provided you limit disturbances within 50 feet of any waters of the state and/or you provide supplemental erosion and sediment controls to treat stormwater

- discharges from earth disturbances within 50 feet of the water of state.
- (e) For small residential lot construction as defined as 'a lot being developed for residential purposes that will disturb less than 1 acre of land, but is part a larger common plan of development or sale,' one has the option of complying with (1), (2) or (3) above or one of the following alternatives:
    - 1. Tiered-technology approach where:
      - a. A 50-foot or larger buffer is retained, no additional requirements are needed,
      - b. The buffer is greater than 30 feet but less than 50 feet wide, implement double perimeter controls spaced a minimum of at least 5 feet apart between land disturbance and water of the state, or
      - c. A less than or equal to 30-foot buffer is maintained, implement double perimeter controls between land disturbance and water of the state and stabilization activities completed with 7 calendar days of temporary or permanent cessation of land disturbance; or
    - 2. Sediment discharge risk based on the site's slope, location and soil type when combined with buffer width.
  
  - g. Measuring Buffer Width: 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.
  
  - h. Description of BMPs: The SWPPP shall include a description of both structural and non-structural BMPs used one or more times at the site, providing the following general information for each:
    - (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 for the BMP.
  
  - i. Specific Instance of BMPs: 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) Where, in relation to other site features, the BMP is to be located;
    - (3) When the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project; and
    - (4) Site conditions that must be met before removal of the BMP if the BMP is not a permanent BMP.
  
  - j. Disturbed Areas: Slopes for disturbed areas must be defined in the SWPPP. A site map or maps defining the sloped areas for all phases of the project must be included in the SWPPP.
    - (1) For soil disturbing activities that have 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.
    - (2) 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.
    - (3) Allowances to the 14 day completion period for temporary and final stabilization may be made due to weather and equipment malfunctions. In drought-stricken areas where initiating vegetative stabilization measures immediately are infeasible, alternative stabilization measures must be employed. The use of allowances shall be documented in the SWPPP.

- (4) Interim stabilization 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. These BMPs may include a combination of sediment basins, check dams, sediment fences and mulch. 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) or if the slope is greater than 3% and greater than 150 feet in length, then the permittee shall establish interim stabilization within seven days of ceasing operations on that part of the site.
  - (5) In limited circumstances, stabilization may not be required if the intended function of a specific area of the site necessitates that it remain disturbed.
- k. Installation: The permittee shall ensure the BMPs are properly installed at the locations and relative times specified in the SWPPP.
- (1) Peripheral or border BMPs to control runoff from disturbed areas shall be installed or marked for preservation before general site clearing is started. Note that this requirement does not apply to earth disturbances related to initial site clearing and establishing entry, exit and access of the site, which may require that stormwater controls be installed immediately after the earth disturbance.
  - (2) For phased projects, BMPs shall be properly installed as necessary prior to construction activities.
  - (3) Stormwater discharges from disturbed areas which leave the site shall pass through an appropriate impediment to sediment movement such as a sedimentation basin, sediment traps and/or silt fences prior to leaving the land disturbance site.
  - (4) A drainage course change shall be clearly marked on a site map and described in the SWPPP.
  - (5) If vegetative stabilization measures are being implemented, stabilization is considered “installed” when all activities necessary to seed or plant the area are completed.
- l. Sedimentation Basins: The SWPPP shall include a sedimentation basin for each drainage area with ten or more acres disturbed at one time.
- (1) The sedimentation basin shall be sized to a local 2-year, 24-hour storm. A 2-year, 24-hour storm event shall be determined for the project location using the National Oceanic and Atmospheric Administration’s National Weather Service Atlas 14 which can be located at <http://hdsc.nws.noaa.gov/hdsc/pfds/>.
  - (2) Basins designed and initiated under the 2012 Area-Wide Land Disturbance General Permit MO-R100038 or prior authorizations shall comply with the requirements held in those authorizations. Any construction activities designed and initiated under this authorization shall comply with the local 2-year, 24-hour storm event by January 1, 2018.
  - (3) Accumulated sediment shall be removed from the basin when basin is 50% full.
  - (4) Utilize outlet structures that withdraw water from the surface when discharging from basins and impoundments unless infeasible.
  - (5) Discharges from the basin shall not cause scouring of the banks or bottom of the receiving stream.
  - (6) The SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.
  - (7) 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.
  - (8) 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 delivery. 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.

- m. Pollution Prevention Measures: The SWPPP shall include BMPs for pollution prevention measures. At minimum such measures must be designed, installed, implemented and maintained to:
- (1) Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
  - (2) 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. Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a discharge of pollutants, or where exposure of a specific material or product poses little risk or stormwater contamination (such as final products and material intended for outdoor use);
  - (3) Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures. Included but not limited to the installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers; and
- n. Roadways: Where applicable, upon installation of or connection to roadways, all efforts should be made to prevent the deposition of earth and sediment onto roadways through the use of proper BMPs.
- (1) Stormwater inlets susceptible to receiving sediment from the permitted land disturbance site shall have curb inlet protection.
  - (2) Where stormwater will flow off the end of where a roadway terminates, a sediment catching BMP such as gravel berm or silt fence shall be provided.
  - (3) Curb inlets shall be cleaned weekly or following a precipitation event that generates a run-off.
- o. Dewatering: Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited unless managed by appropriate controls. The SWPPP shall include a description of any anticipated dewatering methods.
- (1) The SWPPP shall call for specific BMPs designed to treat water pumped from trenches and excavations and in no case shall this water be pumped off-site without being treated by the specified BMPs.
11. Good housekeeping practices shall be maintained at all times to keep waste from entering waters of the state. Solid and hazardous waste management include providing trash containers and regular site cleanup for proper disposal of solid waste such as scrap building material, product/material shipping waste, and food containers and cups, and providing containers and proper disposal of waste paints, solvents and cleaning compounds. The provision of portable toilets for proper disposal of sanitary sewage and the storage of construction materials should be kept away from drainage courses and low areas.
12. All fueling facilities present shall at all times adhere to applicable federal and state regulations concerning underground storage, above ground storage and dispensers.
13. Hazardous substances that are transported, stored, or used for maintenance, cleaning, or repair shall be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations.
14. Containers: All paint, solvents, petroleum products, petroleum waste products and storage containers such as drums, cans, or cartons shall be stored according to BMPs. The materials exposed to precipitation shall be stored in watertight, structurally sound, closed containers. All containers shall be inspected for leaks or spillage during the inspection of BMPs.

15. Amending/Updating the SWPPP: The permittee shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. The permittee shall amend the SWPPP at a minimum whenever the:
  - a. 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;
  - 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 excessive sediment deposits in streams or lakes); and/or
  - f. Department determines violations of water quality standards may occur or have occurred.
  
16. An individual shall be designated by the permittee as the lead for environmental matters. The lead individual for environmental matters shall have a thorough and demonstrable knowledge of the site's SWPPP and sediment and erosion control practices in general. The lead individual for environmental matters or a designated inspector knowledgeable in erosion, sediment and stormwater control principles shall inspect all structures that function to prevent pollution of waters of the state
  
17. Site Inspections: The permittee (or a representative of the permittee) shall conduct regularly scheduled inspections.
  - a. 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.
  - b. Inspections are only required during the project's normal working hours.
  - c. For disturbed areas that have not been finally stabilized, all installed BMPs and other pollution control measures shall be inspected for proper installation, operation and maintenance.
  - d. Areas on-site that have been stabilized must be inspected at least once per month.
    - (1) For areas where disturbed portions have undergone temporary stabilization at the same time active construction continues on other areas, inspections shall occur at least once a month while stabilized and when re-disturbed shall follow either frequency outlined in subsection h. below.
    - (2) For areas where disturbed portions have undergone final stabilization at the same time active construction continues on other areas, inspection frequency may be cease on the finally stabilized areas according to the following:
      - (a) After the first monthly inspection, inspect once more within 24 hours of a storm event of 0.25 inches or greater.
      - (b) If there are no issues or evidence of stabilization problems, further inspections may cease.
      - (c) If unstable site conditions or sediment movement are observed, the site must be re-stabilized and monthly inspections shall occur until final stabilization is confirmed following a storm event of 0.25 inches or greater.
  - e. All stormwater outfalls shall be inspected for evidence of erosion or sediment deposition.
  - f. When practicable the receiving stream shall also be inspected for 50 feet downstream of the outfall.
  - g. Any structural or maintenance problems shall be noted in an inspection report and corrected as soon as possible but no more than seven calendar days after the inspection.
    - (1) If weather conditions 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.
    - (2) The documentation must be filed with the regular inspection reports.
    - (3) The permittee shall correct the problem as soon as weather conditions allow.
  - h. All BMPs must be inspected in accordance to one of the two schedules listed below, and any

- changes to the frequency of inspections, including switching between the options listed below, must be documented in the SWPPP:
- (1) At least once every seven 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 and within 72 hours if the event ceases during a non-work day such as a weekend or holiday; or
  - (2) Once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches or greater or the occurrence of runoff from snowmelt. To determine if a storm event of 0.25 inches or greater has occurred on-site, the permittee must either keep a properly maintained precipitation gauge on site, or obtain the storm event information from a weather station near the site.
    - (a) Inspections shall be conducted within 24 hours once a storm event has produced 0.25 inches within a 24 hour period, even if the storm event is still continuing.
    - (b) If the permittee has 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 is required to conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the end of the storm.
18. The SWPPP must explain how the person responsible for erosion control will be notified when stormwater runoff occurs
19. Site Inspections Reports: A log of each inspection and copy of the inspection report shall be kept readily accessible and must be available upon request by the department. Electronic logs are acceptable as long as reports can be provided in a timely manner. If inspection reports are kept off-site, the SWPPP must indicate where they are stored. The inspection report shall be signed by the permittee or by the person performing the inspection if duly authorized to do so. The inspection report is to include the following minimum information:
- a. Inspector's name;
  - b. Date of inspection;
  - c. Observations relative to the effectiveness of the BMPs;
  - d. Actions taken or necessary to correct the observed problem; and
  - e. Listing of areas where land disturbance operations have permanently or temporarily stopped.
20. Notification to All Contractors: The permittee shall be responsible for notifying 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 action or precautions shall be taken while on-site to minimize the potential for erosion and the potential for damaging any BMP. The SWPPP shall contain a record of notification; for example, a list of contractors or entities given a copy of the SWPPP or education session sign-in sheet. The permittee is responsible for any damage a subcontractor may do to established BMPs and any subsequent water quality violation resulting from the damage.
21. Public Notification: The permittee shall post a copy of the public notification sign on page 15 of this permit at the main entrance to the site. 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 permit has been terminated.

## OTHER DISCHARGES

A record of each reportable release of hazardous substance shall be retained with the SWPPP and made available to the department upon request. The department may also require the submittal of a written or electronic report detailing measures taken to clean up the spill within five (5) days of the spill. Such a report must include the type of material spilled, volume, date of spill, date clean-up was completed, clean-up method, and final disposal method.



## SAMPLING REQUIREMENTS AND EFFLUENT LIMITATIONS

The department may require sampling and reporting as a result of illegal discharges, compliance issues, complaint investigations, or other such evidence of contamination from activities at the site. If such an action is needed, the department will specify in writing any sampling requirements, including such information as location, extent and parameters.

## RECORDS

1. The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site, results of any monitoring and analysis, and all site inspection records. The records shall be accessible during normal business hours. The records shall be retained for a period of at least three years from the date of the Letter of Termination.
2. The permittee shall provide a copy 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.
3. 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.

## LAND PURCHASE AND CHANGE OF OWNERSHIP

1. If the permittee sells any portion of the 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.
2. Property of any size which is part of a larger common plan of development where the property has been stabilized and the original permit terminated will require application of a new land disturbance permit for any future land disturbance activity unless exempted per 10 CSR 20-6.010(1)(B), 10 CSR 20-6.200(1)(B), and 40 CFR 122.26(a)(2)(ii).
3. If the entire tract is sold to a single entity, then this permit shall be terminated when the new owner obtains a new land disturbance permit for the site.
4. 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 while no permit is required for less than one acre of land sold.

## TERMINATION

This permit may be terminated when all projects are stabilized. The project is considered to be finally stabilized when perennial vegetation, pavement, buildings, or structures using permanent materials cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetation cover shall be at least 70% over 100% of the site. In order to terminate the permit, the permittee shall notify the department by submitting *Form H- Request for Termination of a General Permit* (<http://dnr.mo.gov/forms/780-1409-f.pdf>).

## DUTY TO REAPPLY

Unless terminated, the permittee shall submit an application for the renewal of this permit by submitting *Form E-Application for General Permit* (<http://dnr.mo.gov/forms/780-0795-f.pdf>) and

*Form G – Application for Stormwater Permit Under the General Permit: Land Disturbance* (<http://dnr.mo.gov/forms/780-1408-f.pdf>) no later than thirty (30) days prior to the permit's expiration date. If a facility submits a timely and complete application in accordance with 10 CSR 20-6.010(5)(B), (5)(C), and (10)(E)1, as well as § 644.051.10, RSMo 2015, if the department is unable, through no fault of the permittee, to issue a renewal prior to expiration of the previous permit, the terms and conditions of the expired permit are administratively continued and will remain fully effective and enforceable until such time when a permit action is taken. Failure to submit a renewal application for a facility that is still in operation is a violation of the Missouri Clean Water Law. As part of the complete application and as required by the federal NPDES eReporting rule, participation in the department's Electronic Discharge Monitoring Report Submission System (eDMR) will be required. Facilities already participating in eDMR need not re-apply upon renewal. More information can be found at: <http://dnr.mo.gov/env/wpp/edmr.htm>. Failure to apply for renewal of a permit may result in termination of this permit and enforcement action to compel compliance with this condition and the Missouri Clean Water Law. This permit may be applied for and issued electronically once made available by the director in accordance with Section 644.051.10, RSMo.

#### MODIFICATION, REVOCATION, AND REOPENING

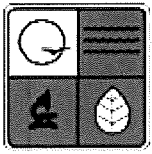
1. The full implementation of this operating permit shall constitute compliance with all applicable federal and state statutes and regulations in accordance with §644.051.16, RSMo, and the CWA section 402(k); however, this permit may be reopened and modified, or alternatively revoked and reissued to comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a) (2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:
  - a. contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
  - b. controls any pollutant not limited in the permit.
2. 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.

#### STANDARD CONDITIONS

These Standard Conditions incorporate permit conditions as required by 40 CFR 122.41 or other applicable state statutes or regulations. These minimum conditions apply unless superseded by requirements specified in the permit.

1. 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.
2. 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.
3. Duty to Provide Information: The permittee shall furnish to the department, within a reasonable time, 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.

4. 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.
  
5. 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.



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**  
**MO-R100038**

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 (permit) 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 CFR124.8, 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 a permit.

This Fact Sheet is for a:

- Major
- Minor
- Industrial Facility
- Variance
- Master General Permit
- Permit with widespread public interest

**Definitions**

**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.

**Immediately:** For the purposes of this permit, immediately should be defined as within 24 hours.

**Infeasible:** Infeasible means not technologically possible, or not economically practicable and achievable in light of best industry practices.

**Larger Common Plan of Development or Sale:** A contiguous area where multiple separate and distinct construction activities are occurring under one plan.

**Non-structural Best Management Practice:** Institutional, educational or pollution prevention practices designed to limit the amount of stormwater runoff or pollutants that are generated in the landscape. An example includes ordinance development.

**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 should be defined as any activity that has been

ceased without any intentions of future disturbance.

Structural Best Management Practice: Physical controls working individually or as a group, appropriate to the source, location, and area climate for the pollutant to be controlled. Examples include moving earth for sedimentation basin and planting vegetation.

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 – Facility Information**

Facility Type: Industrial Stormwater  
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 SWPPP requirement to minimize pollutants of concern from this type of facility or for all facilities covered under this permit. 10 CSR 20-6.200(6)(A)7. specifies that "general permits shall contain BMP requirements and/or monitoring and reporting requirements to keep the stormwater from becoming contaminated." 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 local conditions.

While drafting this permit for renewal, the department hosted four public meetings on January 27, February 24, April 18, and May 19, 2016, which allowed stakeholders to voice concerns about conditions within the permit and submit comments during the period of initial involvement. These concerns were taken into consideration when drafting the permit.

## **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:

Please mark all appropriate designated waters of the state categories of the receiving stream.

- 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 beneficial water uses shall be maintained in accordance with 10 CSR 20-7.031(4). The BMP requirement established by this permit are intended to be protective of all streams that fall within the categories of receiving water bodies indicated above. A general permit does not take into consideration site-specific conditions.

### **Part III – Applicability**

Condition number 5 includes support activities. Those support activities are to become part of the land disturbance permitted area and included in the acreage calculations, whether the support activities are located adjacent to, on-site or off-site from the main land disturbance construction area. For example, if the main land disturbance site is 0.6 acres and the project needs fills that is gathered from a borrow site specific to this project which equals 0.5 acres, then the total acreage for this project is an acre or more and the conditions of this permit apply to both the main construction area and the borrow area.

Condition number 14 was expanded to include a more comprehensive list of state and federal requirements that must be taken into consideration.

If the proposed project encounters and will potentially affect a species of concern, please report it to the Missouri Department of Conservation and the United States Fish and Wildlife Service. For more information about requirements of the Endangered Species Act, please visit the following links:

1. To determine the potential for species of concern within or near a project, please visit the United States Fish and Wildlife Services’ “Information, Planning and Conservation” website at <http://ecos.fws.gov/ipac/>.
2. If there are listed species in the county or township, check to see if critical habitat has been designated and if that area overlaps or is near the project area. Critical habitat designations and associated requirements may also be found at 50 CFR Parts 17 and 226. For additional information, use the map view tool at <http://criticalhabitat.fws.gov/crithab/> to find data specific to the state and county.

The Missouri Department of Conservation’s internet site for the Natural Heritage Review may be very helpful and can be found at the following link, <https://naturalheritagereview.mdc.mo.gov/>.

### **Part IV – Exemptions**

Condition Number 2 was added to cite all state exemptions from permitting requirements, combining several previous cited exemptions into one condition and reference. This includes an exemption for linear construction where the entire disturbance, including clearing of land to access the linear disturbance, is less than two feet in width.

Condition Number 3 was added to cite federal regulations that exclude land disturbance projects related to the installation or maintenance work for oil and gas related activities.

### **Part V – Rationale of Technology Based Limitations & Permit Conditions**

#### **303(d) LIST & TOTAL MAXIMUM DAILY LOAD (TMDL):**

Section 303(d) of the Federal CWA requires that each state identify waters that are 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 that are impaired but not addressed by normal water pollution control programs.

#### **ANTI-BACKSLIDING:**

A provision in the Federal Regulations [CWA Section 303(d) (4); CWA Section 402(c); 40 CFR Part 122.44(I)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

- Applicable: Backsliding proposed in this permit conforms to the anti-backsliding provisions of Section 402(o) of the CWA and 40 CFR 122.44. The department has determined that technical mistakes were made in the previous permit [CWA 402(o)(2)(B)(ii)]. The Department has determined that technical mistakes or mistaken interpretations of law were made in issuing the

permit under section 402(a)(1)(b).

**Settleable Solids:** The Settleable Solids limitation was removed since has been determined to not be a statewide technology or water quality based limitation given a variability of soil type in the state. Increased technology based best management practices have been included and are a more appropriate technology based requirement.

**Water Quality Standard Narrative Prohibitions.** The previous permit contained language which referenced narrative compliance with the water quality standards found in 10 CSR 20-7.031. In order to comply with 40 CFR 122.44(d)(1), the permit writer has conducted reasonable potential determinations for each general and applicable specific criterion and established numeric effluent limitations where reasonable potential exists. While the removal of the previous permit language creates the appearance of backsliding, the permit writer has evaluated discharges associated with this general permit as to whether reasonable potential to cause excursions of specific or general criteria on a statewide level and found that no reasonable potential exists given the proper implementation of a Stormwater Pollution Prevention Plan and associated best management practices and that the requirements of this permit are equally protective as compared to the previous permit. Therefore, given this new information, and the fact that the previous permit special condition was not consistent with 40 CFR 122.44(d)(1), an error occurred in the establishment of the general criteria as a special condition of the previous permit.

**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 that the best avenue forward for implementing the Antidegradation requirements into general permits is by requiring the appropriate development and maintenance of a SWPPP. The SWPPP must identify all Best Management Practices (BMPs) that are reasonable and effective, 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 new BMPs that are reasonable and cost effective. New facilities seeking coverage under this permit are required to develop a SWPPP that includes this analysis and documentation of appropriate BMPs. Renewal of coverage for a facility requires a review of the SWPPP to assure that the selected BMPs continue to be appropriate.

- Applicable:** The main pollutant of concern in this permit is sediment. Compliance with the technology-based limitations established in this permit for the protection of General Criteria, along with the evaluation and implementation of BMPs as documented in the SWPPP, meets the requirements of Missouri's Antidegradation Review [10 CSR 20-7.031(3), 10 CSR 20-7.031 Table A, and 10 CSR 20-7.015(9)(A)5].

**STORMWATER POLLUTION PREVENTION PLAN (SWPPP):**

In accordance with 40 CFR 122.44(3)(k) Best Management Practices (BMPs), BMPs are implemented 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 Developing Your Stormwater Pollution Prevention Plan, a Guide for Construction Sites (EPA 833-R-06-004; [https://www3.epa.gov/npdes/pubs/sw\\_swppp\\_guide.pdf](https://www3.epa.gov/npdes/pubs/sw_swppp_guide.pdf)) published by the United States Environmental Protection Agency (EPA) in May 2007, BMPs are measures or practices used to reduce the amount of pollution entering waters of the state. BMPs may take the form of a process, activity, or physical structure. EPA developed resources and tools related to construction stormwater along with the BMPs to control and minimize stormwater ( <https://www.epa.gov/npdes/stormwater-discharges-construction-activities>). Along with EPA's resources and tools, the International Stormwater BMP database ([www.bmpdatabase.org/index.htm](http://www.bmpdatabase.org/index.htm)) may provide guidance on BMPs appropriate for specific industries.

Additionally in accordance with 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 stormwater discharges.

- Applicable: A SWPPP shall be developed and implemented for each site and shall incorporate required practices identified by the department with jurisdiction, incorporate erosion control practices specific to site conditions, and provide for maintenance and adherence to the plan.

The new permit has been revised to allow permittees to store SWPPP documents electronically as long as they can be provided in an expedient manner.

Release of a hazardous substance must be reported to the department in accordance with 10 CSR 24-3.010. If the spill occurs outside of normal business hours, or if the permit holder cannot reach regional office staff for any reason, the permit holder is instructed to report the spill to the department's 24 hour Environmental Emergency Response hotline at (573) 634-2436 at the earliest practicable moment after discovery. Leaving a message on a department staff member voice-mail does not satisfy this reporting requirement.

#### **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.

#### **SPECIFIC CRITERIA CONSIDERATIONS:**

An evaluation of discharges associated with land disturbance activities has been conducted to determine if any pollutants discharged under this general permit would have reasonable potential to cause or contribute toward an excursion of specific water quality criterion. Pollutants discharged from land disturbance activities are not commonly associated with pollutants listed as specific criteria in the Missouri Water Quality Standards; therefore, reasonable potential to cause an excursion of a specific criterion does not exist.

#### **GENERAL CRITERIA CONSIDERATIONS:**

In accordance with 40 CFR 122.44(d)(1), effluent limitations shall be placed into the permit for those pollutants which have been determined to cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality. The rule further states that pollutants which have been determined to cause, have the reasonable potential to cause, or contribute to an excursion above a narrative criterion within an applicable State water quality standard, the permit shall contain a numeric effluent limitation to protect that narrative criterion. In order to comply with this regulation, the permit writer will complete reasonable potential determinations on whether the discharge will violate any of the general criteria listed in 10 CSR 20-7.031(4). These specific requirements are listed below followed by derivation and discussion [the lettering matches that of the rule itself, under 10 CSR 20-7.031(4)]. It should also be noted that Section 644.076.1, RSMo states that it shall be unlawful for any person to cause or permit any discharge of water contaminants from any water contaminant or point source located in Missouri that is 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.

- (a) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses. The SWPPP requires implementation of best management practices to store, prevent, or minimize stormwater and/or any related land disturbance activity discharges (namely sediment). If one follows their SWPPP and other permit conditions including timely inspections, no reasonable potential to cause an excursion of this narrative exists. Additionally, there had been no indication to the Department that a stream has had issues maintaining beneficial uses as a result of the controlled and managed stormwater discharges per the SWPPP. Therefore, based on the information reviewed during the drafting of this permit, no reasonable potential to cause or contribute to an excursion of this criterion exists.
- (b) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses. Please see (a) above as justification is the same.
- (c) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses. Please see (a) above as justification is the same.
- (d) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life. This permit addresses discharges from land disturbance activities and it not expected to include an toxic pollutants. Best management practices are to be addressed in the SWPPP should any toxic pollutant of concern be on-site.
- (e) There shall be no significant human health hazard from incidental contact with the water. Please see (a) above as justification is the same.
- (f) There shall be no acute toxicity to livestock or wildlife watering. Please see (d) above as justification is the same.
- (g) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community. Please see (a) above as justification is the same.
- (h) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247. Please see (a) above. Additionally, any solid wastes received or produced at this facility are wholly contained in appropriate storage facilities, are not discharged, and are disposed of offsite. Therefore, this discharge does not have reasonable potential to cause or contribute to an excursion of this criterion.

The settleable solids requirement was removed from this permit and was replaced with additional, more specific BMP requirements. The settleable solids limit was determined not to be protective of all waters across the state, therefore, it was removed. Examples of these BMPs include requirements to:

- Install and maintain perimeter controls along areas of the site that will receive pollutant discharges;
- Minimize sediment track-out from the site;
- Provide storage for runoff up to and including a 2-year, 24-hour storm event when designing sedimentation basins; and
- Direct stormwater to vegetated areas.

The minimum buffer width was increased from 25 feet to 50 feet. Studies have shown that a 50 foot vegetative buffer more adequately treats sediment from stormwater discharges. This appears to be standard in EPA's permit as well as in many other states. A literature review was conducted to assess the effectiveness of buffer widths in relation to sediment removal. In an early literature review on grass buffers in agricultural settings, Dosskey (2001) concluded that 40 -100% of sediment entering from cultivated fields was removed using buffer strips 0.5 to 20 meters. Liu *et al.* (2008) conducted an analysis of 85 estimates of sediment removal by vegetated buffers. They found that sediment removal efficiency ( $E_s$ , the percentage of inflowing sediment trapped within a buffer) increased with buffer width according to the relationship:  $E_s = 13.4 \log_e(w) + 56.9$  in

which  $w$  (m) is buffer width. This equation predicts that  $E_s$  increases from 78% for a 5 meter wide buffer to 88% and 97% at widths of 10 meters and 20 meters, respectively. Yaun *et al.* (2009; 93 estimates) and Zhang *et al.* (2010; 81 estimates) garnered similar results to Liu *et al.*

In order to design controls that match the sediment removal efficiency of a 50-foot buffer, first the permittee must know what this efficiency is for the 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 sediment controls used to reduce the discharge of sediment prior to the buffer.

Sediment removal efficiencies are based on the U.S. Department of Agriculture's RUSLE2 (Revised Universal Soil Loss Equation 2) model for slope profiles using a 100-foot long exposed slopes.

Sediment removal is defined as the annual sediment delivered at the downstream end of the 50-foot natural buffer (tons/yr/acre) divided by the annual yield from cleared area (tons/yr/acre).

Sediment removal is in part a function of (1) a perimeter control (i.e., silt fence) located between the disturbed portion of the site and the upland edge of the natural buffer and (2) stormwater flows traveling through a 50-foot buffer of undisturbed natural vegetation.

Additional guidance may be found at [https://www.epa.gov/sites/production/files/2017-02/documents/2017\\_cgp\\_final\\_appendix\\_g\\_-\\_buffer\\_reqs\\_508.pdf](https://www.epa.gov/sites/production/files/2017-02/documents/2017_cgp_final_appendix_g_-_buffer_reqs_508.pdf).

Inspection frequencies: Site inspection frequencies have been changed from the previous permit based upon guidance from the USEPA and from stakeholder discussions. These frequencies will allow flexibility but will still allow for frequent enough inspections to ensure that all BMPs are adequately functioning.

## **Part VI – Effluent Limitations Determination**

In this general permit, Technology-Based Effluent Limitations are established through the SWPPP and BMP requirements. Effective BMPs may have to be designed on a site-specific basis. The implementation of monitoring provides a tool for each facility to evaluate the effectiveness of BMPs to ensure protection of water quality.

## **Part VII – Land Purchase and Change of Ownership**

A “larger common plan of development or sale” is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan. This term is used in conjunction with common promotional plan, as defined in §644, RSMo.

Any portion of a project that is sold to a developer is still considered part of a larger common plan of development or sale and will require a permit.

If a portion of a site is sold to an individual for the purpose of building his or her private residence:

- A permit is required if the portion of land sold is equal to or greater than one acre.
- A permit is not required if the portion of land sold is less than one acre.

## **Part VIII – Termination**

The word ‘plant density’ was removed from the first paragraph since the department determined that percent of vegetative cover more accurately describes the vegetative requirements of this permit. This decision was made after discussion within the department and with stakeholders.

It is preferable that temporary BMPs such as sediment fence be removed prior to permit termination to

eliminate potential solid waste issues that may occur as a result of unnecessary and unmaintained BMPs.

Additional options for winter site stabilization as part of the vegetation requirement may exist, such as using a seeded erosion control blanket.

### **Part IX – Duty to Reapply**

This section has been revised to reflect the current applicable statutes which require applicants to submit an application for coverage 30 days prior to expiration of this permit. Currently, a paper application is required; however, applicants are to submit an application for coverage electronically as soon as they are made available by the director. The department will announce the availability status of the new permit and the process to reapply at least 60 days prior to the expiration of the existing permit.

### **Part X – Standard Conditions**

This section was revised to only include the standard conditions that specifically apply to this permit. All other conditions have been removed.

### **Part XI – 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 NOTICE:**

The department shall give public notice that 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 seeking comments on this permit occurred from March 31 to May 1, 2017.

**DATE OF FACT SHEET: 06/16/2017**

**COMPLETED BY:**  
**CHRISTOPHER MILLER**  
**ENVIRONMENTAL SPECIALIST**  
**573-526-3337**  
**christopher.miller@dnr.mo.gov**

**EDITED BY:**  
**STACIA BAX**  
**ENVIRONMENTAL SUPERVISOR**  
**573-526-4586**  
**stacia.bax@dnr.mo.gov**

**Appendix C – Sample Copy of Inspection Form**

**Self-Inspection Checklist: Land Disturbance**

<b>Date:</b>	<b>Time:</b>	<b>Project Name:</b>	<b>Permit #:</b>
<b>Designated Responsible Person In SWPPP (Name, Company):</b>			
<b>Reason for Inspection:</b> <input type="checkbox"/> Weekly <input checked="" type="checkbox"/> Stormwater Event            Rainfall Total: _____ <input type="checkbox"/> Other			

Inspection Checklist	Satisfactory?	Corrective Action Needed and Notes
<b>SWPPP &amp; Site Sign</b> – Is SWPPP on site and updated with records attached? Is sign/notice posted on construction site?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>ESC Plan</b> – Do erosion and sediment control BMPs in the field match specifications in SWPPP?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Construction Exit</b> – Is sediment trackout controlled at the construction exit? Are streets substantially free of sediment?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Stockpiles</b> - Are stockpiles stabilized or controlled by a BMP? Are borrow/fill areas identified on the SWPPP?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Dewatering operations</b> – Are dewatering operations filtering sediment/pollutants?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Housekeeping</b> – Are litter, construction debris, and construction chemicals controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>BMP Maintenance</b> - Have all BMPs been repaired/ sediment accumulation removed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Tree Protection</b> –Is fencing installed properly? Are root zones and tree canopy protected from equipment, vehicles and construction material?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>BMP Removal</b> – Have all temporary BMPs that are no longer needed been removed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Stabilization</b> – Has temporary stabilization been achieved on areas inactive for more than 14 days? Has final stabilization been implemented where possible?	<input type="checkbox"/> Yes <input type="checkbox"/> No	

**Training:** The person designated as responsible for environmental matters, and the person designated to conduct self-inspections (if different) are required to have thorough and demonstrable knowledge of erosion and sediment control practices. Training is recommended.

**Unless otherwise noted, all corrective actions must be completed by:**

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 knowing violations.

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

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

**Appendix D – Sample SWPPP Amendment Log**

**Instructions:**

- Create a log here of changes and updates to the SWPPP. Use table below to track these modifications.
- SWPPP modifications are required pursuant to Section C.8 of the Missouri State Operating Permit MORA00000 whenever the:
  - ✓ Design, operation, or maintenance of BMPs is changed;
  - ✓ Design of the construction project is changed that could significantly affect the quality of the stormwater discharges;
  - ✓ Permittee's inspections indicate deficiencies in the SWPPP;
  - ✓ SWPPP is determined to be ineffective in minimizing or controlling erosion and sedimentation (e.g., there is visual evidence of excessive site erosion or excessive sediment deposits in streams or lakes); and
  - ✓ Settleable Solids from a stormwater outfall exceed 2.5 ml/L.

No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]

[Add additional pages as need.]

**Appendix E – *Sample* Contractor Certification/Agreements**

SUBCONTRACTOR CERTIFICATION  
STORMWATER POLLUTION PREVENTION PLAN

Project Number: \_\_\_\_\_

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

Operator(s): \_\_\_\_\_

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

**I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.**

This certification is hereby signed in reference to the above-named project:

Company: \_\_\_\_\_

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

Telephone Number: \_\_\_\_\_

Type of construction service to be provided: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

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

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

Appendix F – *Sample* Grading and Stabilization Activities Log

Date Grading Activity Initiated	Description of Grading Activity	Date Grading Activity Ceased (Indicate Temporary or Permanent)	Date When Stabilization Measures are Initiated	Description of Stabilization Measure and Location



**Appendix G – Sample Delegation of Authority Form**

**Instructions:**

- Appendix G should be used by the owner of the property to determine the person or position that will be authorized to sign any inspection reports, the stormwater pollution prevention plan itself, and any other documents required by the Missouri General Operating permit.
- The person making this designation must meet the following requirements:
  - ✓ For a corporation, this could be a president, secretary, treasurer, or vice president, or any other person who performs similar policy or decision-making functions for the corporation.
  - ✓ For a partnership or sole proprietorship, this could be a general partner or the proprietor.
  - ✓ For a municipality, state, federal or other public agency, this could be a principal executive officer or ranking elected official.
- The designee is authorized if:
  - ✓ The authorization is made in writing by the individual making the designation.
  - ✓ The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as an operator, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company.
  - ✓ The signed and dated written authorization is included in the SWPPP.

**Delegation of Authority**

I, \_\_\_\_\_, hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Missouri State Operating Permit, at the **Replace Sewer Lines & Infrastructure Ozark Correctional Center** construction site in Fordland, Missouri. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

\_\_\_\_\_ (name of person or position)  
\_\_\_\_\_ (company)  
\_\_\_\_\_ (address)  
\_\_\_\_\_ (city, state, zip)  
\_\_\_\_\_ (phone)

(Add additional lines as needed for additional individuals /positions)

By signing this authorization, I confirm that I meet the requirements to make such a designation, and that the designee above meets the definition of a "duly authorized representative."

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 knowing violations.

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

**Company:** \_\_\_\_\_

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

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

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

**Appendix J – Not Used**

**Appendix K – Missouri Department of Conservation – Heritage Results for Webster County**



## Missouri Department of Conservation

Missouri Department of Conservation's Mission is to protect and manage the forest, fish, and wildlife resources of the state and to facilitate and provide opportunities for all citizens to use, enjoy and learn about these resources.

### **Natural Heritage Review Level One Report: No Known Records**

**Foreword:** Thank you for accessing the Missouri Natural Heritage Review Website developed by the Missouri Department of Conservation with assistance from the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, Missouri Department of Transportation and NatureServe. The purpose of this report is to provide information to federal, state and local agencies, organizations, municipalities, corporations, and consultants regarding sensitive fish, wildlife, plants, natural communities, and habitats to assist in planning, designing, and permitting stages of projects.

### **PROJECT INFORMATION**

**Project Name and ID Number:** Ozark Correctional Center - Replace Sewer Lines and Infrastructure #12042

**User Project Number:** C1907-01

**Project Description:** The project includes replacement of approximately 2,605 linear feet of existing water main, renovation of approximately 2,865 linear feet of gravity sewer and 16 manholes; a new outfall sewer and discharge structure; a geotextile sludge dewatering system including flocculant mixing/injection system, mixing manifold, and solid waste roll-off containers; sludge holding tank and dewatering building modifications; submersible sludge transfer pumping system; chemical phosphorus removal system modifications; precast and cast-in-place concrete structures, PVC and ductile iron piping systems, electrical system modifications, and related appurtenances. Lat 37.1510. Lon -92.8779. Outfall sewer discharge structure to be located on OCC property near Lat 37.1510. Lon -92.8779 and discharge to riprap lined channel to unnamed tributary to Davis Branch. Webster County, Missouri. Section 2, T28N, R18W

**Project Type:** Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Wastewater treatment plant, Modification

**Contact Person:** Thomas Hancock

**Contact Information:** tom.hancock@amce.com or 4178623355

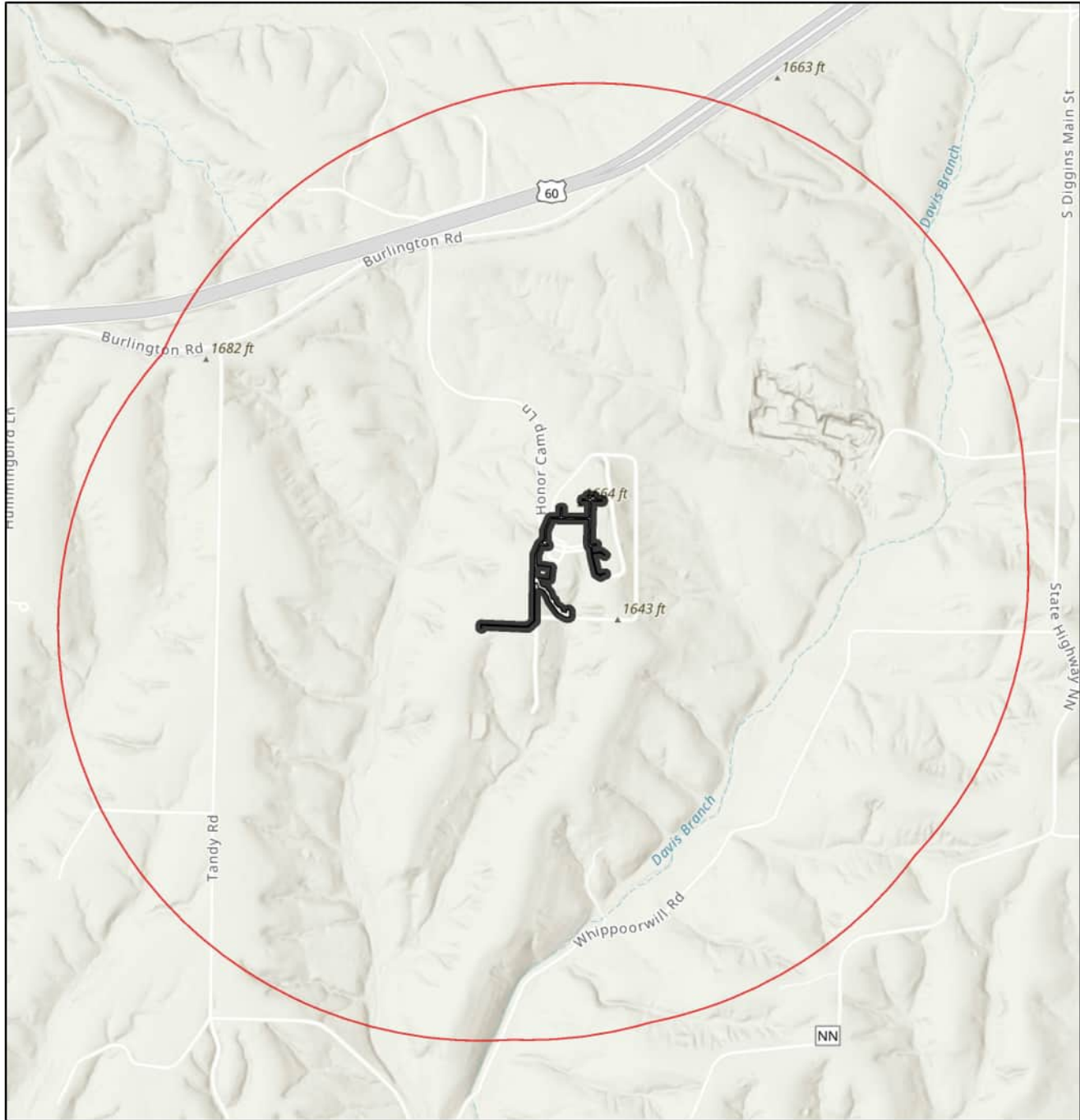
**Disclaimer:** This NATURAL HERITAGE REVIEW REPORT identifies if a species or natural community tracked by the Natural Heritage Program is known to occur within or near the project area submitted, and shares recommendations to avoid or minimize project impacts to sensitive species or natural habitats. Incorporating information from the Natural Heritage Program into project plans is an important step in reducing impacts to Missouri's sensitive natural resources. If an occurrence record is present, or the proposed project might affect federally listed species, the user must contact the Department of Conservation or U.S. Fish and Wildlife Service for more information.

This Natural Heritage Review Report is not a site clearance letter for the project. Rather, it identifies public lands and records of sensitive resources located close to and/or potentially affected by the proposed project. If project plans or location change, this report may no longer be valid. Because land use conditions change and animals move, the existence of an occurrence record does not mean the species/habitat is still present. Therefore, reports include information about records near but not necessarily on the project site. Lack of an occurrence record does not mean that a sensitive species or natural community is not present on or near the project area. On-site verification is the responsibility of the project. However, the Natural Heritage Program is only one reference that should be used to evaluate potential adverse project impacts and additional information (e.g. wetland or soils maps, on-site inspections or surveys) should be considered. Reviewing current landscape and habitat information, and species' biological characteristics would additionally ensure that Missouri Species of Conservation Concern are appropriately identified and addressed in planning efforts.

**U.S. Fish and Wildlife Service – Endangered Species Act (ESA) Coordination:** Lack of a Natural Heritage Program occurrence record for federally listed species in your project area does not mean the species is not present, as the area may never have been surveyed. Presence of a Natural Heritage Program occurrence record does not mean the project will result in negative impacts. This report does not fulfill Endangered Species Act consultation with the U.S. Fish and Wildlife Service (USFWS) for listed species. Direct contact with the USFWS may be necessary to complete consultation and it is required for actions with a federal connection, such as federal funding or a federal permit; direct contact is also required if ESA concurrence is necessary. Visit [IPaC: Home \(fws.gov\)](https://www.fws.gov/ipac) to initiate USFWS Information for Planning and Conservation (IPaC) consultation. Contact the Columbia Missouri Ecological Field Services Office (573-234-2132, or by mail at 101 Park Deville Drive, Suite A, Columbia, MO 65203) for more information.

**Transportation Projects:** If the project involves the use of Federal Highway Administration transportation funds, these recommendations may not fulfill all contract requirements. Please contact the Missouri Department of Transportation at 573-526-4778 or visit [Home Page | Missouri Department of Transportation \(modot.org\)](https://www.modot.org) for additional information on recommendations.

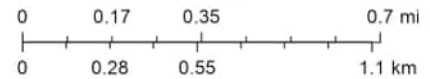
# Ozark Correctional Center - Replace Sewer Lines and Infrastructure



January 4, 2023

1:21,606

- Buffered Project Boundary
- Project Boundary



Esri, NASA, NGA, USGS, FEMA, Missouri Dept. of Conservation, Missouri DNR, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

## Species or Communities of Conservation Concern within the Area:

There are no known records of Species or Natural Communities of Conservation Concern within the defined Project Area.

## Other Special Search Results:

No results have been identified for this project location.

## Project Type Recommendations:

**Waste Transfer, Treatment and Disposal -Wastewater treatment plant: New or Maintenance;** [Clean Water Act](#) permits issued by other agencies regulate both construction and operation of wastewater systems, and provide many important protections for fish and wildlife resources throughout the project area and at some distance downstream. Fish and wildlife almost always benefit when unnatural pollutants are removed from water, and concerns are minimal if construction is managed to minimize erosion and sedimentation/runoff to nearby streams and lakes, including adherence to any Clean Water Act permit conditions.

Revegetate disturbed areas to minimize erosion using native plant species compatible with the local landscape and wildlife needs. Annual ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crownvetch and sericea lespedeza. Please see [Best Management Practices for Construction and Development Projects Affecting Missouri Rivers and Streams \(mo.gov\)](#).

## Project Location and/or Species Recommendations:

**Endangered Species Act Coordination - If this project has the potential to alter habitat (e.g. tree removal, projects in karst habitat) or cause direct mortality of bats, please coordinate directly with U.S. Fish and Wildlife Service (Ecological Services, 101 Park Deville Drive, Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132 Ext. 100 for Ecological Services) for further coordination under the Endangered Species Act. Indiana bats (*Myotis sodalis*, federal- and state-listed endangered) and Northern long-eared bats (*Myotis septentrionalis*, federal-listed threatened) may occur near the project area. Both of these species of bats hibernate during winter months in caves and mines. During the summer months, they roost and raise young under the bark of trees in wooded areas, often riparian forests and upland forests near perennial streams. During project activities, avoid degrading stream quality and where possible leave snags standing and preserve mature forest canopy. Do not enter caves known to harbor Indiana bats or Northern long-eared bats, especially from September to April.**

**Karst:** This county has known karst geologic features (e.g., caves, springs, and sinkholes, all characterized by subterranean water movement). Few karst features are recorded in Natural Heritage records, and ones not noted here may be encountered at the project site or affected by the project. Cave fauna (many of which are Species of Conservation Concern) are influenced by changes to water quality; please check your project site for any karst features and make every effort to protect groundwater in the project area. Additional information and specific recommendations are available at [Management Recommendations for Construction and Development Projects Affecting Missouri Karst Habitat \(mo.gov\)](#).

**Invasive exotic species** are a significant issue for fish, wildlife and agriculture in Missouri. Seeds, eggs, and larvae may be moved to new sites on boats or construction equipment. Please inspect and clean equipment thoroughly before moving between project sites. See [Managing Invasive Species in Your Community | Missouri Department of Conservation \(mo.gov\)](#) for more information.

- Remove any mud, soil, trash, plants or animals from equipment before leaving any water body or work area.
- Drain water from boats and machinery that have operated in water, checking motor cavities, live-well, bilge and transom wells, tracks, buckets, and any other water reservoirs.
- When possible, wash and rinse equipment thoroughly with hard spray or HOT water (>140° F, typically available at do-it-yourself car wash sites), and dry in the hot sun before using again.

**Streams and Wetlands – Clean Water Act Permits:** Streams and wetlands in the project area should be protected from activities that degrade habitat conditions. For example, soil erosion, water pollution, placement of fill, dredging, in-stream activities, and riparian corridor removal, can modify or diminish aquatic habitats. Streams and wetlands may be protected under the Clean Water Act and require a permit for any activities that result in fill or other modifications to the site. Conditions provided within the U.S. Army Corps of Engineers (USACE) Clean Water Act Section 404 permit ([Kansas City District Regulatory Branch \(army.mil\)](#)) and the Missouri Department of Natural Resources (DNR) issued Clean Water Act Section 401 Water Quality Certification ([Section 401 Water Quality Certification | Missouri Department of Natural Resources \(mo.gov\)](#)), if required, should help minimize impacts to the aquatic organisms and aquatic habitat within the area. Depending on your project type, additional permits may be required by the Missouri Department of Natural Resources, such as permits for stormwater, wastewater treatment facilities, and confined animal feeding operations. Visit [Wastewater Permits | Missouri Department of Natural Resources \(mo.gov\)](#) for more information on DNR permits. Visit both the USACE and DNR for more information on Clean Water Act permitting.

**For further coordination with the Missouri Department of Conservation and the U.S. Fish and Wildlife Services, please see the contact information below:**

Email (preferred): [NaturalHeritageReview@mdc.mo.gov](mailto:NaturalHeritageReview@mdc.mo.gov)  
MDC Natural Heritage Review  
Science Branch  
P.O. Box 180  
Jefferson City, MO  
65102-0180  
Phone: 573-522-4115 ext. 3182

U.S. Fish and Wildlife Service  
Ecological Service  
101 Park Deville Drive  
Suite A  
Columbia, MO  
65203-0007  
Phone: 573-234-2132



### **Miscellaneous Information**

FEDERAL Concerns are species/habitats protected under the Federal Endangered Species Act and that have been known near enough to the project site to warrant consideration. For these, project managers must contact the U.S. Fish and Wildlife Service Ecological Services (101 Park Deville Drive Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132; Fax 573-234-2181) for consultation.

STATE Concerns are species/habitats known to exist near enough to the project site to warrant concern and that are protected under the Wildlife Code of Missouri (RSMo 3 CSR 1 0). "State Endangered Status" is determined by the Missouri Conservation Commission under constitutional authority, with requirements expressed in the Missouri Wildlife Code, rule 3CSR 1 0-4.111. Species tracked by the Natural Heritage Program have a "State Rank" which is a numeric rank of relative rarity. Species tracked by this program and all native Missouri wildlife are protected under rule 3CSR 10-4.110 General Provisions of the Wildlife Code.

See [Missouri Species and Communities of Conservation Concern Checklist \(mo.gov\)](#) for a complete list of species and communities of conservation concern. Detailed information about the animals and some plants mentioned may be accessed at [Mofwis Search Results](#). Please contact the Missouri Department of Conservation to request printed copies of any materials linked in this document.

**Appendix L – State Historic Preservation Office – Webster County National Register Listings**

## Webster County National Register Listings

**Hosmer Dairy Farm Historic District** ([nps-nr/96000549.pdf](#)), Co. Farm Rd. 522, approximately .5 mi. SW of jct. with MO Rt. E, Marshfield vic. (5/16/96)

**Love, Col. Thomas C., House** ([nps-nr/85000108.pdf](#)), off Rt. 1, Seymour vic. (1/18/85)

**Rainey Funeral Home Building** ([nps-nr/13001112.pdf](#)), 242 E. Washington St., Marshfield (1/22/14)

**Missouri National Register County List** ([/shpo/mnrlist.htm](#))  
**Acronym Key** ([/shpo/acronyms.htm](#))  
**Recent Listings** ([/shpo/nrrecentlist.htm](#))

\*Each bold-faced link in the list above leads to a word-searchable NATIONAL REGISTER NOMINATION for that resource; other links provide maps or additional context for the resource. The items may be downloaded (right-click) or viewed in your Web browser (double-click). File sizes range from 1 MB to several hundred MB, the time required for loading will depend on your connection speed. You may obtain a free copy of Adobe Reader software required to read the materials by visiting our **Help page** ([../help.htm](#)).

Col. Thomas C. Love House

**Appendix M – Erosion and Sediment Control Guidelines**

***EROSION AND  
SEDIMENT CONTROL  
GUIDELINES***

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## **PHASING/SEQUENCING**

### **DEFINITION & PURPOSE**

Phasing involves developing a schedule that includes the sequencing of construction activities with the implementation of construction site BMPs. The purpose of phasing is to reduce the amount and duration of soil exposed to erosion and to implement and maintain BMPs in coordination with the sequence of construction activities.

### **CONDITIONS FOR EFFECTIVE USE**

A schedule of the sequence and timing of construction activities is a permit requirement for all sites that disturb 1 acre or greater and must be provided in Section 2.2 - Sequencing and Estimated Dates of Construction Activities in the SWPPP template. Projects should be phased when possible to reduce the amount and duration of soil exposed at any one time. The phasing plan should be developed during project design. Disturbed areas in one phase should be stabilized before disturbing subsequent phases. When possible, land disturbance and construction in and around waterways should be scheduled during dry weather.

### **INSTALLATION/CONSTRUCTION PROCEDURES**

The phasing schedule should follow the format in Section 2.2 - Sequencing and Estimated Dates of Construction Activities in the SWPPP template.

### **OPERATION & MAINTENANCE PROCEDURES**

During inspections, verify that work is progressing in accordance with the phasing shown in the SWPPP and that BMPs are installed prior to the start of each construction phase. If phasing has changed, update Section 2.2 of the SWPPP, the site plan, and document the update in Appendix D - SWPPP Amendment Log.



## **PRESERVATION OF EXISTING VEGETATION**

### DEFINITION & PURPOSE

Permanent preservation of existing vegetation and topsoil minimizes the area of disturbance, reducing the need for erosion and sediment control BMPs and the potential for violations. It also provides a financial benefit by reducing the cost of grading, BMPs, topsoil, and seeding. Preserved areas can provide long-term stormwater benefits through increased absorption of rainfall compared to turf grass areas with compacted soil.

### CONDITIONS FOR EFFECTIVE USE

Preservation of existing vegetation requires planning and should be the first step in the design process. The site should be surveyed to identify high quality soils, trees, vegetation, and steep slopes to be preserved. The site improvements, including any temporary roadways, should be designed around these features and follow existing contours to reduce cutting and filling. Sediment control BMPs such as compost filter sock or silt fence may be desirable to protect the preservation area from significant sediment accumulation.

### INSTALLATION/CONSTRUCTION PROCEDURES

Protection of preservation areas with temporary construction fencing and any sediment control BMPs shall be provided prior to the commencement of clearing and grubbing operations or other soil-disturbing activities. Construction materials, equipment storage, and parking areas should be located outside of protected areas where they will not cause root compaction.

### OPERATION & MAINTENANCE PROCEDURES

During weekly and rain event inspections, verify that temporary construction fencing and any sediment control BMPs to protect preservation areas are still in place and operational. If the area to be preserved is adjusted during construction, update the site plan and document the update in Appendix D – SWPPP Amendment Log.

### SITE CONDITIONS FOR REMOVAL

Temporary fencing and any sediment control BMPs shall be removed after final stabilization of the site has occurred.

### COMPANION BMPs

- Tree Preservation





## **TREE PRESERVATION**

### DEFINITION & PURPOSE

Tree preservation is the process of protecting trees from damage related to construction activity. Tree preservation provides erosion control and long-term stormwater benefits by intercepting and absorbing rainfall. Trees also increase property values and the marketability of a development. Additional benefits of trees include improved air quality, shading of buildings, and habitat for birds and people.

### CONDITIONS FOR EFFECTIVE USE

Tree preservation requires planning and should be the first step in the design process. The site should be surveyed to identify trees to be preserved based upon their size, species, condition, location, historical significance, or any combination of these factors. The site improvements, including any temporary roadways, should be designed around these trees. The site should also be designed to follow existing contours as much as possible. Cutting and filling can make it difficult to avoid grading within tree protection zones, reducing the number of trees that can be effectively preserved.

### INSTALLATION/CONSTRUCTION PROCEDURES

Marking and fencing of trees shall be done prior to the commencement of clearing and grubbing operations or other soil-disturbing activities. Sites requiring a Land Disturbance Permit, tree protection fencing shall be installed prior to issuance of the permit. The critical root zone is generally 10 feet beyond the dripline of a tree. Fencing shall be located to protect as much of the critical root zone as possible. If the entire critical root zone cannot be protected, work may encroach into this zone on one side of the tree. Fencing should be at least 4 feet high and supported at a maximum of 10 foot intervals by metal T-posts or other approved methods sufficient to keep the fence upright and in place. T-posts shall be a minimum of 2 feet in the ground. In some cases, a layer of wood chip mulch may be used for temporary road access and to reduce compaction in and near tree protection areas. When used for this purpose, at least 12 inches of chips should be applied where vehicles will travel or park. Mulching may also be utilized within the tree protection zone during construction to protect the soil from compaction, conserve soil moisture and moderate soil temperature. Spread wood chips to a depth of 4 inches, leaving the trunk clear of mulch. See Typical Detail.

### OPERATION & MAINTENANCE PROCEDURES

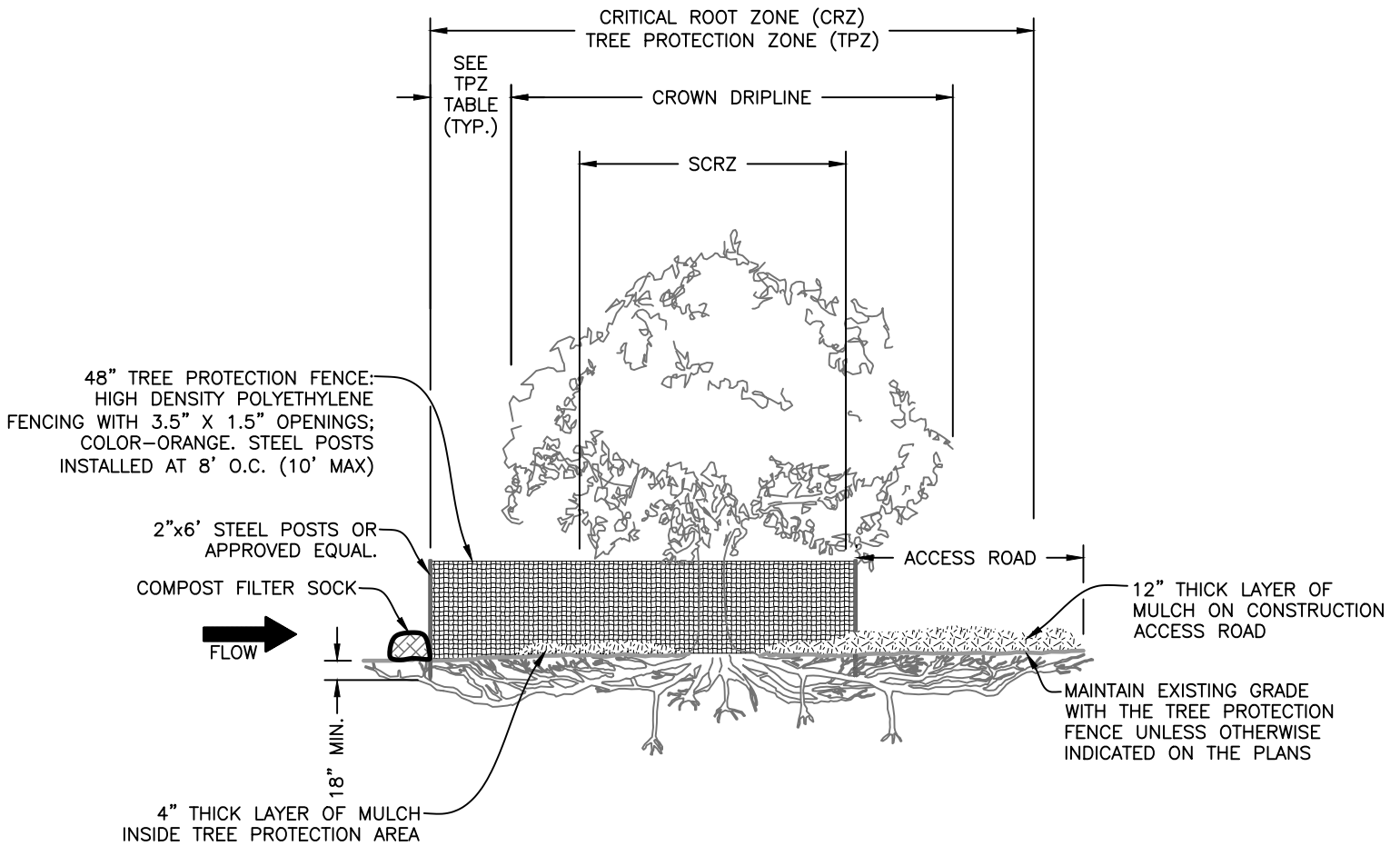
At a minimum, inspect weekly for areas where fence has fallen and/or needs repair. No equipment, materials, and/or debris shall be stored within the tree protection zone fencing. When work requires encroaching within the tree preservation zone, a certified arborist shall be consulted before proceeding with construction activities.

### SITE CONDITIONS FOR REMOVAL

Temporary fencing shall be removed after final stabilization of the site has been achieved.

### COMPANION BMPs

- Preservation of Existing Vegetation and Mulching



### **TREE FENCING NOTES**

1. MAINTAIN TREE PROTECTION FENCING 10' BEYOND DRIPLINE OR AS INDICATED IN THE TREE PROTECTION ZONE TABLE (ON ALL WORK SIDES OF TREE CRITICAL ROOT ZONE).
2. NO EQUIPMENT, MATERIALS, AND/OR DEBRIS SHALL BE STORED WITHIN THE TREE PROTECTION FENCING. THIS INCLUDES DURING FENCE INSTALLATION AND REMOVAL.
3. NO PRUNING SHALL BE PERFORMED EXCEPT BY OR IN THE PRESENCE OF AN APPROVED ARBORIST.
4. IF PROJECT REQUIRES AN ACCESS ROAD WITHIN THE DRIPLINE OF A TREE, PROVIDE A MINIMUM 12" OF MULCH FOR THE ACCESS ROAD.
5. PROVIDE COMPOST FILTER SOCK ALONG PERIMETER OF TREE PROTECTION FENCING DOWN GRADIENT FROM ALL DISTURBED AREAS AND STOCKPILES.

### **ROOT PRUNING NOTES**

1. COORDINATE ROOT PRUNING WITH THE INSTALLATION OF TREE PROTECTION FENCING. WHERE CONFLICTS OCCUR, PERFORM ROOT PRUNING PRIOR TO FENCE INSTALLATION.
2. CAREFULLY EXPOSE ROOTS WITHIN THE LIMITS OF CONSTRUCTION AND MARK FOR PRUNING. PROPOSED ROOT CUTS SHALL BE REVIEWED BY AN ARBORIST PRIOR TO TRENCHING, EXCAVATING, OR CUTTING TO DETERMINE THE IMPACT ON ANY STRUCTURAL CRITICAL ROOTS AND THE CLOSEST POINT TO THE TREES THAT SOIL MAY BE DISTURBED.
3. ROOT PRUNING CAN BE ACCOMPLISHED WITH CIRCULAR SAWS OF VARYING TYPES AND/OR A ROTARY-TYPE STUMP GRINDER TO A DEPTH OF 18" OR TO THE MAXIMUM DEPTH OF THE REQUIRED GRADING CUT, WHICHEVER IS LESS. SAW BLADE AND GRINDER TEETH SHOULD BE SHARPENED PRIOR TO USE. TRENCHING MACHINES ARE NOT ALLOWED IN ROOT PRUNING OPERATIONS.
4. ROOTS OVER 1 INCH IN DIAMETER MUST BE CLEANLY AND SHARPLY CUT WITH A HAND SAW.
5. PRUNING CUTS SHOULD BE FLUSH WITH THE SIDE OF THE TRENCH CLOSEST TO THE TREE.
6. AN ARBORIST SHOULD REVIEW ANY ROOTS OVER 2 INCHES IN DIAMETER ENCOUNTERED DURING EXCAVATION AND/OR CONSTRUCTION ACTIVITIES TO DETERMINE STRUCTURAL STABILITY OF THE TREE.

## **TREE PROTECTION FENCING**

SCALE: NTS





## **VEGETATED FILTER STRIP**

### DEFINITION & PURPOSE

Vegetated filter strips are areas of vegetation that are used as sediment control practices during construction. Vegetation slows down stormwater runoff and filters out sediment.

### CONDITIONS FOR EFFECTIVE USE

Vegetated filter strips are appropriate where a strip of existing vegetation can be left in place in downhill areas to provide sediment control in place of or in addition to other sediment control BMPs. They should be used in areas of sheet flow only. Level spreaders may be needed to ensure sheet flow. Filter strip width and length should be determined based on the size and slope of the drainage area and type of vegetation. See [MDNR Guide Section 6-201](#). If the vegetated filter strip is part of a preservation area (see Preservation of Existing Vegetation), additional sediment control BMPs may be desired to protect the preservation area from excessive sediment deposition. Vegetated filter strips installed as a permanent stormwater quality control measure should not be used as a sediment control BMP.

### INSTALLATION/CONSTRUCTION PROCEDURES

Existing vegetation that will be used as a vegetated filter strip should be marked the width and length shown on the plans prior to construction and designated as no disturbance. It may be desirable to fence off the filter strip to protect it from construction activities.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Verify that the vegetated filter strip has not been removed or damaged by construction activities. Remove excessive sediment accumulation if needed for functionality. Seed areas of erosion or dead vegetation as needed. Install additional BMPs if the vegetated filter strip becomes ineffective, and update the site plan and Appendix D – SWPPP Amendment Log.

### SITE CONDITIONS FOR REMOVAL

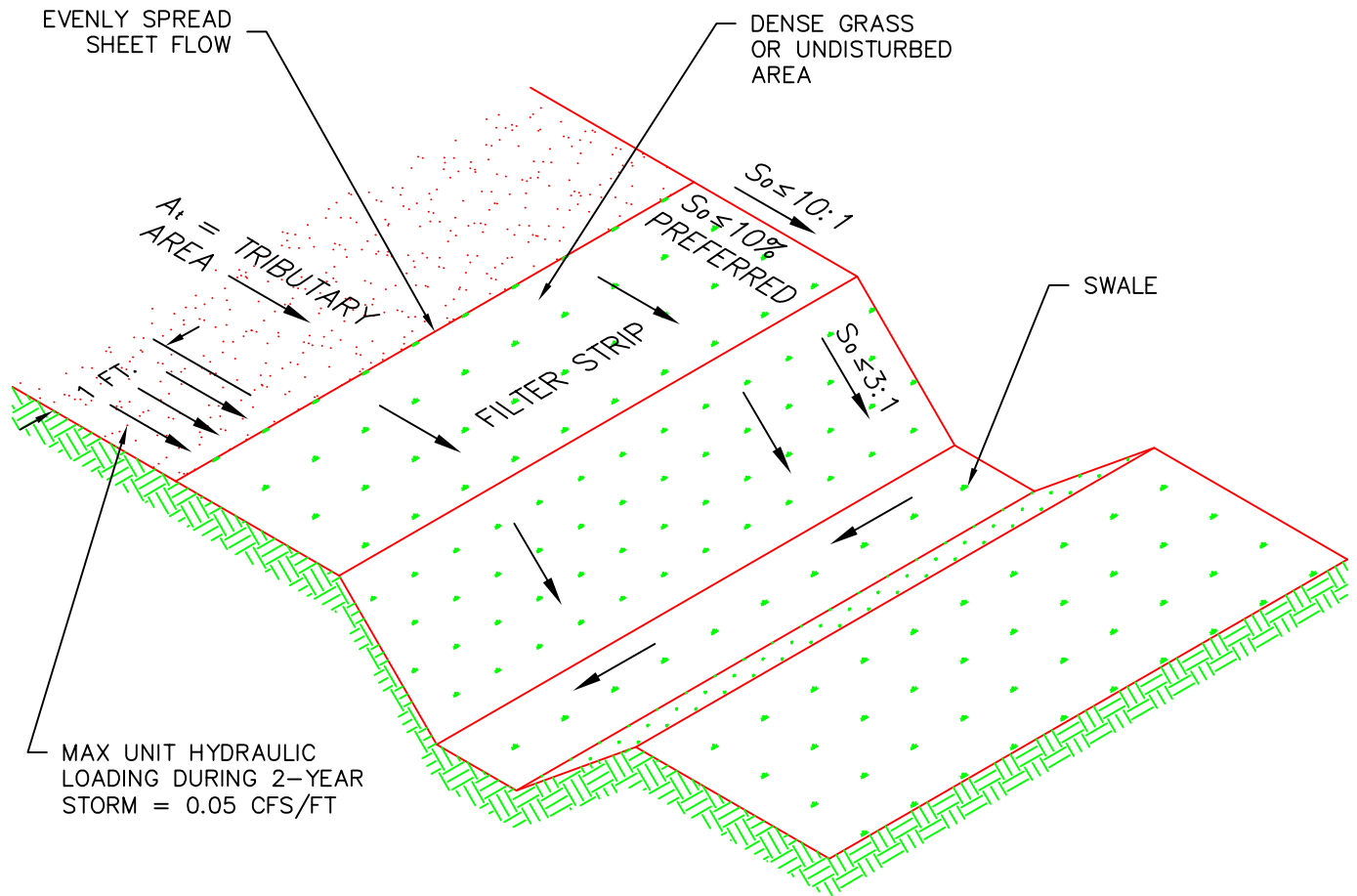
The vegetated filter strip should remain in place until the drainage area is stabilized, at which point it is typically replaced with permanent vegetation or, in the case of a phased site, replaced with improvements. The SWPPP should provide site-specific information on removal/replacement of the vegetated filter strip.

### ROBUST ALTERNATIVES

- Compost Filter Sock and Silt Fence

### COMPANION BMPs

- Preservation of Existing Vegetation



REFER TO SPRINGFIELD WATER QUALITY PROTECTION POLICY FOR FURTHER DESIGN CRITERIA

ADAPTED FROM DENVER URBAN DRAINAGE & FLOOD CONTROL DISTRICT - DRAINAGE CRITERIA MANUAL

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## **EROSION CONTROL BLANKETS**

### **DEFINITION & PURPOSE**

An erosion control blanket (ECB) is a blanket of synthetic or natural fibers to protect soil from the erosive impact of precipitation and overland flow, typically on slopes and in channels. ECBs also retain moisture and facilitate establishment of vegetation. Erosion control blankets are also sometimes referred to as Rolled Erosion Control Products (RECPs).

### **CONDITIONS FOR EFFECTIVE USE**

Factors in the selection of ECB include soil conditions, steepness and length of slope, sheer stress, and type and duration of protection needed to establish desired vegetation. Products are available for a variety of uses and longevity, typically from 3 months to 36 months. Manufacturer's specifications should be followed in ECB selection. See [MDNR Guide Section 6-97](#) for general guidance on ECB use and selection.

### **INSTALLATION/CONSTRUCTION PROCEDURES**

The type of ECB shown on the plans should be installed immediately after completion of a phase of grading and/or seeding. Follow manufacturer's specifications for installation, particularly noting requirements for check slots, fastening devices (staples), and the need for firm contact with soil. See Manufacturer's Detail or Typical Detail.

### **OPERATION & MAINTENANCE PROCEDURES**

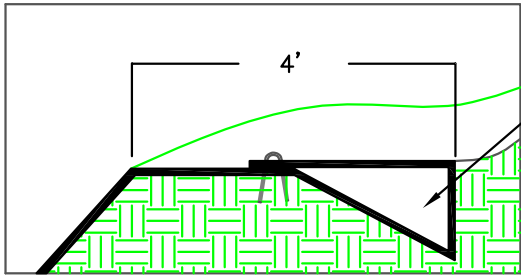
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site until adequate vegetation is established. Repair erosion and/or undermining at top of slope. Repair undermining beneath blankets. Pull back the blankets, fill and compact eroded area, re-seed and then firmly secure the blankets. Reposition or replace blankets that have moved along the slope or have been damaged.

### **SITE CONDITIONS FOR REMOVAL**

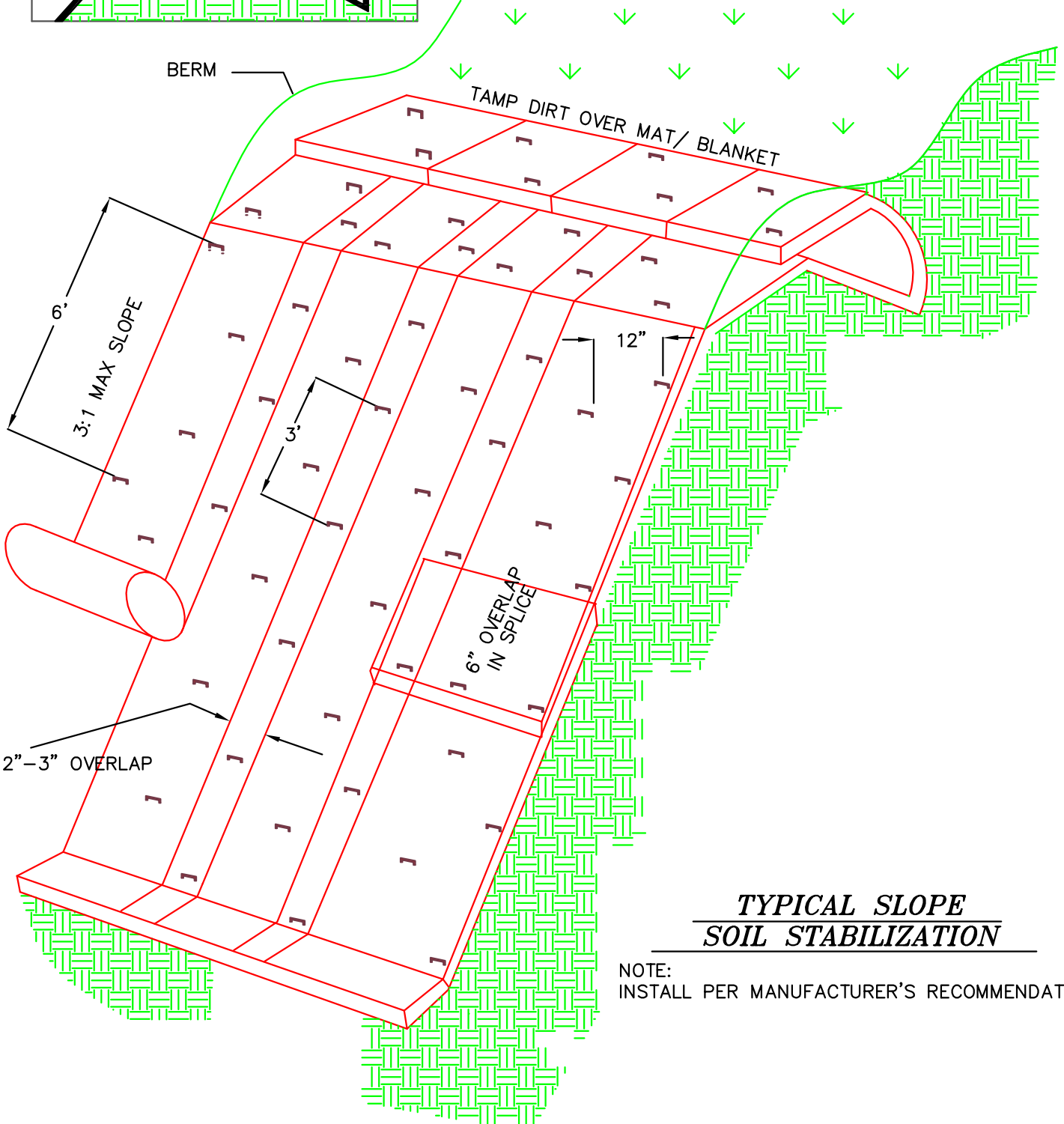
ECB is typically left in place and designed to degrade over time.

### **ROBUST ALTERNATIVES**

- Turf reinforcement mat



6'X6' ANCHOR TRENCH  
 NOTES:  
 SLOPE SURFACE SHALL BE FREE OF  
 ROCKS AND CLODS.  
 MATS/BLANKET SHOULD BE INSTALLED  
 VERTICALLY DOWNSLOPE.



***TYPICAL SLOPE  
 SOIL STABILIZATION***

NOTE:  
 INSTALL PER MANUFACTURER'S RECOMMENDATION



## **TURF REINFORCEMENT MAT**

### DEFINITION & PURPOSE

A turf reinforcement mat (TRM) is a rolled mat of non-degradable synthetic material that provides a matrix to greatly reinforce the root system of the desired vegetation for permanent erosion protection in high flow channels and on critical slopes.

### CONDITIONS FOR EFFECTIVE USE

Factors in the selection of TRM include soil conditions, steepness and length of slope, depth of flow, runoff velocities, and time required to establish desired vegetation. Manufacturer's recommendations should be followed in TRM selection. See [MDNR Guide Section 6-97](#) for general guidance on TRM use and selection.

### INSTALLATION/CONSTRUCTION PROCEDURES

The type of TRM shown on the plans should be installed immediately after completion of a phase of grading and/or seeding. Follow manufacturer's specifications for installation, particularly noting requirements for check slots, fastening devices (staples), and the need for firm contact with soil. See Manufacturer's Detail or Typical Detail.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site until adequate vegetation is established. Repair erosion and/or undermining at the top of the slope. Repair undermining beneath mats. Pull back the mats, fill and compact eroded area, seed and then secure mats firmly. Reposition or replace mats that have moved along the slope or channel and secure firmly. Replace damaged mats.

### SITE CONDITIONS FOR REMOVAL

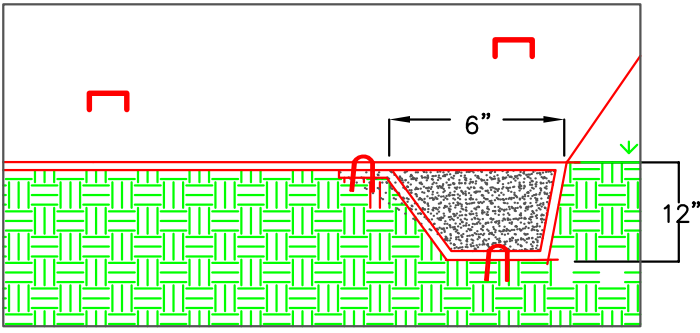
TRMs are left in place permanently.

### ROBUST ALTERNATIVES

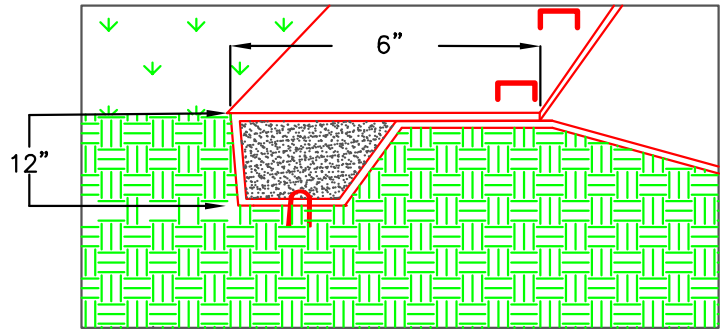
- Plastic transition mat

### COMPANION BMPs

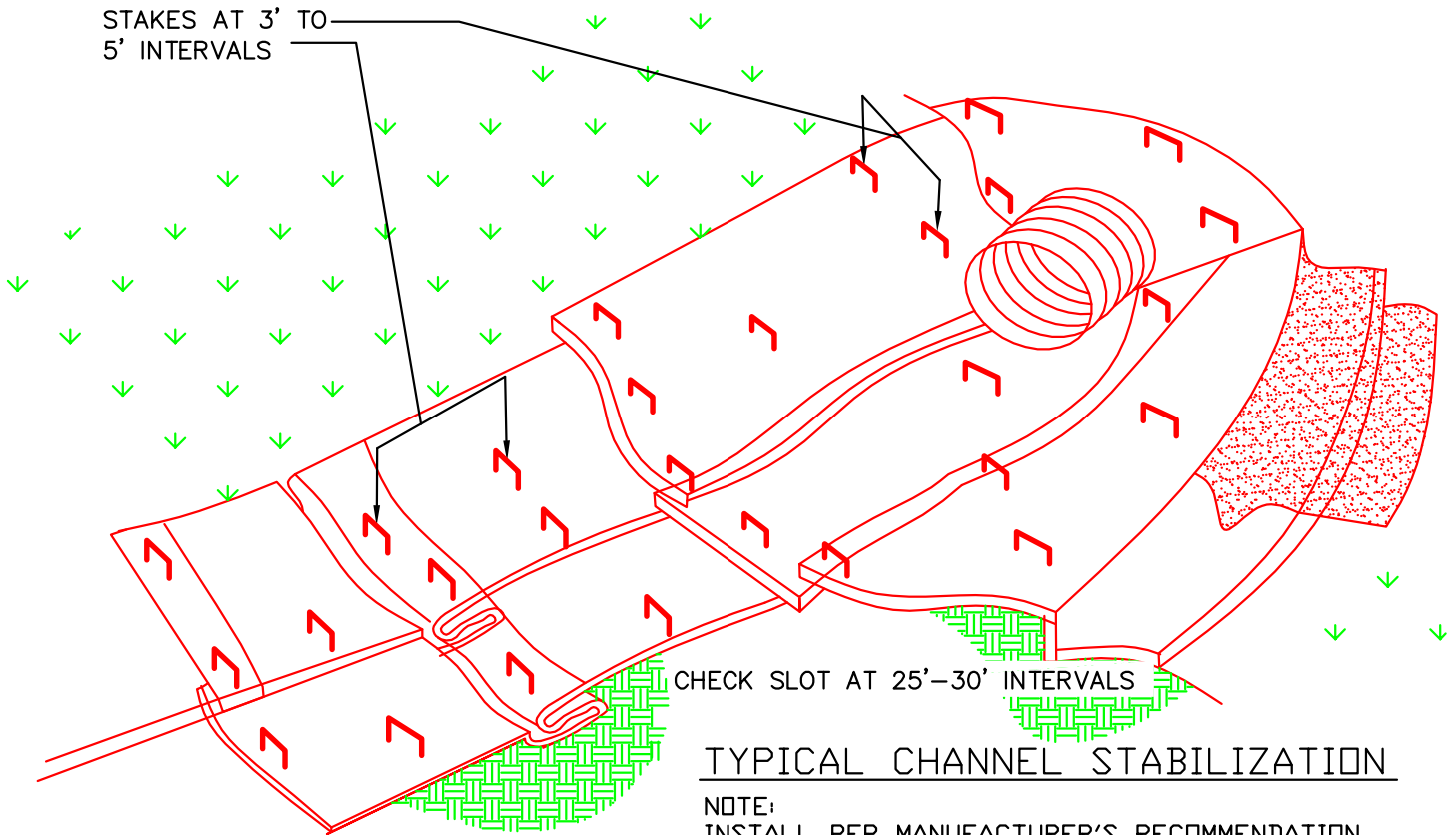
- Ditch Checks in channels and Fiber Rolls on slopes



INITIAL CHANNEL ANCHOR TRENCH

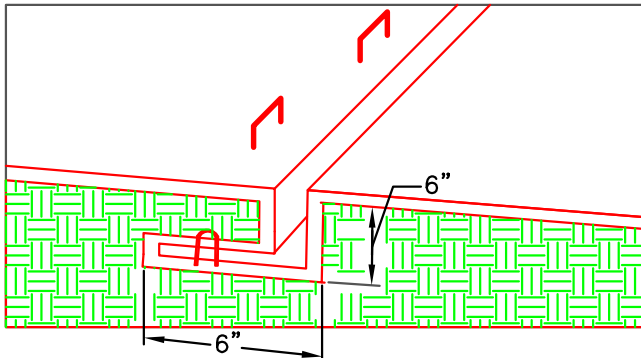


TERMNAL SLOPE AND CHANNEL ANCHOR TRENCH

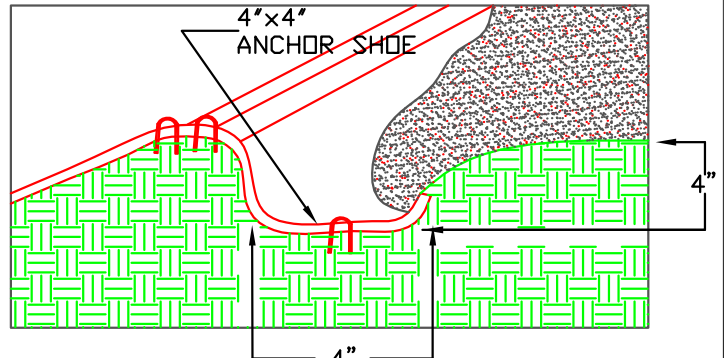


TYPICAL CHANNEL STABILIZATION

NOTE:  
INSTALL PER MANUFACTURER'S RECOMMENDATION



INTERMITTENT CHECK SLOT



LONGITUDINAL ANCHOR TRENCH

Modified from California Stormwater BMP Handbook

NTS





## **HYDROSEEDING**

### **DEFINITION & PURPOSE**

Hydroseeding is a method of seeding that consists of applying a mixture of water, seed, wood fiber, and soil stabilizer (if used) with hydroseeding equipment.

### **CONDITIONS FOR EFFECTIVE USE**

To select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to: soil conditions, site topography, season and climate, vegetation types, maintenance requirements, sensitive adjacent areas, water availability, and plans for permanent vegetation (if hydroseeding is done for temporary vegetation). Soil should be loose (un-compacted) at time of application. For best results, cover the hydroseed layer with a mulch layer to help protect the seed from wind and erosion, retain soil moisture, and control soil temperature during establishment. Mulching should also be used when there is not sufficient time in the season to ensure adequate vegetation establishment and coverage for erosion control. Conduct a soil test to determine if soil amendments are needed. Fertilizer should only be applied if a soil test indicates it is needed. The hydroseeding mixture should be determined by an industry professional. See [MDNR Guide Section 6-87](#) for additional guidance.

### **INSTALLATION/CONSTRUCTION PROCEDURES**

Hydroseeding should be done immediately after completion of a phase of grading. Hydroseeding can be accomplished using a multiple-step or one-step process. The multiple-step process ensures maximum direct contact of the seeds to soil. When the one-step process is used to apply the mixture of seed, fiber, etc., the seed rate shall be increased to compensate for all seeds not having direct contact with the soil. Follow-up applications shall be made as needed to cover weak spots. Avoid overspray on existing vegetation, waterways, sidewalks, and roadways. Straw or other mulch should be applied to reduce the erosive capacity of stormwater and keep soil and seed in place.

### **OPERATION & MAINTENANCE PROCEDURES**

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Hydroseeded areas should be inspected for failures and re-seeded and mulched within the planting season, using not less than half the original application rates.

### **ROBUST ALTERNATIVES:**

- Sod
- Turf reinforcement mat
- Control Blankets



## **SEEDING**

### DEFINITION & PURPOSE

Seeding is used to establish temporary or permanent vegetation in order to protect exposed soil from erosion.

### CONDITIONS FOR EFFECTIVE USE

The SWPPP should include a site-specific seeding specification for permanent seeding and for temporary seeding if needed. See Section 329200 - Turfs and Grasses for permanent seeding specifications and guidance and Section 015723 - Temporary Storm Water Pollution Control for temporary seeding specifications and guidance. Conduct a soil test to determine the need for soil amendments. Specifications for topsoil and soil amendments should be followed to ensure vegetation establishment and growth. Fertilizer should only be applied if a soil test indicates it is needed. Use additional stabilization (erosion control blankets, etc.) on slopes steeper than 3:1 and in areas of concentrated flow.

### INSTALLATION/CONSTRUCTION PROCEDURES

Seeding should be done immediately after completion of a phase of grading, or in areas where construction activity has ceased for 14 days. Follow seeding specification for topsoil, soil amendments, seed type, seeding rate, and seeding dates. Apply straw or other mulch (see Mulching). Water immediately, to a depth of 4 inches.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Protect seeded areas from vehicular and foot traffic. Reseed and mulch areas that have not sprouted within 21 days of planting. Repair damaged or eroded areas and reseed/mulch as needed. Do not mow until 4 inches of growth occurs. During the first 4 months, mow no more than 1/3 the grass height. Seeded areas should be repaired and reseeded/mulched for one year following permanent seeding to ensure successful establishment.

### ROBUST ALTERNATIVES:

- Sod and Hydroseed



## **SODDING**

### DEFINITION & PURPOSE

Sod is a mat of grass with an established root system used to provide immediate vegetation for erosion control.

### CONDITIONS FOR EFFECTIVE USE

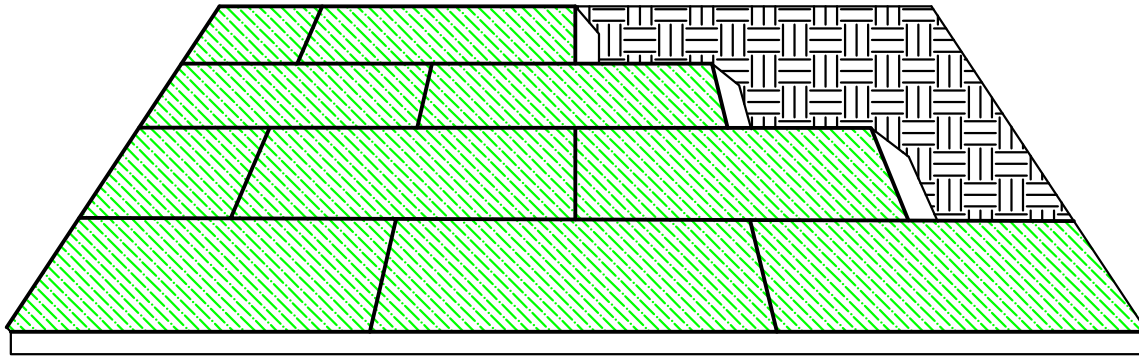
Sod is an effective way to achieve immediate erosion protection in areas of sheet flow and low concentrated flows with velocities less than 5 feet/second. A soil test should be performed to determine if soil amendments are needed. Fertilizer should only be applied if a soil test indicates it is needed.

### INSTALLATION/CONSTRUCTION PROCEDURES

Install immediately after finish grading. Remove debris larger than 1 inch in diameter and concentrated areas of smaller debris. Level and roll soil lightly to provide an even grade and firm the surface. Soil should not be excessively wet or dry. Lay first row of sod perpendicular to the slope or direction of flow. Lay subsequent rows tightly against previous rows with joints staggered in a brick-like pattern. Fill minor gaps with good soil and roll entire surface to ensure contact. Stake, staple and/or net corners and centers of sod strips as required, especially in areas of concentrated flow. Water the sod immediately after installation, enough to soak 4 inches into the soil without causing runoff. For additional guidance see [MDNR Guide Section 6-107](#).

### OPERATION & MAINTENANCE PROCEDURES

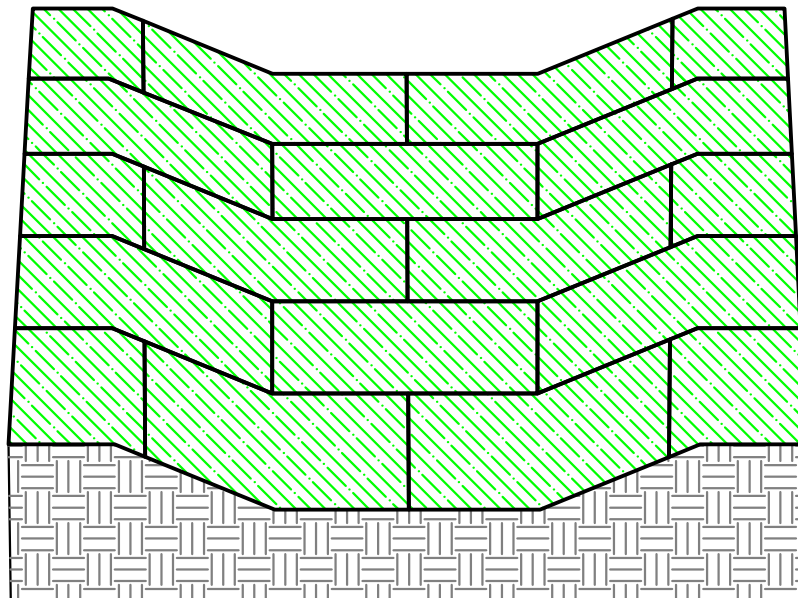
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Water the sod as often as necessary to maintain moist soil to a depth of at least 4 inches. Reposition areas of sod that have moved along the slope. Remove sediment accumulations, and replace sod if necessary. Repair and replace sod in eroded areas as needed. Do not mow sod until 3 inches of new growth occurs. During the first 4 months, mow no more than 1/3 the grass height.



LAY SOD IN A STAGGERED PATTERN WITH STRIPS BUTTED TIGHTLY AGAINST EACH OTHER

ON SLOPE > 3:1 USE PEGS OR STAPLES TO FASTEN SOD FIRMLY AT THE CORNERS AND CENTERS.

*INSTALLATION OF GRASS SOD*



LAY SOD PERPENDICULAR TO THE DIRECTION OF FLOW. USE PEGS OR STAPLES TO FASTEN SOD FIRMLY AT THE CORNERS AND CENTERS

*INSTALLATION OF SOD IN WATERWAYS*



## MULCHING

### DEFINITION & PURPOSE

A layer of organic material designed to protect exposed soil or freshly seeded areas from erosion by eliminating direct impact of precipitation and slowing overland flows. Mulch materials include grass, hay, straw, wood chips, wood fibers, and shredded bark.

### CONDITIONS FOR EFFECTIVE USE

Mulching can be used in areas of sheet flow for temporary soil stabilization on disturbed areas and applied to seeded areas to protect the seed and retain moisture for plant establishment. It is essential to seeding success in most conditions. In landscape areas, mulch is installed for permanent use. Where slopes are 3:1 or greater, hydraulic mulch-bonded fiber matrix, erosion control blankets, or turf reinforcement mats should be used. See [MDNR Guide Section 6-91](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

Install immediately after grading landscaped areas or after seeding in other areas. Grade area and remove all debris larger than 1 inch if area is to be vegetated and mowed in the future, larger than 2 inches if area is to be permanently mulched. If area is to be seeded, follow requirements of seeding. Spread mulch evenly and anchor by crimping it into the ground or using netting.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site until adequate vegetation is established. For permanent mulch, inspect annually. Protect from vehicular and foot traffic. Repair damaged or eroded areas, and reseed and replace mulch as needed.

### SITE CONDITIONS FOR REMOVAL

Mulching is biodegradable and will remain in place.



## **SOIL BINDERS**

### DEFINITION & PURPOSE

Soil binders are materials applied to the soil surface to temporarily prevent water-induced erosion of exposed soils on construction sites. These materials must be made for this purpose and material safety data sheet available upon request. Soil binders also provide temporary dust, wind, and soil stabilization (erosion control) benefits. The useful life of most products is 3 to 6 months.

### CONDITIONS FOR EFFECTIVE USE

Soil binders should be used in areas of sheet flow only. Soil binders are typically applied to disturbed areas requiring short-term, temporary protection and in combination with other BMPs, such as perimeter controls, seeding, and mulching. Because soil binders can often be incorporated into the work, they may be a good choice for areas where grading activities will soon resume. Binders can also be applied to stockpiles to prevent water and wind erosion. See MDNR [Guide Section 6-103 on Dust Control](#) for more information on soil binders.

### INSTALLATION/CONSTRUCTION PROCEDURES

Consider drying time for the selected soil binder, and apply with sufficient time before anticipated rainfall. Soil binders shall not be applied during or immediately before rainfall. Soil binders may not cure if low temperatures occur within 24 hours of application. Follow manufacturer's specifications for application rates, pre-wetting of application area, and cleaning of equipment after use. Use the recommendations to maximize usefulness and avoid formation of pools or impervious areas where stormwater cannot infiltrate.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site, looking for damage from vehicles, runoff, or freeze-thaw conditions. Reapply product or utilize additional BMPs.

### SITE CONDITIONS FOR REMOVAL

Soil binders are typically left in place to degrade naturally.

### COMPANION BMPs

- Seeding and Hydroseeding



## **SLOPE DRAINS**

### DEFINITION & PURPOSE

A slope drain is a pipe or lined channel which extends from the top to the bottom of a cut or fill slope.

### CONDITIONS FOR EFFECTIVE USE

These structures are designed to convey concentrated runoff to protect exposed slopes from upstream runoff. They can be used for sheet flow and concentrated flow. Slope drains typically extend beyond the toe of the slope to a stable area or outlet. They should be designed by a registered design professional. See [MDNR Guide Section 6-153](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

Install concurrently with diversion devices, as soon as cut and fill operations have occurred. Install according to plans. Typical installation is as follows. Install slope drain down the slope, perpendicular to slope contours, extending beyond the toe of slope. At top of slope, grade a diversion channel toward the slope drain. Install flared end or t-section at pipe inlet. Section should be well entrenched and stable so water can enter freely. Ensure that all pipe connections are secure and watertight. Securely anchor the exposed section of the drain with stakes. Install flared end section at pipe outlet and discharge into a sediment trap or other stabilized outlet. Protect area around inlet with filter fabric. Protect outlet with rip rap or other energy dissipation device.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on site. Remove sediment and trash accumulation at inlet. Repair settlement, cracking, or piping holes. Repair leaks or inadequate anchoring along pipe. Remove sediment and stabilize eroded areas at outlet. Extend the outlet if necessary.

### SITE CONDITIONS FOR REMOVAL

Remove concurrently with upstream diversion device after slope has been stabilized. Stabilize the exposed areas where the slope drain and diversion device were removed.

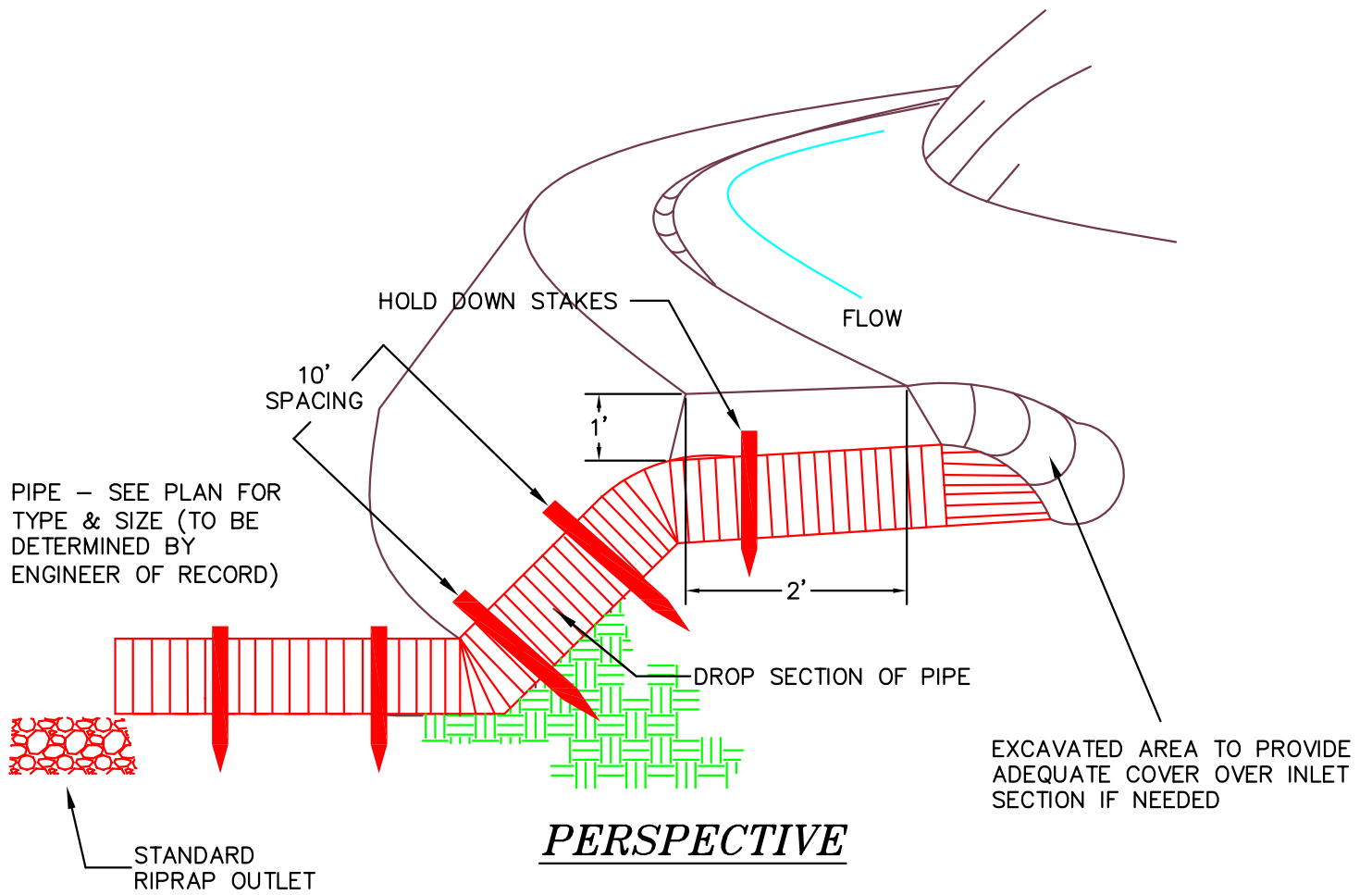
### ROBUST ALTERNATIVES

- Conveyance Channel

### COMPANION BMPs

- Plastic transition mat and Rip-Rap





Modified from Chesterfield, Missouri Model BMPs for Land Disturbance

NTS





## **TEMPORARY STREAM CROSSING**

### DEFINITION & PURPOSE

A temporary stream crossing is a structure placed across a waterway that allows vehicles to cross the waterway during construction to minimize erosion and downstream sedimentation.

### CONDITIONS FOR EFFECTIVE USE

Temporary stream crossings are installed at sites where construction equipment or vehicles need to frequently cross a waterway, and when alternate access routes are not feasible. They should be designed by a registered design professional. Appropriate permits (404, 401, etc.) must be obtained. Design considerations include: current and proposed watershed conditions, average and peak discharge (typically, 2-year rainfall intensity event), effect on water surface elevation off-site, velocity, sediment removal, and protection of fish and trees. General guidelines for a low water crossing include: light traffic, bank height less than 5 feet, and perpendicular to flow or with a slight upstream arc. General guidelines for a culvert crossing include: sized for 2-year rainfall intensity event with 1 foot freeboard and no flooding of offsite areas, pipe parallel to flow, embankment perpendicular to channel or with a slight upstream arc, rip rap on exposed faces sized for overtopping during a peak storm period. See [MDNR Guide Section 6-29](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

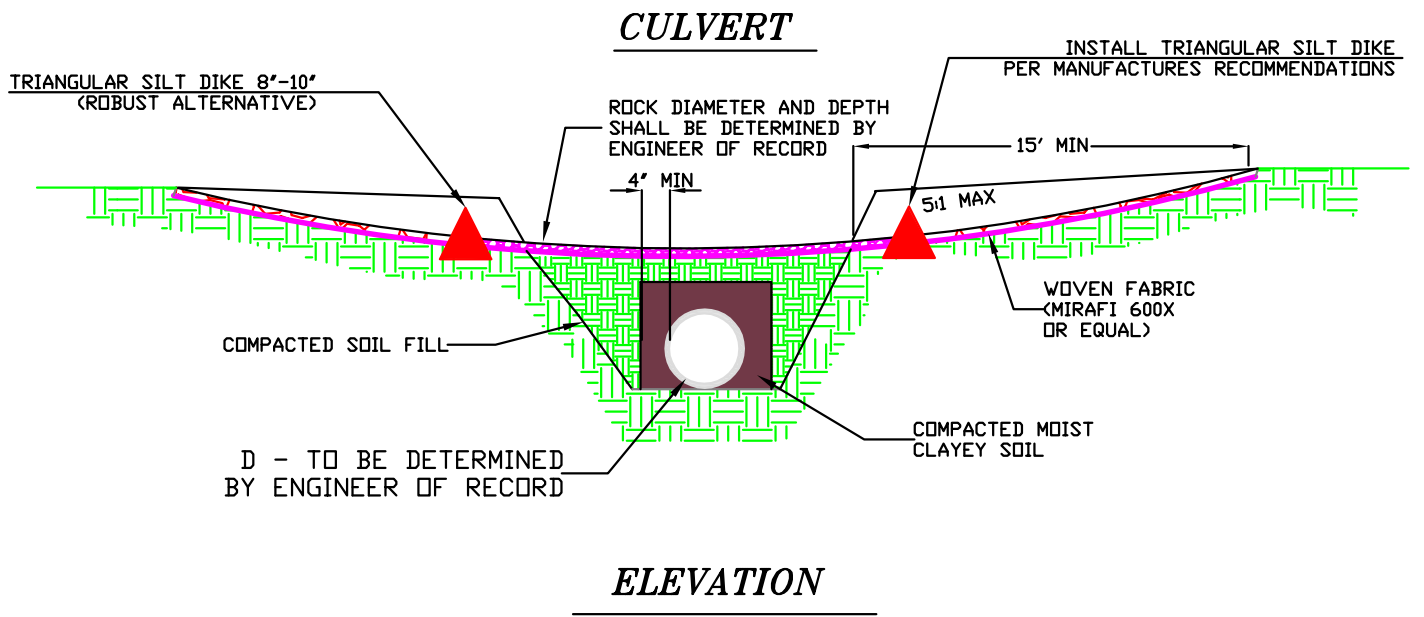
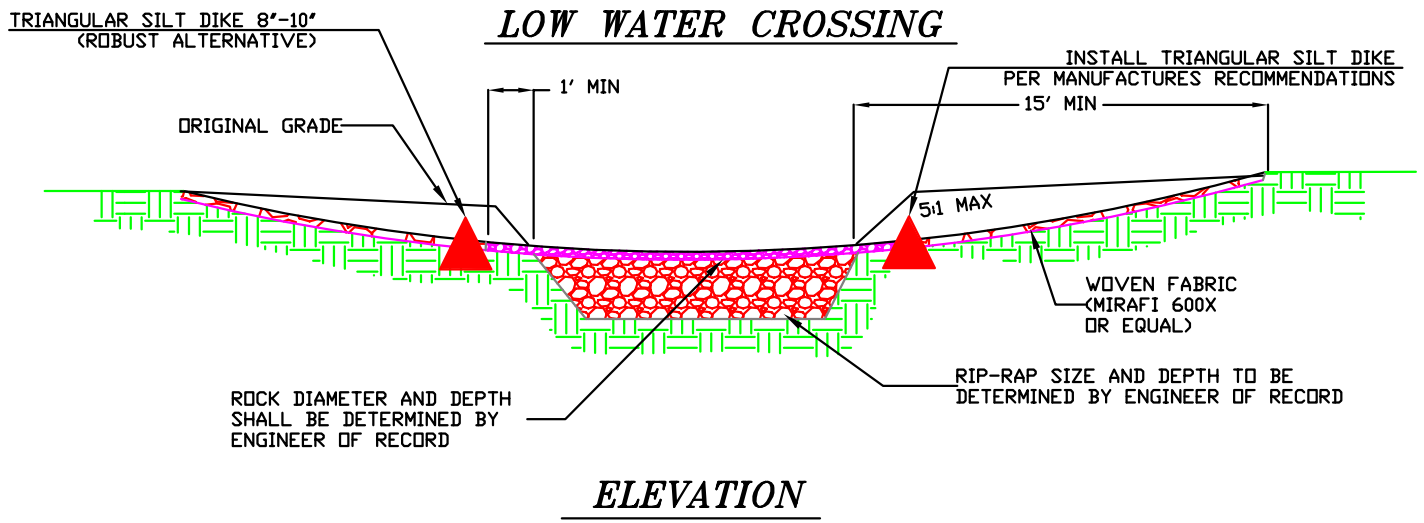
Install during periods of dry weather. Installation may require dewatering or temporary diversion of the stream. Procedures are specific to the type of crossing used. Generally, provide a stable means to bypass normal channel flow prior to disturbing the channel. Stabilize the channel bottom, install culvert (if used), grade and compact access ramps and soil embankment, install fabric, stone, and rip rap according to design.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site, checking for: blockage in channel, debris buildup, erosion of abutments, channel scour, rip rap displacement, piping of soil, and structural weakening. Remove sediment and trash accumulation. Repair and stabilize eroded areas. Extend rip rap if necessary.

### SITE CONDITIONS FOR REMOVAL

Remove as soon as alternative access is available. All foreign materials should be removed from creek. The streambed/banks should be returned to the original contour and stabilized if necessary.



Modified from Chesterfield, Missouri Model BMPs for Land Disturbance

NTS



## **WATER DIVERSIONS**

### DESCRIPTION & PURPOSE

Water diversions consist of practices that intercept and divert water around a construction site.

### CONDITIONS FOR EFFECTIVE USE

A water diversion is implemented when work is performed in a body of water or when runoff needs to be diverted around a construction site to keep the runoff clean. Diversion of stream flow should generally be combined with other in-stream BMPs downstream of the diversion such as check dams to act as secondary measures for sediment control. Excavation of a bypass channel or passing the flow through a pipe is appropriate for the diversion of streams generally less than 20 feet wide, with flow rates less than 99 cubic feet/second. Water diversions may be used with other practices, such as pumps. Pumped diversions are suitable for intermittent and low flow streams. Temporary berms, excavated channels, or a combination of both can be used to divert runoff around a construction site. Diversions should be designed by a registered design professional. See [MDNR Guide Section 6-143](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

Install the diversion according to the plans prior to starting construction in the area that water will be diverted around. When working in a body of water, install downstream sediment controls such as check dams before installing the diversion to catch any sediment released during installation.

### OPERATION & MAINTENANCE PROCEDURES

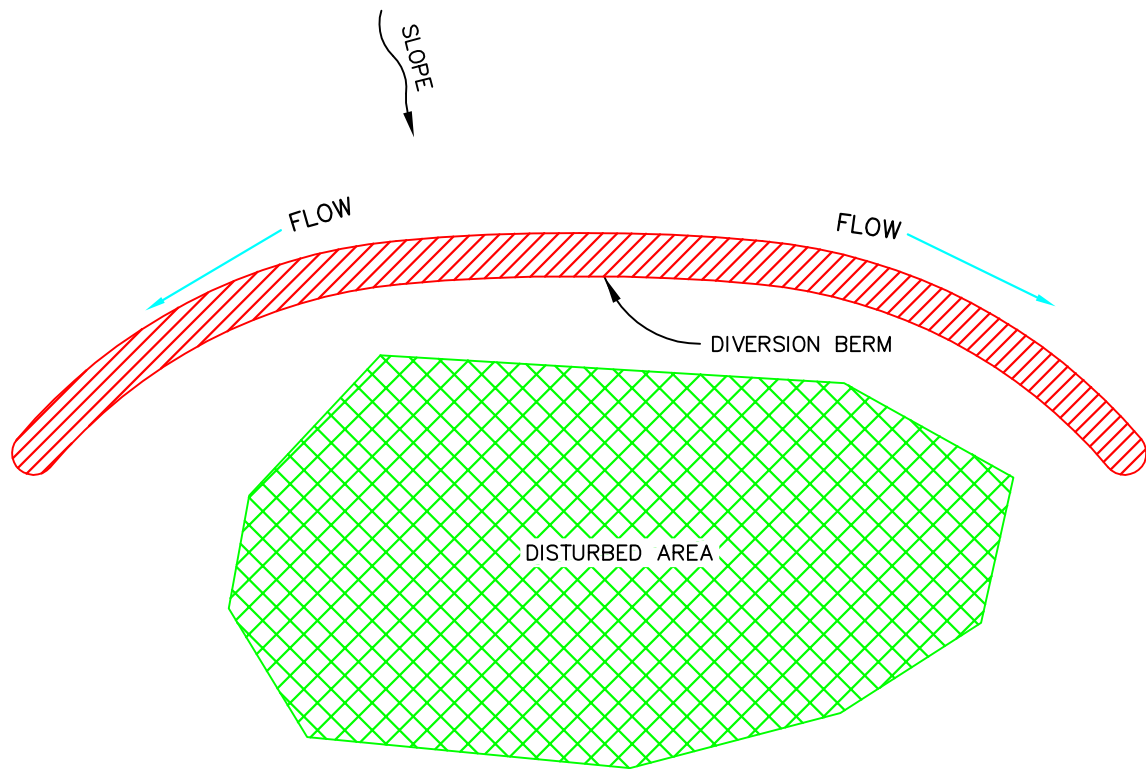
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Remove debris and sediment from area.

### SITE CONDITIONS FOR REMOVAL

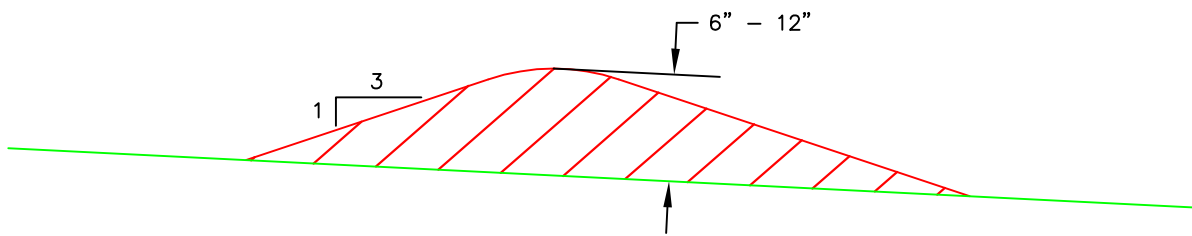
Remove the water diversion when work in the area is completed.

### COMPANION BMPs

- Dewatering and Temporary Stream Crossing



*PLAN*



THE AREA WHERE THE BERM IS CONSTRUCTED SHALL BE STRIPPED OF VEGETATION PRIOR TO PLACING FILL FOR THE BERM. FILL SHALL BE A GOOD QUALITY TOPSOIL REASONABLY FREE OF STONES, ROOTS AND OTHER DEBRIS.

*ELEVATION*



## **DUST CONTROL/ WIND EROSION**

### **DEFINITION & PURPOSE**

Practices of controlling wind-borne dust include phasing, preservation of trees and existing vegetation, minimization of soil disturbance, mulching, watering, wind barriers, and soil binders.

### **CONDITIONS FOR EFFECTIVE USE**

Phase work to the extent practical to minimize the amount of area disturbed at one time (see Phasing/Sequencing). Preservation of grass and trees and the use of solid board fences may also serve as wind barriers. For areas not subjected to traffic, vegetation provides the most practical method of dust control and should be established as early as possible. Effectiveness of application of water, adhesives, and chemical treatment depends on soil, temperature, humidity and wind velocity. See [MDNR Guide Section 6-103](#) for additional guidance.

### **INSTALLATION/CONSTRUCTION PROCEDURES**

Use dust control when clearing and grading activities create blowing dust, especially during periods of dry weather. Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution. Place barriers at right angles to prevailing wind at intervals of about 10 times their height to control soil blowing. Paved areas that have soil on them from construction sites should be cleaned with street sweeper. Mulching offers a fast and effective means of controlling dust when properly applied. Binders and tackifiers should be used on organic mulches. NOTE: If calcium chloride or spray-on adhesives are used for dust control, a permit may be required from MDNR. Follow manufacturer's specifications for binders and tackifiers.

### **OPERATION & MAINTENANCE PROCEDURES**

Check areas where mulch or binders have been applied for dust control and adjust/reapply as needed, according to manufacturer's specifications.

### **SITE CONDITIONS FOR REMOVAL**

Dust control practices can be terminated when stabilization has been achieved.

### **ROBUST ALTERNATIVES**

- Binders and Tackifiers



## **CONSTRUCTION EXIT**

### DEFINITION & PURPOSE

A stabilized exit to a construction site is designed to minimize the amount of sediment tracked from the site on vehicles and equipment. Mud and sediment fall off of tires as they bounce along the stabilized entrance.

### CONDITIONS FOR EFFECTIVE USE

Limit the number of points of ingress/egress and locate them where it is safe for construction vehicles and equipment to access public road. Avoid placing construction exit in low areas, where stormwater can accumulate and discharge off site. If possible, locate where permanent roads will eventually be constructed. See [MDNR Guide Sections 6-7 through 6-15](#) for construction exit and robust alternatives.

### INSTALLATION/CONSTRUCTION PROCEDURES

Install prior to the start of construction. Properly grade and compact each construction entrance/exit to prevent runoff from leaving the site. Install culvert under entrance if needed to maintain positive drainage. Install woven geotextile fabric and cover with 3 to 6" aggregate to a depth of 6". Construction exit should have a length of 50' and a turn radius of 25' or full width of roadway. All contractors, subcontractors, and suppliers should be instructed to utilize construction entrance/exit before entering or exiting unstable areas.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Add a new lift of rock, or turn stones when voids become inundated with sediment and pad becomes smooth. Keep all temporary roadway ditches clear. Immediately remove any mud, rock or debris tracked onto paved surfaces. Use a street sweeper adjacent with the construction exit to reduce track out from site.

### SITE CONDITIONS FOR REMOVAL

Remove exit when vehicles and equipment will no longer access unpaved areas.

### ROBUST ALTERNATIVES

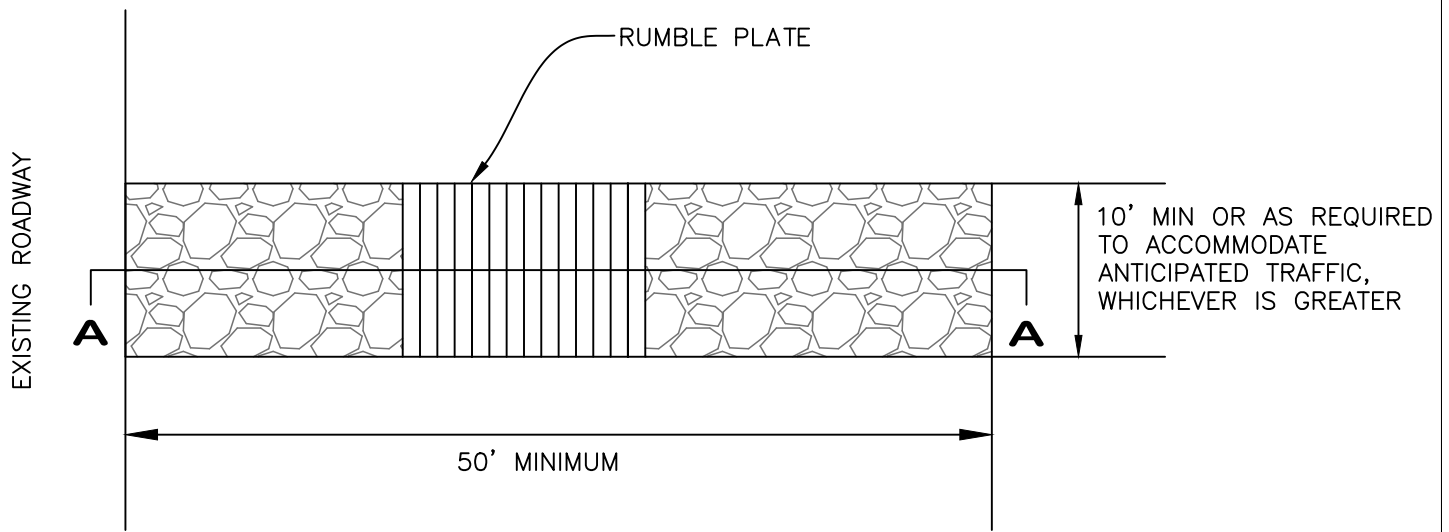
- Rumble Plate, Bamboo Mat, Automated Wheel Wash Systems

### COMPANION BMPs

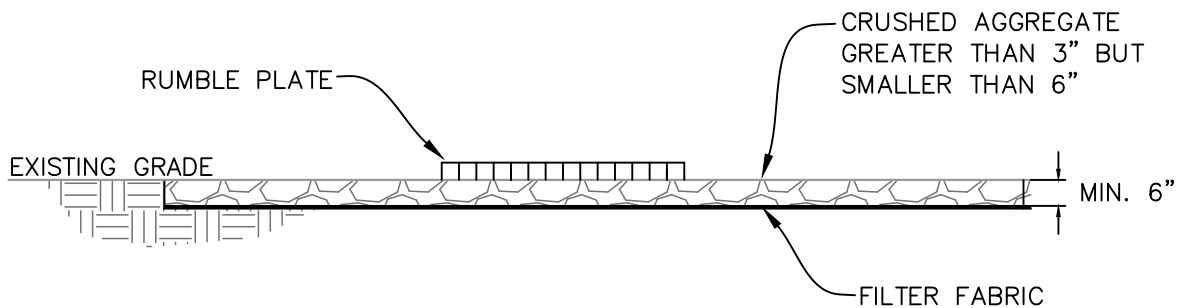
- Triangular Foam Perimeter control
- Street cleaning
- Stabilized gravel access road

# CONSTRUCTION EXIT NOTES

1. RUMBLE STRIPS ARE RECOMMENDED FOR LARGER SITES.
2. RUMBLE STRIPS SHALL BE A MINIMUM LENGTH OF 20' OR AS NEEDED TO REMOVE SEDIMENT FROM TIRES.
3. AVOID PLACING EXITS IN AN OUTFALL AREA OR OTHER LOW AREAS WHERE WATER PONDS OR FLOWS.
4. A CULVERT SHALL BE INSTALLED IF EXIT CROSSES A DITCH.
5. ROCK APRON INSTALLATION SHALL BE WIDE ENOUGH TO ACCOMMODATE TURNING VEHICLES.
6. ADD NEW ROCK OR RAKE EXISTING ROCK WHEN VOIDS FILL WITH SEDIMENT.
7. ANY MUD, ROCK OR DEBRIS TRACKED ONTO PAVED SURFACES AND ACCUMULATED IN CURBS SHALL BE REMOVED IMMEDIATELY USING A SWEEPER, SHOVEL, ETC.
8. REMOVE EXIT WHEN VEHICLES AND EQUIPMENT WILL NO LONGER ACCESS UNPAVED AREAS.



**PLAN**



**SECTION A-A**

**CONSTRUCTION EXIT**

SCALE: NTS



## CONSTRUCTION PARKING

### DEFINITION AND PURPOSE:

A stabilized pad designed to: provide off street parking for construction related vehicles, eliminate parking on non-surfaced areas, and minimize the amount of sediment tracked from the site. Stabilization generally consists of aggregate over woven fabric. The stabilized pad also distributes the axle load of vehicles over a larger area; thereby mitigating the rutting impact vehicles normally have on unpaved areas.

### APPROPRIATE APPLICATIONS:

At locations close to related work zones that have access along continuous paved or stabilized surfaces. Parking may be distributed in clusters and/or relocated with different phases of construction.

### CONDITIONS FOR EFFECTIVE USE:

Ditches or pipes, if needed, sized for 2 year rainfall intensity event; HGL below parking surface. Aggregate size should be a minimum of 2"-3" washed stone. Minimum of 6" thick and sized to handle anticipated number of employee and visitor vehicles.

### WHEN BMP IS TO BE INSTALLED:

Immediately after, or concurrently with, installation of construction entrance and washdown station.

### STANDARDS AND SPECIFICATIONS:

Grade and compact area of pad and ditches, if needed. Install culverts if needed to maintain positive drainage. Place fabric and aggregate, and compact. Install signage indicating the designated parking area.

### OPERATION AND MAINTENANCE PROCEDURES:

Inform drivers of inappropriately parked vehicles that they need to be moved. If necessary to ensure compliance on an ongoing basis, contact employers of violators. Install *No Parking* signage in areas where vehicles are being parked inappropriately. Remove sediment and clods of dirt. Repair areas that have settled. Replace rock if necessary to maintain clean surface.

### SITE CONDITIONS FOR REMOVAL:

Remove/relocate when vehicles can legally park on paved areas without impeding non-construction related traffic.

### TYPICAL DETAILS:

Not Applicable



## **STABILIZED CONSTRUCTION ROADWAY**

### DEFINITION AND PURPOSE:

A stabilized pathway providing vehicular access to a remote construction area designed to reduce rutting, tracking of mud in wet weather, and creation of dust in dry weather. The “roadway” can be constructed of aggregate over fabric, asphaltic concrete or Portland cement concrete based on the longevity of the project, required performance, and site conditions.

### APPROPRIATE APPLICATIONS:

On long travel paths on unstable areas, adjacent to bodies of water, in areas where poor soil is encountered, and where there are steep grades and additional traction is needed. Roadways should follow the natural terrain to the extent possible. Site conditions will dictate design and need.

### CONDITIONS FOR EFFECTIVE USE:

Ditches or pipes, if needed, sized for 2 year rainfall intensity events; HGL 6” below parking surface.

### WHEN BMP IS TO BE INSTALLED:

Prior to vehicles or equipment accessing remote areas.

### STANDARDS AND SPECIFICATIONS:

Properly grade roadway to prevent runoff from leaving the construction site. Design stabilized access to support the heaviest vehicles and equipment that will use it. Install culvert(s) under road, if needed, to maintain positive drainage. Place and compact roadway materials. Coordinate materials with those used for stabilized construction entrance/exit points. Vegetate road ditches.

### OPERATION AND MAINTENANCE PROCEDURES:

Inspect routinely for damage and repair as needed. Remove sediment and clods of dirt from road daily. Keep all temporary roadway ditches clear of sediment and debris. Repair areas that have settled. Replace rock if necessary to maintain a clean surface.

### SITE CONDITIONS FOR REMOVAL:

Remove when vehicles and equipment will no longer access remote areas; regrade area and vegetate.

### TYPICAL DETAILS:

TC-3



## **STREET CLEANING**

### DEFINITION & PURPOSE

Street cleaning includes shoveling, brooming, sweeping and/or vacuuming to remove track-out of sediment from paved public roads.

### CONDITIONS FOR EFFECTIVE USE

Shoveling should be used to remove mud layers and large dirt clods. Sweeping and vacuuming may not be effective when paved roads are wet or muddy.

### INSTALLATION/CONSTRUCTION PROCEDURES

If track out is present, street cleaning should be performed as soon as possible, at the end of the work day, and before rain events. If not mixed with debris or trash, consider incorporating the removed sediment back into the project. Otherwise, sweeper waste should be disposed in a solid waste dumpster on or off-site. Do not wash any sediment or debris down the storm drain.

### OPERATION & MAINTENANCE PROCEDURES

Inspect ingress/egress access points daily, and clean tracked sediment as needed and/or required.



## **COMPOST FILTER SOCKS**

### **DEFINITION & PURPOSE**

A compost filter sock is a mesh tube filled with composted material used to control sediment through settling and filtration.

### **CONDITIONS FOR EFFECTIVE USE**

Compost filter socks are generally placed along the perimeter of a site, at intervals along a slope, or as ditch checks to slow down runoff and retain sediment, allowing cleaned water to flow through. Compost material shall be screened  $\leq 2$  inches. Filter socks generally come in 8", 12", and 18" diameters. Compost filter socks can be used for sheet flow and small concentrated flows. Common industry practice is that drainage areas should not exceed 0.25 acres per 100 feet of sock length and flow should not exceed one cubic foot per second. Manufacturer's specifications should be followed for selecting the sock diameter. See [MDNR Guide Section 6-167](#) for additional guidance.

### **INSTALLATION/CONSTRUCTION PROCEDURES**

Install prior to disturbance of the site. Follow manufacturer's specifications. See Typical Detail.

### **OPERATION & MAINTENANCE PROCEDURES**

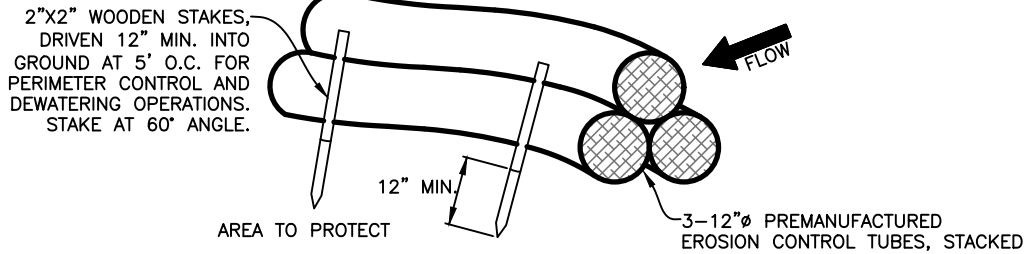
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Prevent vehicles and machinery from damaging sock. Remove accumulated sediment generally when it reaches half the height of the sock, replace broken stakes, and repair or replace sections that are torn.

### **SITE CONDITIONS FOR REMOVAL**

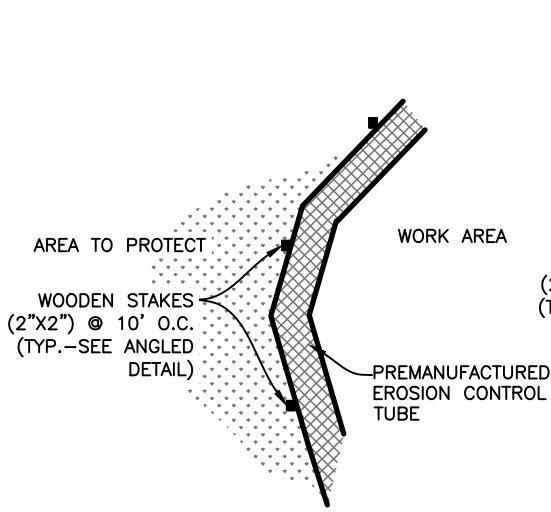
Removal of sock can occur after permanent vegetation is established. The mesh material can be cut open and removed, leaving the compost to degrade naturally.

### **ROBUST ALTERNATIVES**

- Tie Down Composted River Sock
- Silt fence

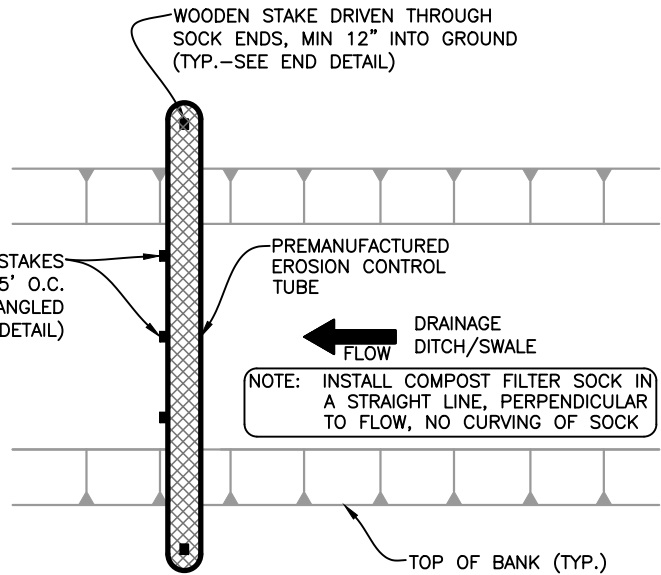


**ROBUST PYRAMID FORMATION**

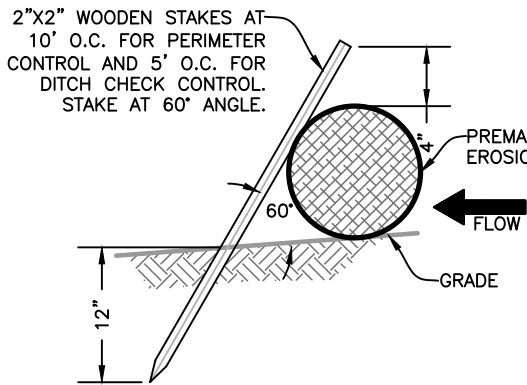


**STANDARD**

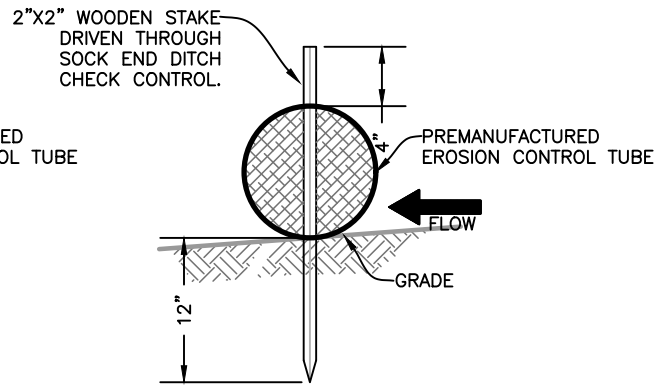
**PERIMETER CONTROL PLAN**



**DITCH CHECK PLAN**



**ANGLED DETAIL**

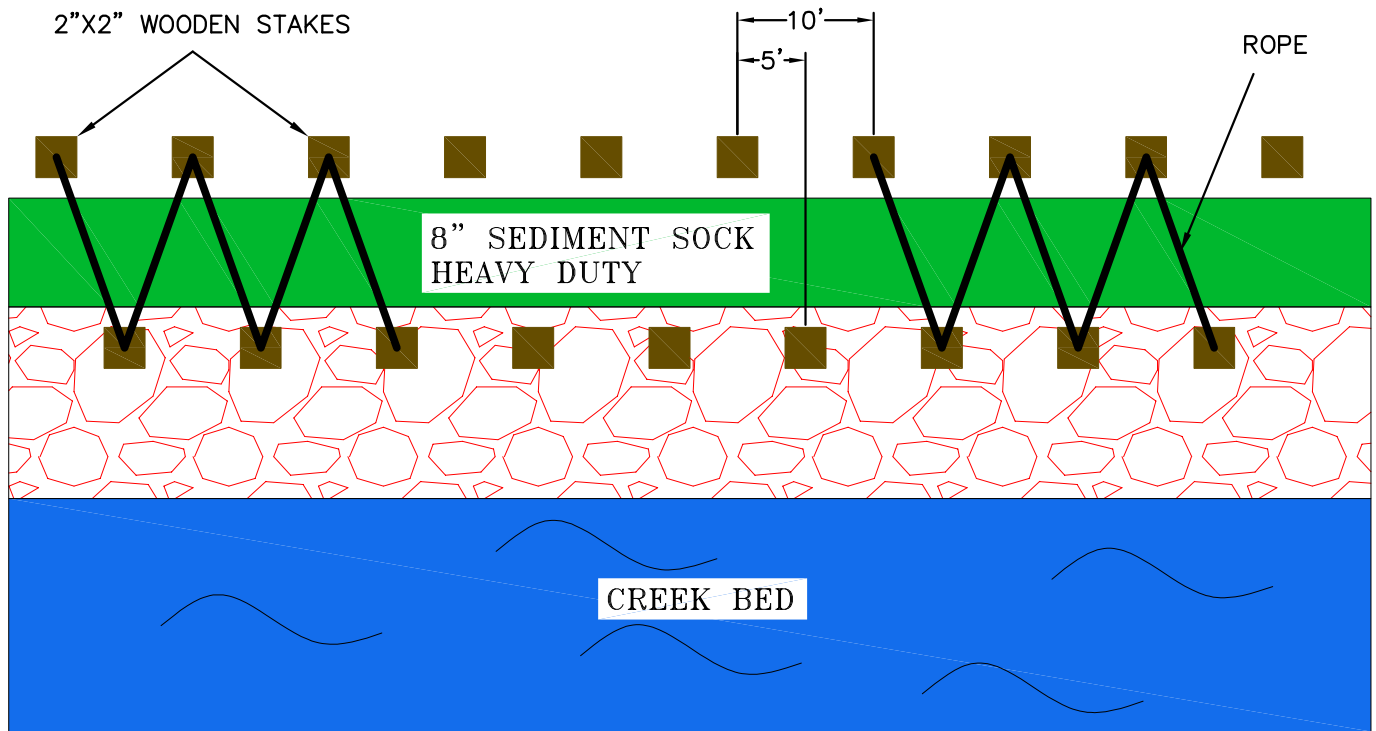


**END DETAIL**

**COMPOST FILTER SOCK**

**EROSION & SEDIMENT CONTROL DEVICE NOTES**

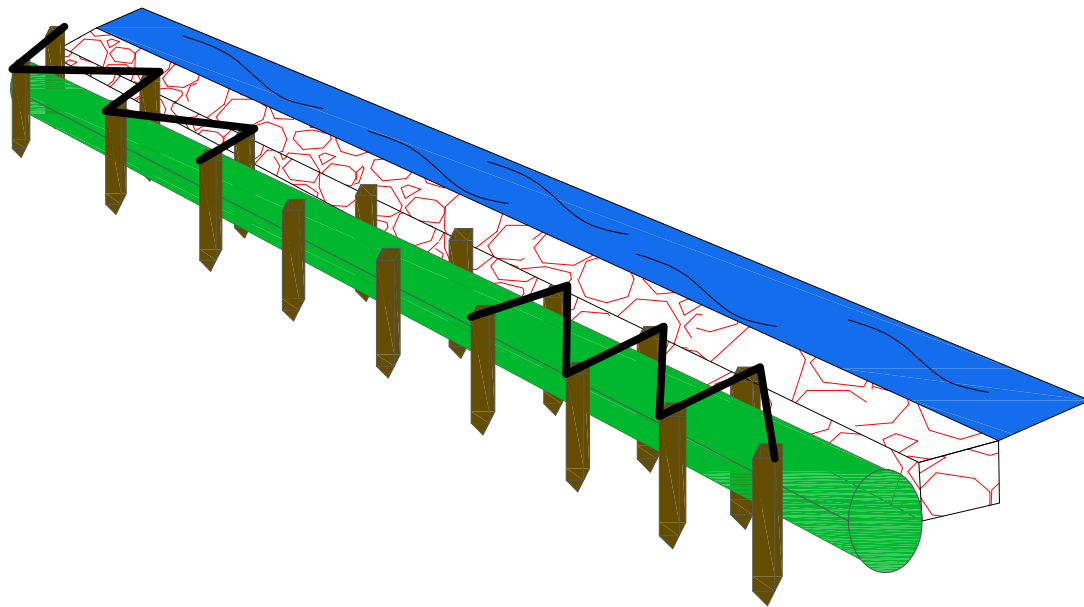
1. COMPOST FILTER SOCKS AND COMPOST FILTER DITCH CHECKS SHALL BE INSTALLED AND MAINTAINED PER MANUFACTURER'S RECOMMENDATIONS.
2. FABRIC MESH TUBE AND COMPOST FILTER MEDIA SHALL MEET OR EXCEED FILTREXX SPECIFICATIONS.
3. STRAW/HAY BALES SHALL NOT BE USED.
4. PLACE COMPOST FILTER SOCKS AT DOWNSLOPE LIMIT OF AREA TO BE GRADED.
5. STOCK PILES OF TOPSOIL SHALL ALSO HAVE COMPOST FILTER SOCKS SURROUNDING THE LOWER PERIMETER.
6. COMPOST FILTER SOCKS SHALL BE PLACED ALONG A LEVEL CONTOUR WITH AN ALLOWANCE OF ± 4".
7. AT EACH END OF DIKE, TURN DIKE UPSLOPE AND EXTEND UNTIL GROUND SURFACE RISES 18".
8. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED BY CONTRACTOR.
9. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES.
10. SEDIMENT TRAPPED BY COMPOST FILTER SOCKS SHALL BE DISPOSED OF IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
11. COMPOST FILTER SOCKS AND COMPOST FILTER DITCH CHECKS SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.



**PERIMETER CONTROL**

**NOTES:**

- USE 2"X2"X2.5" WOODEN STAKES SPACED EVERY TEN FEET, OFFSET EVERY 5 FEET ON OPPOSITE SIDE OF SOCK.
- TIE ROPE TO FOUR STAKES ALTERNATING SIDE.
- LEAVE 30 FEET BETWEEN TIED STAKES



NTS



## **SILT FENCE**

### DEFINITION & PURPOSE

A silt fence consists of a run of filter fabric, stretched, trenched in the ground and attached to anchored posts. Silt fence used as a perimeter control BMP encourages ponding of runoff and settling of sediment from stormwater.

### CONDITIONS FOR EFFECTIVE USE

Install silt fence along slopes, at bases of slopes, and around the perimeter of a site as a final barrier to sediment being carried off site. Silt fence should follow level contour lines with ends turned upslope in a J-Hook. Silt fence should never be used in areas of concentrated flow. Common industry practice is that drainage areas should not exceed 0.25 acres per 100 feet of fence length. See [MDNR Guide Section 6-137](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

Install silt fence prior to disturbance and at intervals during construction of fill slopes. Follow Manufacturer's Specifications. See Typical Detail.

### OPERATION & MAINTENANCE PROCEDURES

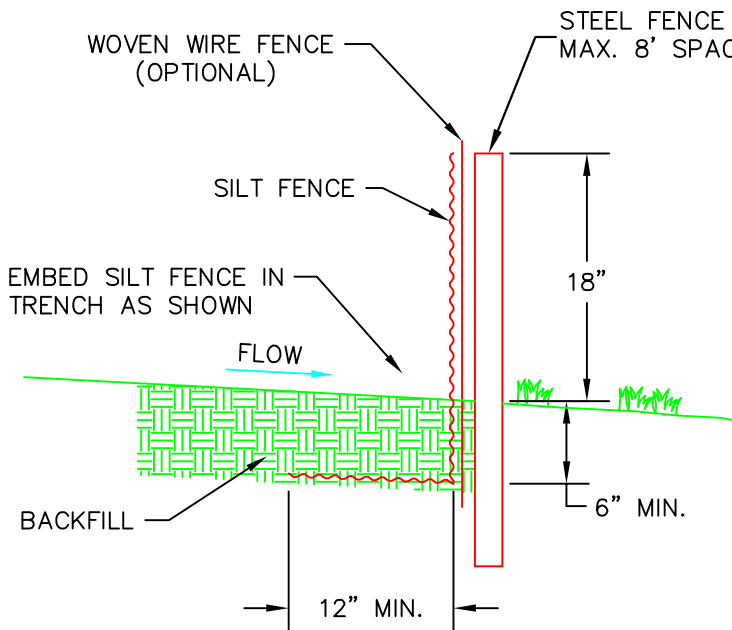
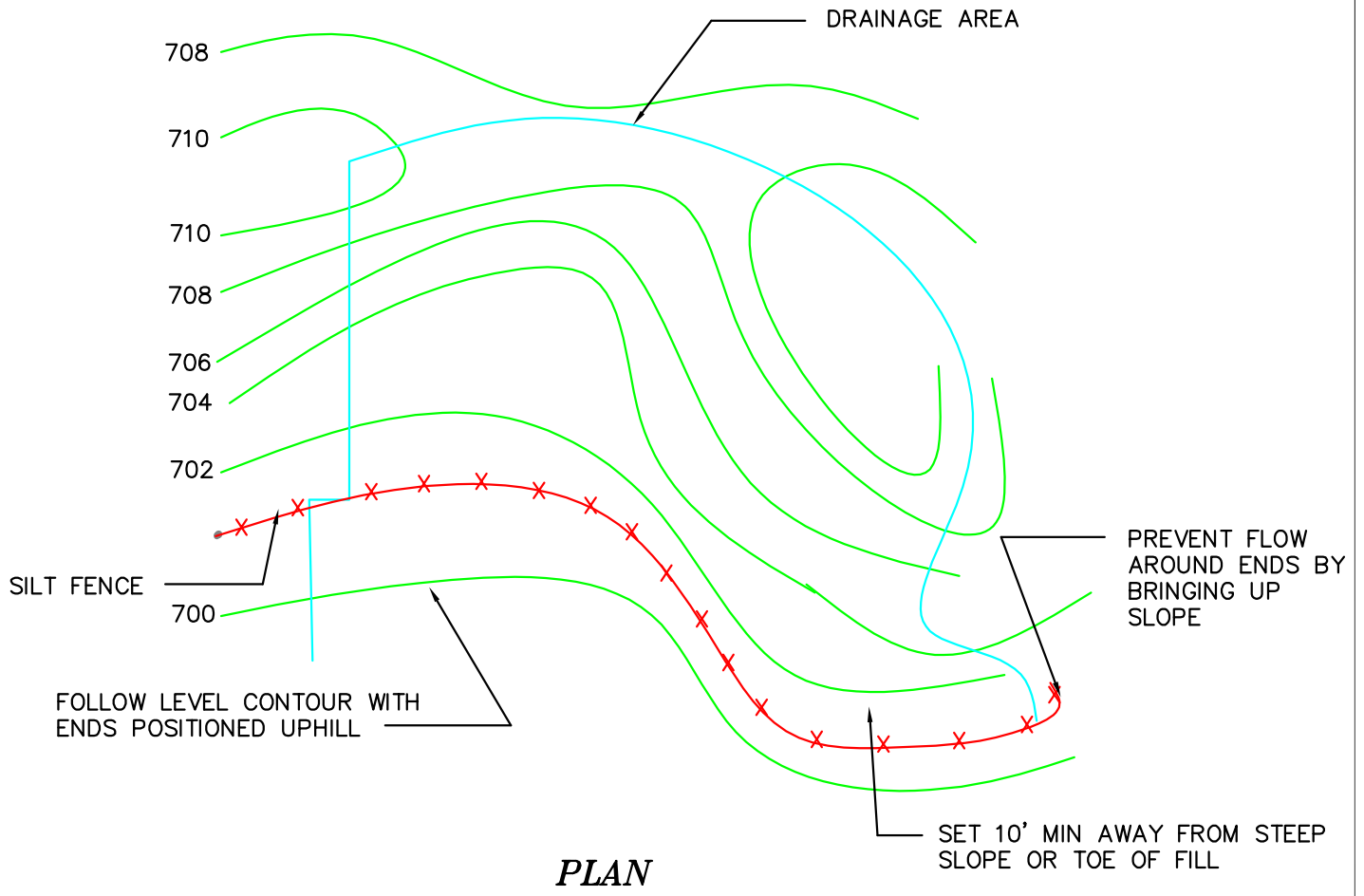
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Remove sediment buildup once it accumulates to 6 inches. Replace torn/clogged fabric, and repair loose fabric and broken stakes.

### SITE CONDITIONS FOR REMOVAL

Remove silt fence after permanent vegetation is established. Remove fence, grade trench area and vegetate.

### ALTERNATIVES

- Compost Sock



**NOTES:**

1. PLACE SILT FENCE AT DOWNSLOPE LIMIT OF AREA TO BE GRADED.
2. SILT FENCE SHALL BE PLACED ALONG A LEVEL CONTOUR WITH AN ALLOWANCE OF  $\pm 4$  INCHES.
3. SEDIMENT TRAPPED BY THIS PRACTICE SHALL BE DISPOSED OF IN AN APPROVED SITE IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
4. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH SUPPORT POST OR TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POSTS.
5. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN IT HAS SERVED ITS USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES.
8. AT EACH END OF SILT FENCE, TURN FENCE UPSLOPE AND EXTEND UNTIL GROUND SURFACE RISES 18 INCHES.

Modified from Chesterfield, Missouri Model BMPs for Land Disturbance

NTS



## **DITCH CHECKS**

### DEFINITION & PURPOSE

Ditch checks are used in channels to reduce water velocity, dissipate energy, and contain sediment in ditches. A ditch check is constructed of 12” or greater compost filter sock, rock-lined geotextile or rock bags.

### CONDITIONS FOR EFFECTIVE USE

Ditch checks should be placed at specified intervals to slow velocities and provide adequate sediment storage capacity. Ditch checks should be designed by a registered design professional based on the hydraulics/hydrology of the site. See [MDNR Guide Section 6-191](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

Immediately following excavation of ditch line, install ditch checks according to plan specifications. Ditch checks need to be installed perpendicular to the ditch. It is important to establish elevation of center mass to be lower than the outside edges. Water should never be allowed to flow around ends of a check dam, as this will cause erosion and deteriorate ditch walls.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Remove accumulation of trash and debris. Remove sediment when depth reaches one-half of the ditch check height. Repair/restore ditch check structure, if necessary, to original configuration.

### SITE CONDITION FOR REMOVAL

Remove ditch checks after stabilization of ditch line. Clean out sediment. Remove materials that make up ditch checks.

### ALTERNATIVES

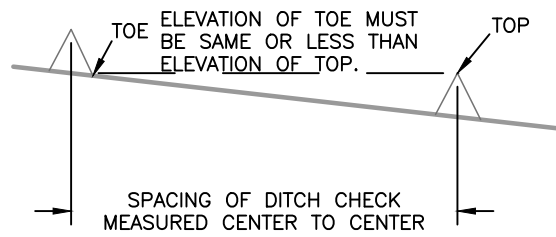
- Triangular Dikes

### ROBUST ALTERNATIVES

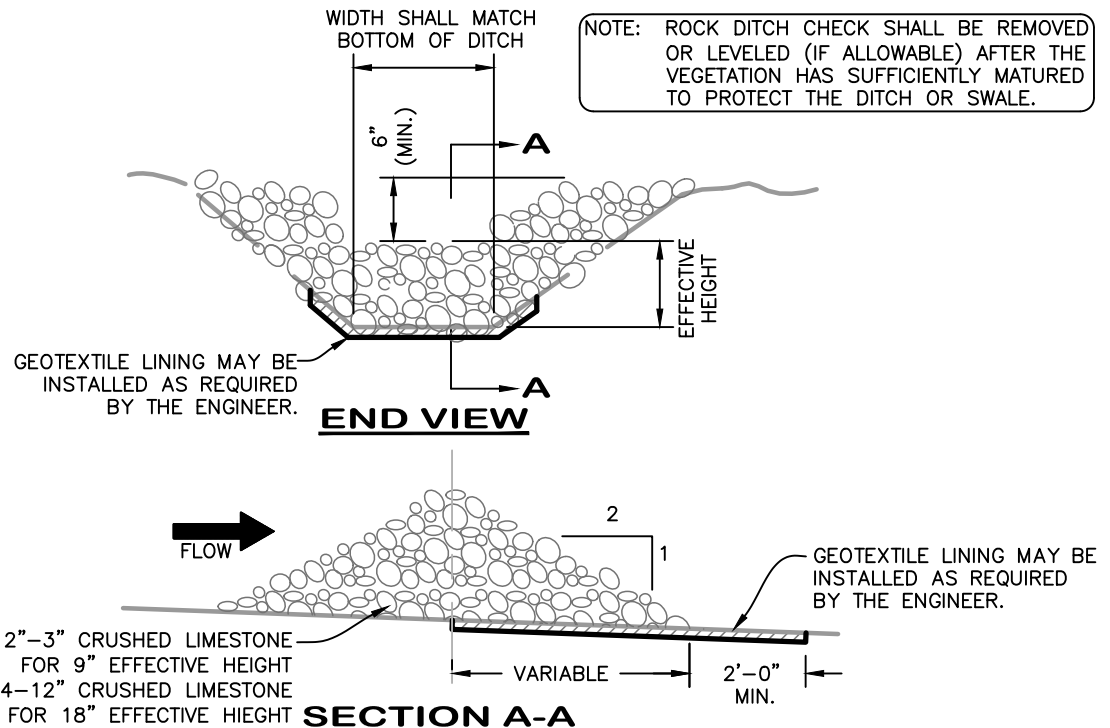
- Check Dam and Pyramid Sock



<b>DITCH CHECK SPACING</b>		
<b>DITCH SLOPE (%)</b>	<b>SPACING FOR 9" EFF. HEIGHT (FT.)</b>	<b>SPACING FOR 18" EFF. HEIGHT (FT.)</b>
0.5	150	300
1.0	75	150
1.5	50	100
2.0	37	75
2.5	30	60
3.0	25	50
3.5	21	43
4.0	19	38
4.5	16	33
5.0	15	30
5.5	13	27
6.0	12	25
6.5	11	23
7.0	10	21
7.5	10	20
8.0	9	19
8.5	9	18
9.0	8	17
9.5	8	16
10.0	7	15



**MINIMUM DITCH CHECK SPACING**



**ROCK DITCH CHECK**  
SCALE: NTS





## **CHECK DAMS**

### DEFINITION & PURPOSE

Check dams reduce flow velocity, allowing sediment to settle out. A check dam is a device constructed of rock, rock bags, or proprietary products placed across a natural or man-made channel or swale. They are similar to ditch checks but designed to be more robust. Not to be constructed from silt fence.

### CONDITIONS FOR EFFECTIVE USE

Check dams should be designed by a registered design professional and consists of one or more dams placed at intervals in channels and swales to slow velocities, reducing erosion and allowing sediment to settle out. They can also be used as an alternative to a sediment basin for sites with a drainage area of 20 acres or less. They can also be used as a secondary sediment control measure in streams but should be combined with water diversion and other BMPs. See [MDNR Guide Section 6-187](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

Install before disturbing vegetation in contributing drainage area and immediately following excavation of channels or swales. Check dams must be placed perpendicular to flow of water. Install geotextile filter fabric below rock. When using rock bags, no geotextile is needed. Check dam must be long enough to assure that center mass is lower than outside edge so that water will run over the middle and not undermine outside edges.

### OPERATION & MAINTENANCE PROCEDURES

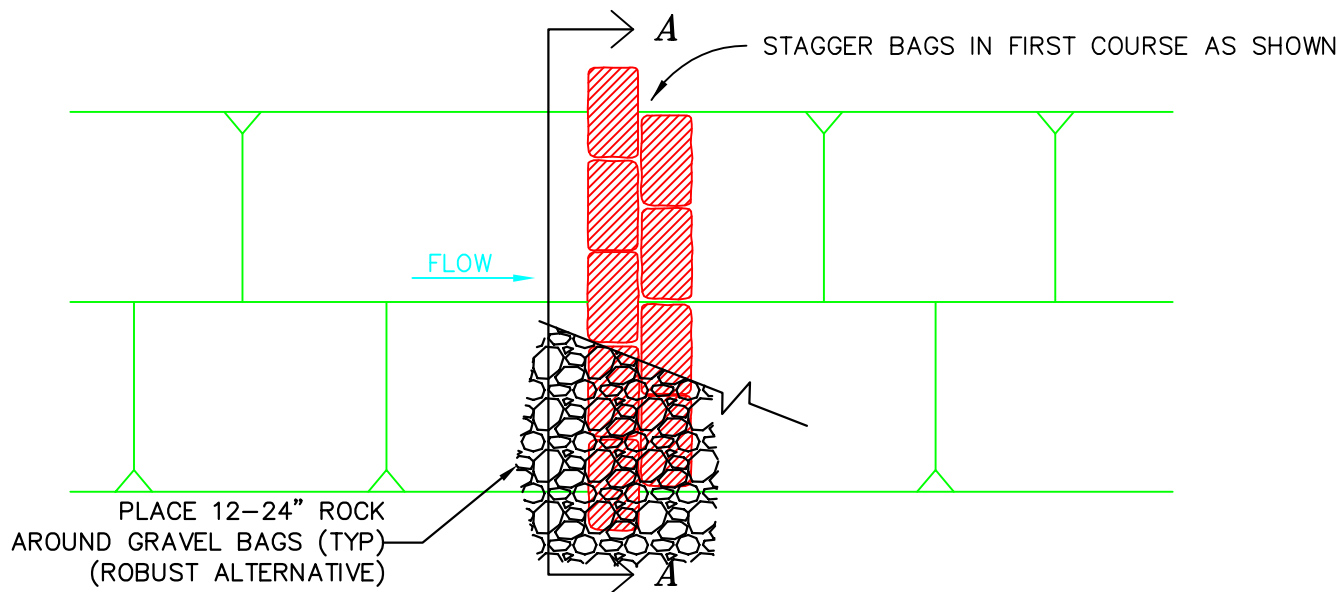
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Remove accumulation of trash and leaves. Remove sediment when depth reaches one-half of the check dam height. Repair/restore dam structure, if necessary, to original configuration.

### SITE CONDITIONS FOR REMOVAL

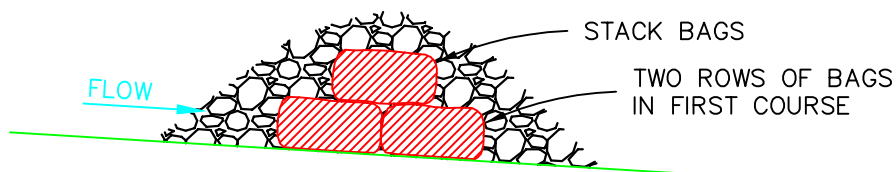
Remove check dam after contributing areas have been stabilized. Clean out sediment. Remove check dam material and return stream or channel back to original condition.

### ROBUST ALTERNATIVES

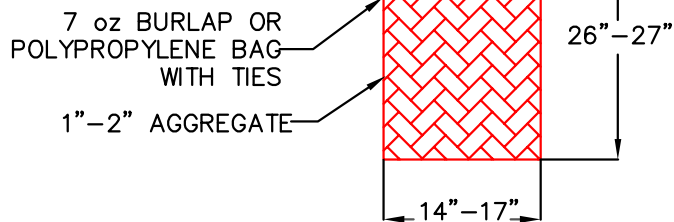
- Constructed Conveyance Channel and Diversion Practices



**PLAN**



**PROFILE**

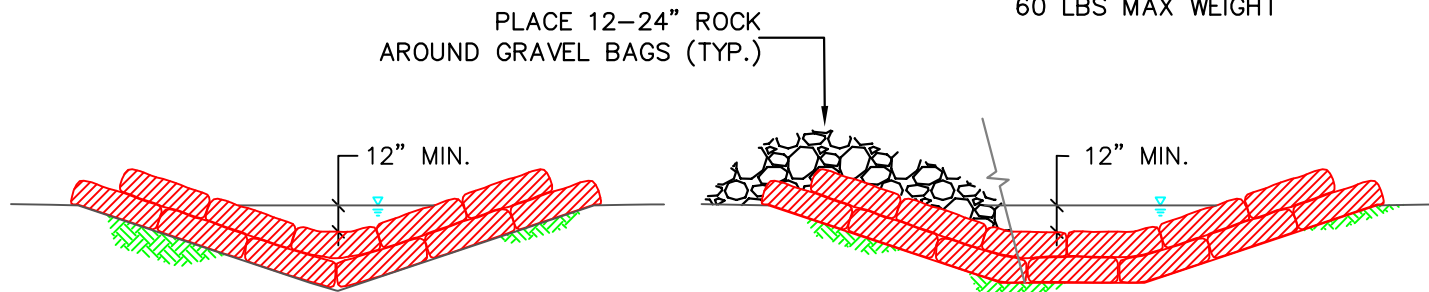


**GRAVEL BAG**

NOTE: FILL BAGS 2/3 FULL.  
60 LBS MAX WEIGHT

NOTES:

FILL BAGS WITH 1" TO 2" CRUSHED LIMESTONE.  
BAGS MAY BE BURLAP OR WOVEN PLASTIC.  
SPACE CHECK DAMS ACCORDINGLY



**A-TYPICAL CROSS-SECTIONS**

Modified From Greene County Missouri – Storm Water Design Standards

NTS



## **INLET PROTECTION**

### **DEFINITION & PURPOSE**

A temporary sediment control barrier placed around an inlet that minimizes sediment from entering the storm drain.

### **CONDITIONS FOR EFFECTIVE USE**

All functional inlets that drain disturbed areas should have inlet protection. The type of inlet protection should be determined based on the type of inlet, drainage area, slope, and whether the inlet is in a high traffic area. Types of inlet protection include gravel bags and proprietary inserts and covers. Compost filter sock or silt fence can be used for protection of area inlets where the sock and fence can be properly staked into the ground. Compost filter sock may also be used on pavement for curb inlet protection but gravel bags may be a better choice in high traffic areas because of their higher flow rate.

### **INSTALLATION/CONSTRUCTION PROCEDURES**

Install before land disturbing activities begin on existing inlets, or immediately after installation of a new inlet. Gravel bags may be placed either as a j-hook on the upstream end of the inlet or as a full barrier, sometimes stacked 2 bags high, across the entire opening of the inlet). Create an overflow bypass in the inlet protection structure so that excessive ponding of water around the inlet will not become a safety issue.

### **OPERATION & MAINTENANCE PROCEDURES**

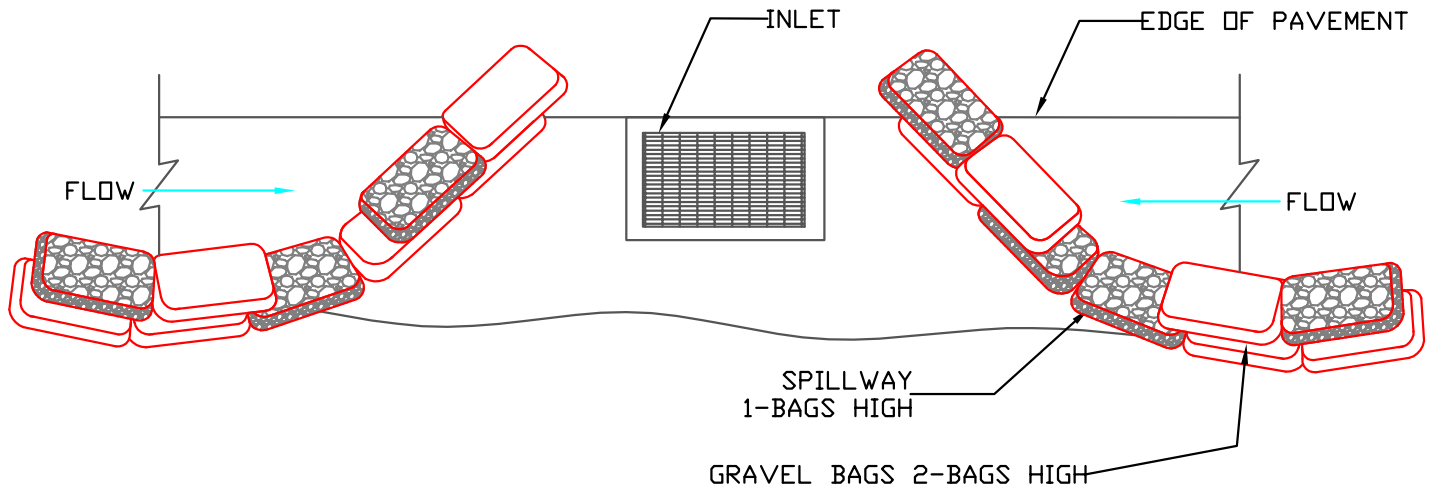
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Inspect inlet protection to ensure integrity and effectiveness every week or 48 hour after every rain event that causes stormwater runoff to occur on-site. Remove sediment and construction debris that impedes flow to the inlet, and replace or repair nonfunctional inlet protection.

### **SITE CONDITIONS FOR REMOVAL**

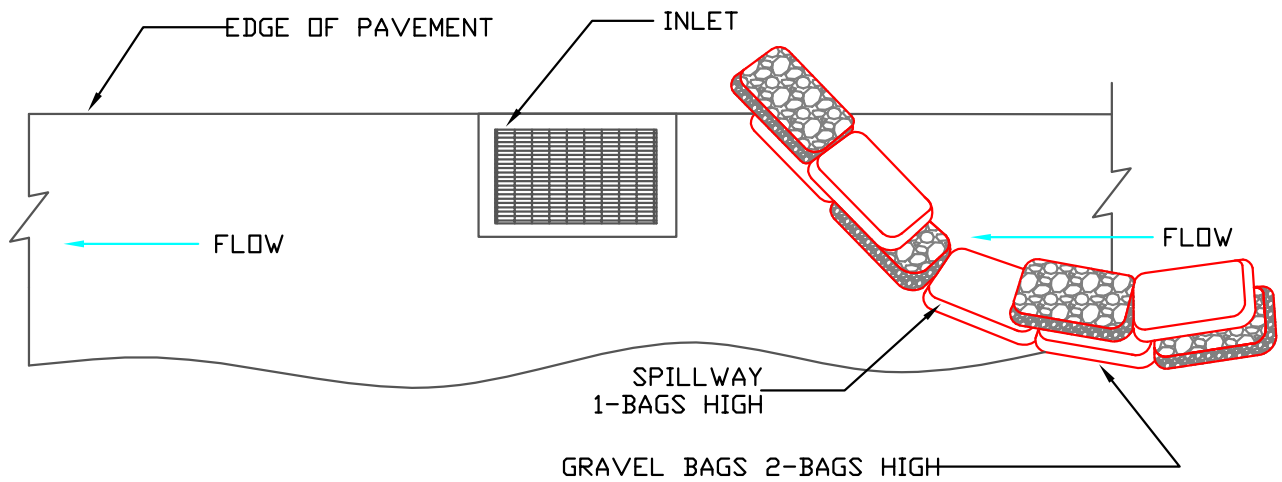
Remove after contributing drainage areas have been adequately stabilized.

### **ROBUST ALTERNATIVES**

- Inlet Filter Inserts



**TYPICAL PROTECTION FOR INLET ON SUMP**



**TYPICAL PROTECTION FOR INLET ON GRADE**



## **GRAVEL BAGS**

### DEFINITION & PURPOSE

Open mesh nylon or burlap bags of gravel designed to pond water and cause sediment to settle out.

### APPROPRIATE APPLICATIONS

Gravel bags may be implemented on a project-by-project basis with other BMPs.

### CONDITIONS FOR EFFECTIVE USE

Type of Flow: Sheet flow and concentrated flow. Gravel bags can be used alone or with other BMPs. They can be used as inlet protection, check dams in streams and channels, outfall protection, for water diversions, to create temporary sediment basins, and as barriers.

### INSTALLATION/CONSTRUCTION PROCEDURES

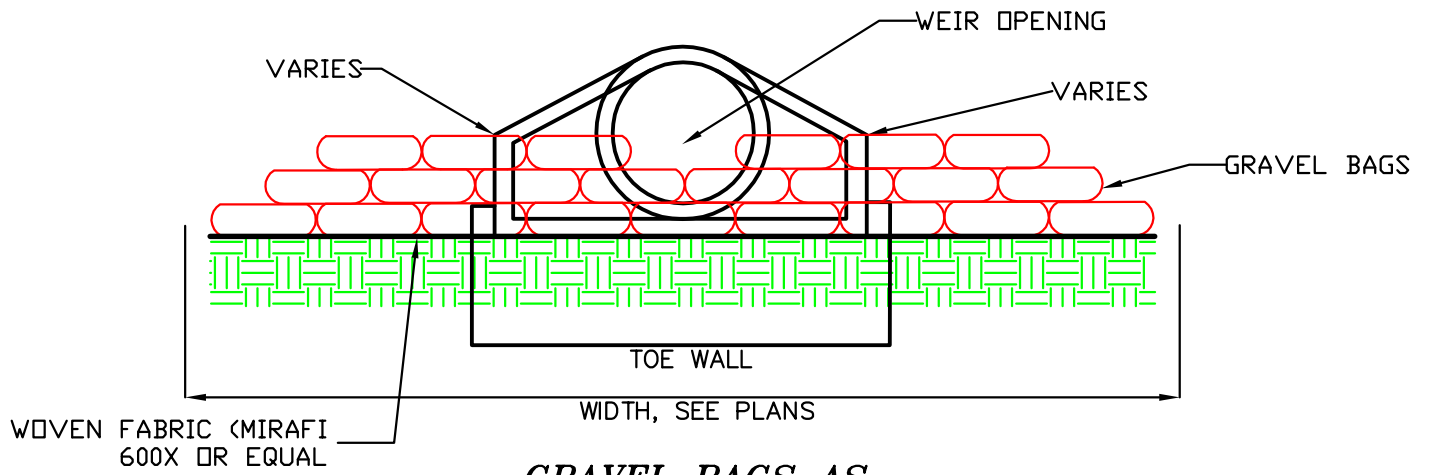
Time of installation is dependent upon the function gravel bags are intended to perform. When used as a linear control for sediment removal, install along a level contour and turn ends of gravel bag row up slope (j-hook style) to prevent flow around the ends. When used for concentrated flows, stack gravel bags to required height using a pyramid approach. The upper rows of gravel bags should overlap joints in lower rows.

### OPERATION & MAINTENANCE PROCEDURES

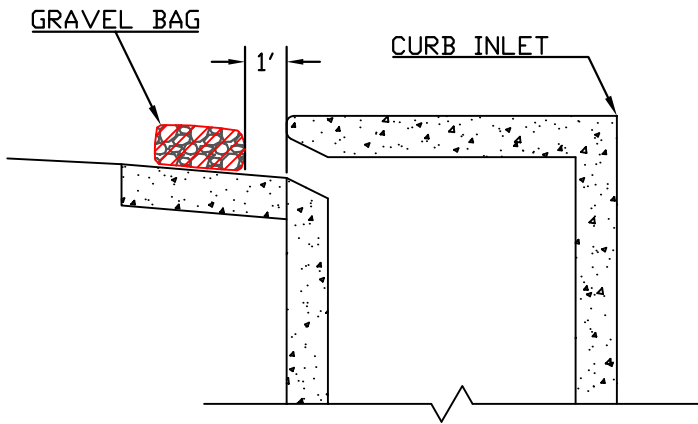
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Replace or stabilize any damaged bags or bags that have moved out of place. Repair wash-outs or other damages as needed. Inspect gravel bags for sediment accumulations, and remove sediment when accumulation reaches  $\frac{1}{2}$  the height of the structure.

### SITE CONDITIONS FOR REMOVAL

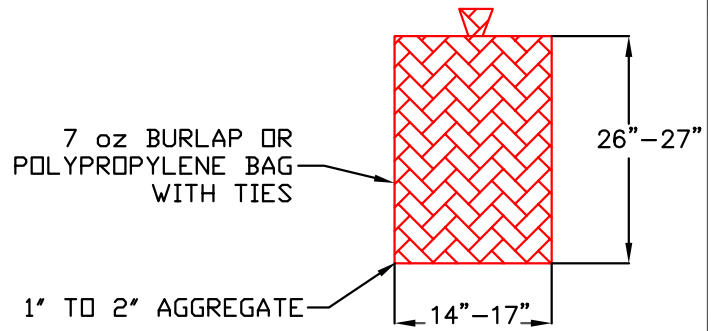
Remove upon completion of upstream/upslope work and vegetation/stabilization of contributing runoff areas.



**GRAVEL BAGS AS  
ROCK OUTLET PROTECTION**

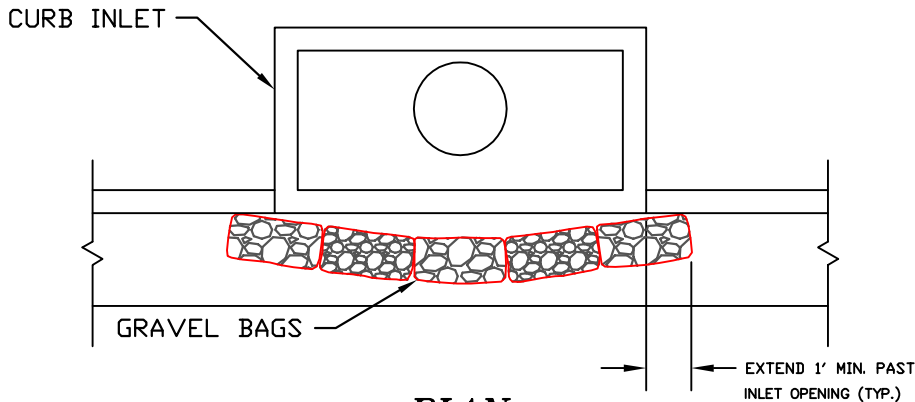


**CROSS-SECTION**



**GRAVEL BAG**

NOTE: FILL BAGS 2/3 FULL.  
60 LBS MAX WEIGHT



**PLAN**

**GRAVEL BAGS AS  
INLET PROTECTION**

- NOTE:
1. FILL BAGS WITH CRUSHED 1" TO 2" LIMESTONE
  2. BAGS SHALL BE BURLAP OR WOVEN PLASTIC
  3. BAGS SHALL BE INSPECTED AND REPLACES AS NEEDED

NOTE:  
COMPOST FILTER SOCK MAY BE USED AS INLET PROTECTION BUT MUST BE STAKED AT EDGES AND IN THE CENTER. USE 8" OR 12" SOCK SIZE DEPENDING ON ROADWAY CLASSIFICATION.



## **FIBER ROLLS/WATTLES**

### DEFINITION & PURPOSE

Fiber rolls or straw wattles are a rolled erosion control product filled with straw, flax, rice, coconut fiber material, or composted material. Each roll is wrapped with UV-degradable polypropylene netting or with biodegradable materials like burlap, jute, or coir. These devices are slope dissipaters that reduce velocity of runoff as sheet flow and catch sediment on steep slopes.

### CONDITIONS FOR EFFECTIVE USE

Fiber rolls can be used in areas of low shear stress including: along the toe, top, face, and at grade breaks on exposed and erodible slopes to shorten slope length and spread runoff as sheet flow, at the end of a downward slope where it transitions to a steeper slope, along the perimeter of a project (less than 1/3 acre) or down-slope of a stockpile, and down-slope of other exposed soil areas. See [MDNR Guide Section 6-195](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

Install fiber roll immediately after rough grading and prior to seeding or mulching. On slopes, install fiber rolls along the contour with a slight downward angle at the end of each row to prevent ponding at the midsection. Turn the ends of each fiber roll upslope (like a j-hook) to prevent runoff from flowing around the roll. Determine using manufacturer's specification the vertical spacing for slope installations. Straw wattles can float or move if not properly staked and trenched in.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on site. Remove sediment accumulation when it reaches ½ the height of the roll/wattle. Repair or replace split, torn, unraveled, or slumping fiber rolls.

### SITE CONDITIONS FOR REMOVAL

Fiber rolls are typically left in place on slopes. If they are removed after stabilization has been achieved, collect and dispose of the accumulated sediment.

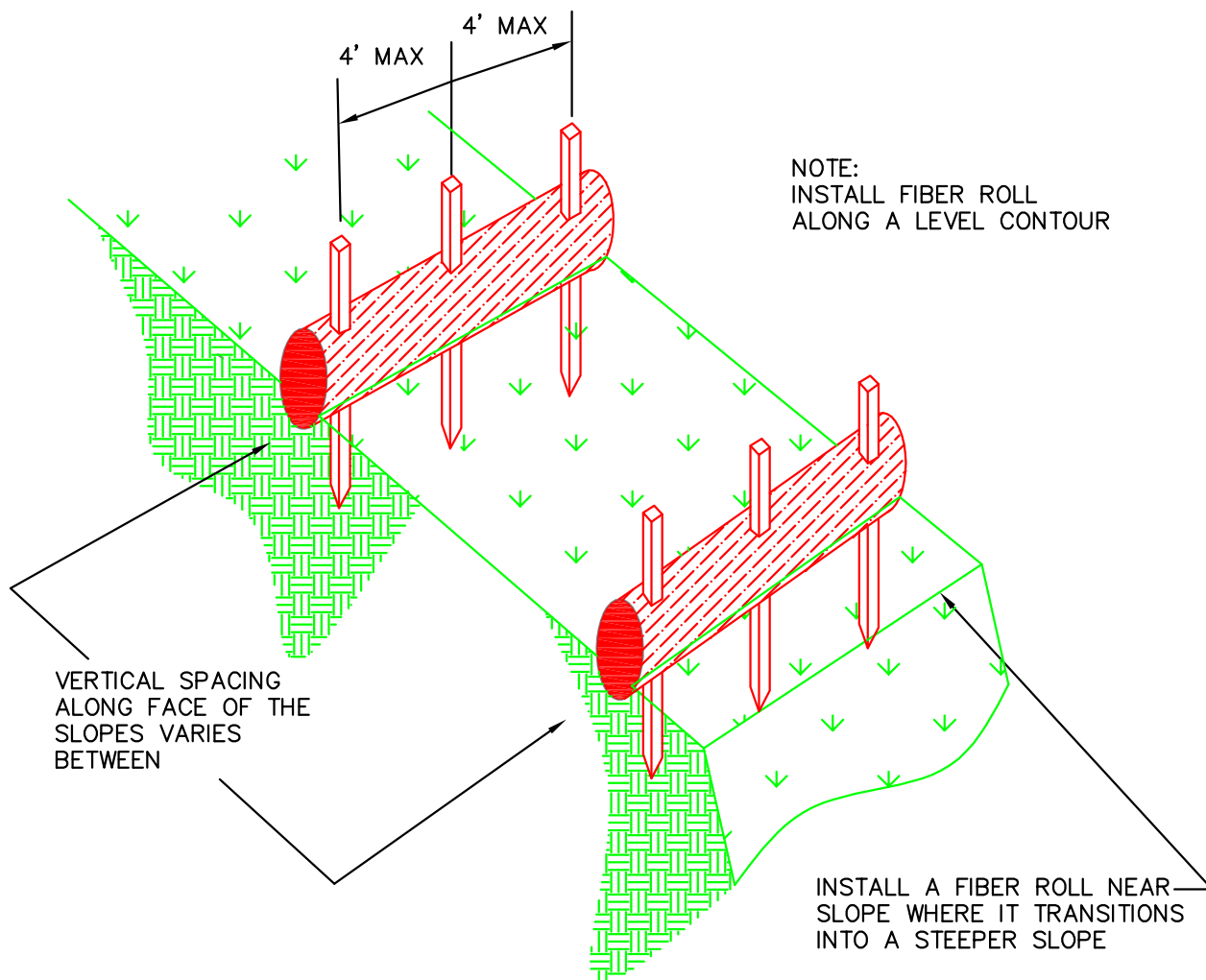
### ROBUST ALTERNATIVES

- Compost Sock

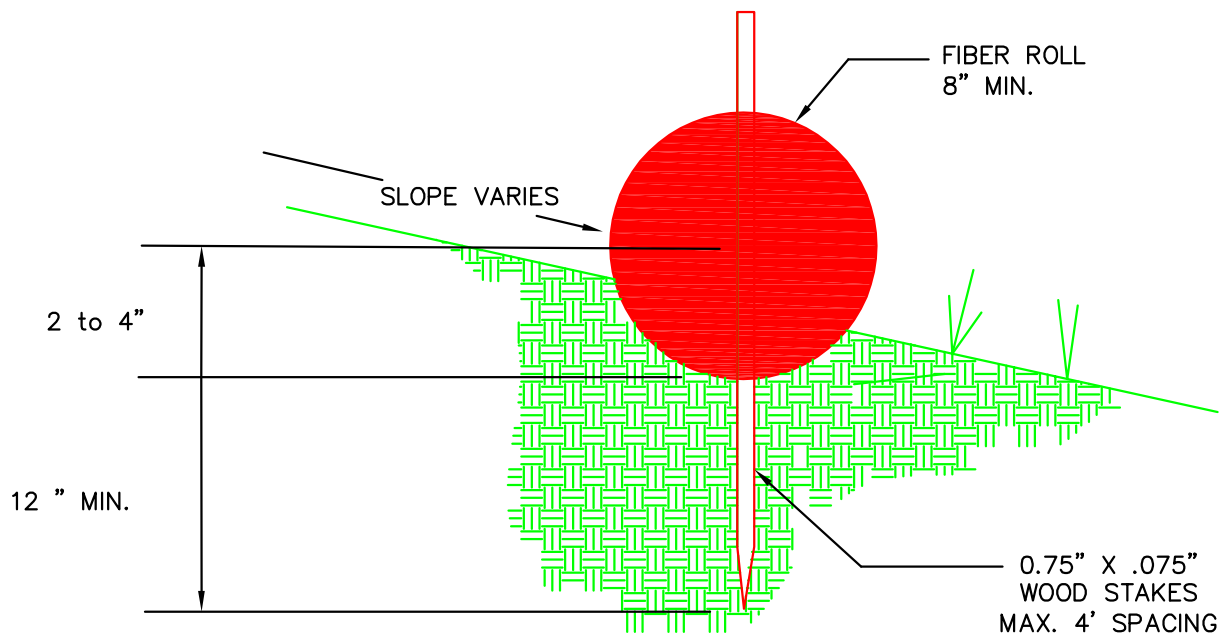
### COMPANION BMPs

- Erosion Control Blanket





**TYPICAL FIBER ROLL INSTALLATION**



**ENTRENCHING DETAILS**

Modified from California Stormwater BMP Handbook

NTS



## **DEWATERING OPERATIONS**

### **DEFINITION & PURPOSE**

Dewatering operations are practices using dewatering bags, filter socks, rock bags or a suction pump with skimmer to manage the discharge of pollutants when stormwater and non-stormwater must be removed from a construction site. Water cannot be directly pumped into storm sewer system, streams, or lakes without first going through a sediment control BMP.

### **CONDITIONS FOR EFFECTIVE USE**

These practices are implemented for removing standing stormwater and allowable non-stormwater discharges from construction sites. Non-stormwater removal includes groundwater, water from cofferdams, water diversions, and waters used during construction activities that must be removed from a work area and are authorized discharges in the state land disturbance permit. Site conditions will dictate the design. A dewatering plan should be submitted as part of the SWPPP detailing the location of dewatering activities, equipment, BMPs and discharge point. Additional permits or special permission from other agencies may be required for some dewatering operations. It is best if stormwater is allowed to settle in the trap or basin for a minimum of 24 hours after the storm event. The intake hose of the dewatering pump should be elevated off the bottom. Dewatering discharges must not cause erosion at the discharge point. See [MDNR Guide Section 6-207](#) for additional guidance.

### **INSTALLATION/CONSTRUCTION PROCEDURES**

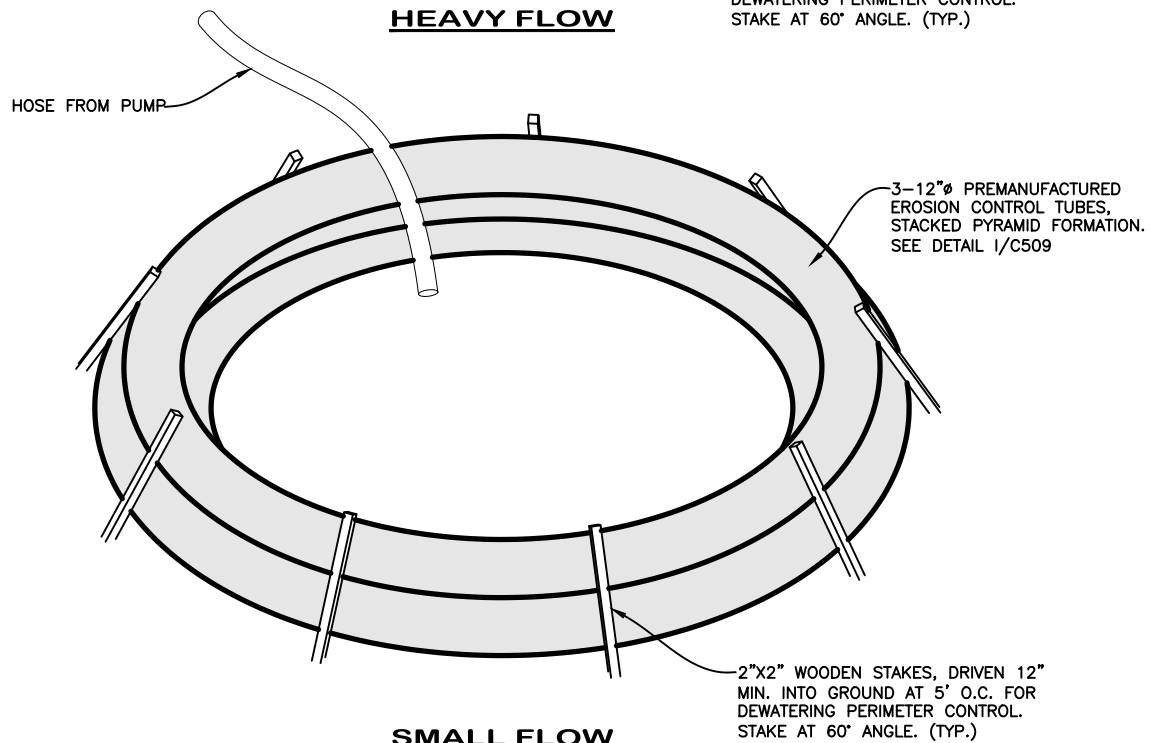
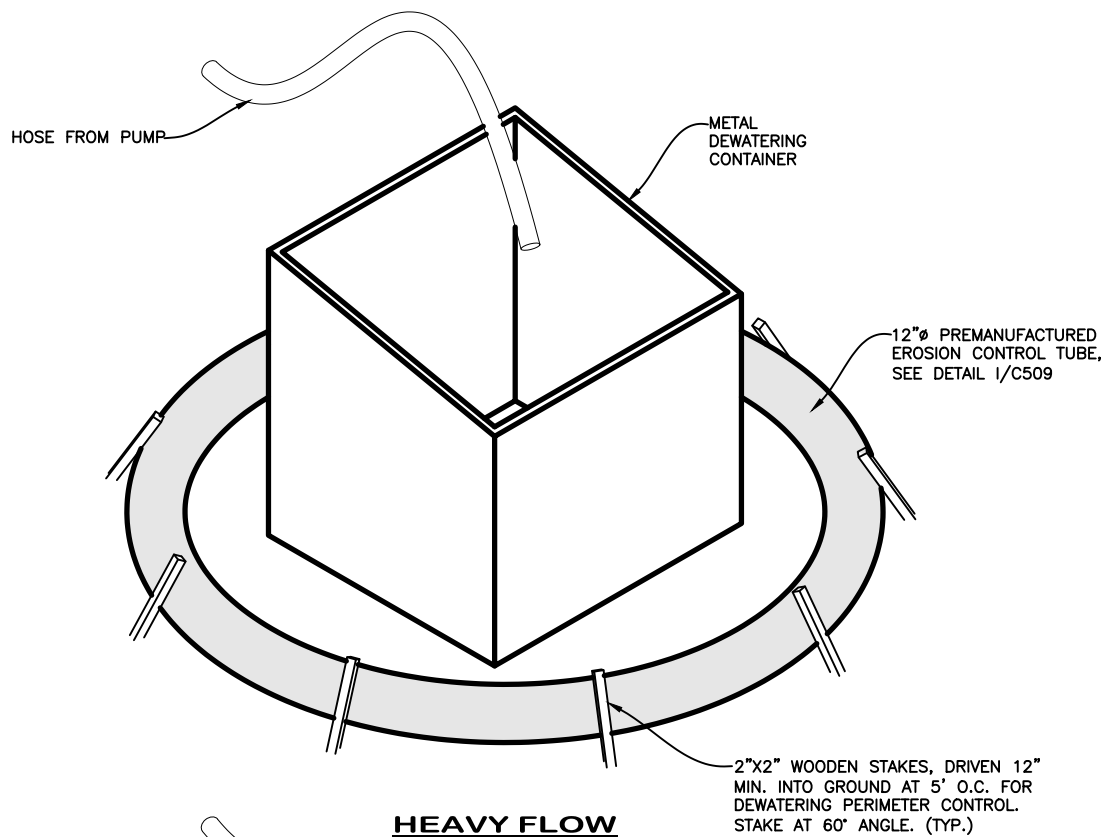
Implement the dewatering plan detailed in the SWPPP as needed to dewater work areas.

### **OPERATION & MAINTENANCE PROCEDURES**

Dewatering operations should be closely attended when in use to ensure BMPs are functioning properly. Accumulated sediment removed during the maintenance of a dewatering device can be incorporated into the site.

### **SITE CONDITIONS FOR REMOVAL**

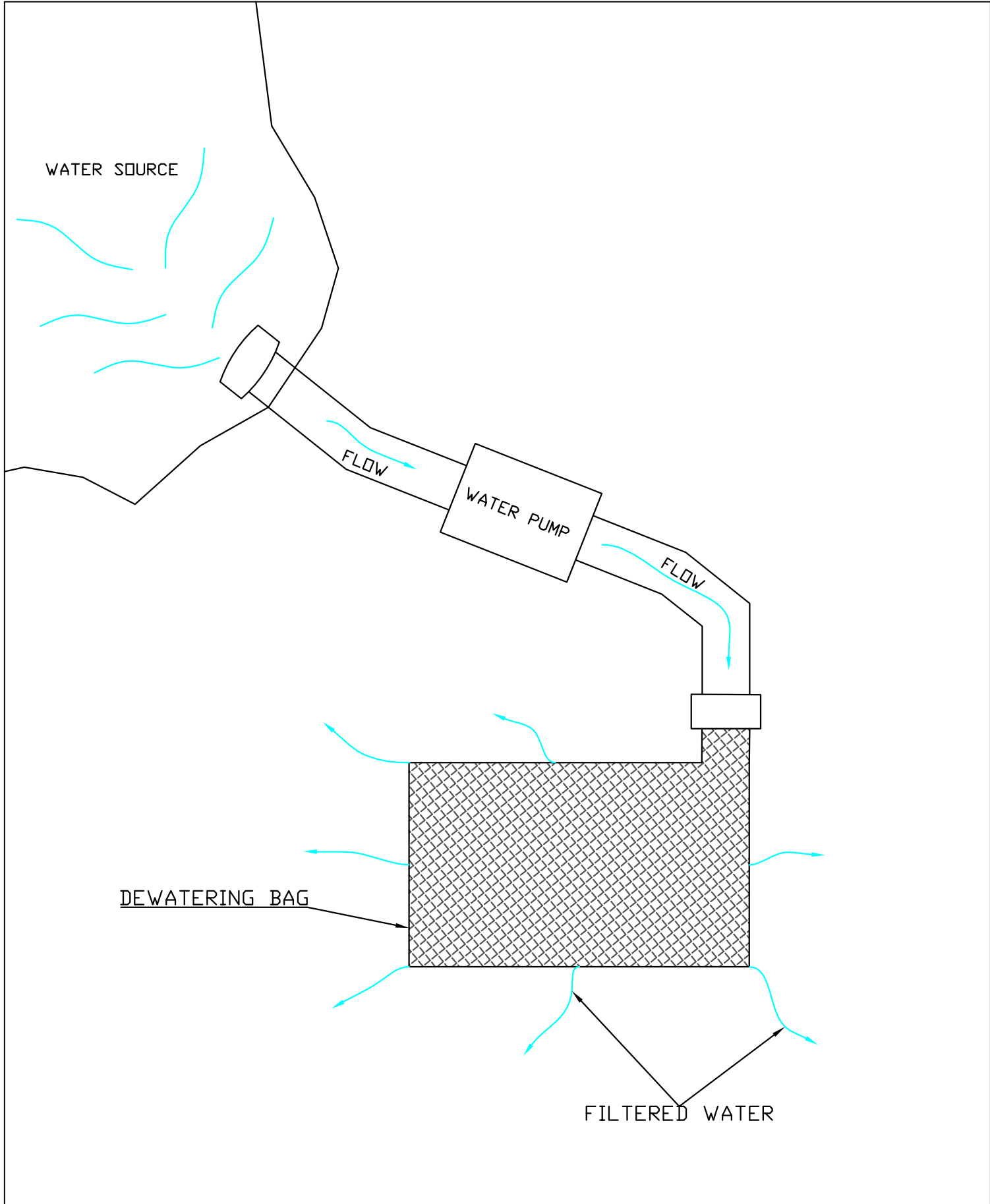
Remove the dewatering operation when dewatering the site is no longer necessary.



### **DEWATERING OPERATION NOTES**

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARING AND IMPLEMENTING A DEWATERING PLAN DETAILING LOCATION OF DEWATERING ACTIVITIES, EQUIPMENT, BMPs AND DISCHARGE POINT. CONTACT PROJECT ENGINEER 72 HOURS IN ADVANCE OF COMMENCING WORK AT 417-862-3355.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING SIZE OF EQUIPMENT, MINIMUM SETTLEMENT TIME AND MAINTENANCE REQUIREMENTS OF DEWATERING OPERATIONS TO ENSURE CLEAN, SEDIMENT FREE, FILTERED DISCHARGE AT ALL TIMES.
3. WHERE CONTINUOUS GROUND WATER FLOWS ARE PRESENT, HEAVY FLOW DEWATERING METHOD SHALL BE USED.
4. CEASE DEWATERING OPERATIONS WHEN DISCHARGE BEGINS TO CONTAIN SEDIMENT LOADS.
5. DEWATERING BAGS SHALL NOT BE USED.
6. PLACE COMPOST FILTER SOCKS ALONG A LEVEL CONTOUR AROUND PERIMETER OF DEWATERING OPERATION DISCHARGE.
7. CONTRACTOR SHALL MONITOR DISCHARGE AT ALL TIMES WHEN IN USE AND MAINTENANCE SHALL BE MADE PROMPTLY AS NEEDED.
8. DEWATERING DISCHARGES MUST NOT CAUSE EROSION AT DISCHARGE POINT.
9. SEDIMENT TRAPPED BY DEWATERING OPERATION SHALL BE DISPOSED OF IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
10. SEE SPECIFICATION SECTION 312300.

**DEWATERING OPERATION** A  
SCALE: NTS 47



Modified from California Stormwater BMP Handbook

NTS



## **SEDIMENT BASIN**

### DEFINITION & PURPOSE

A sediment basin is a temporary settling pond designed to slowly release runoff, detaining it long enough to allow sediment to settle out. Sediment basins may also be retrofitted to permanent stormwater detention or retention basins after construction has ended.

### CONDITIONS FOR EFFECTIVE USE

The basin should be designed by a registered design professional. Sediment basins are required by the state land disturbance permit for each drainage area with 10 or more acres disturbed at one time and shall be sized to contain a volume of at least 3,600 cubic feet per each disturbed acre draining thereto. Other similarly effective BMPs can be specified if a sediment basin is impractical. Sediment basins must have a stabilized spillway and utilize outlet structures that withdraw water from the surface unless infeasible. Basins should be located as close to the sediment source as possible. A sediment basin should not be used in areas of continuously running water (live streams) or in areas where failure of the embankment will result in loss of life, damage to homes or structures, or prevent the use of roadways or utilities. See [MDNR Guide Section 6-209](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

Sediment basins should be constructed according to the design plans prior to disturbance of the drainage area.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Remove trash accumulation at outlet. Remove sediment accumulations at a minimum when the basin is 50% full. Any sediment accumulation must be removed prior to converting the sediment basin into a permanent stormwater basin. If not removed, the accumulated sediment reduces the basin's capacity and makes it difficult to achieve adequate vegetation. Repair and reseed any erosion damage on spillway. Repair settlement, cracking, piping holes, or seepage at embankment. Replace gravel around riser if basin does not drain properly.

### SITE CONDITIONS FOR REMOVAL

If the basin is to be converted to a permanent stormwater basin, it will remain in place. For temporary sediment basins, remove after upstream areas are stabilized. Grade surface as appropriate and vegetate immediately.

### ALTERNATIVES

- Sediment Traps and Check Dams

### COMPANION BMPs

- Gravel Bags



## **SEDIMENT TRAP**

### DEFINITION & PURPOSE:

A sediment trap is a temporary pond where sediment-laden stormwater is detained, allowing sediment to settle out before runoff is discharged through a stabilized spillway/dewatering pipe.

### CONDITIONS FOR EFFECTIVE USE

Sediment traps should be designed by a registered design professional. Sediment traps can be used where runoff can be directed into them at low velocities, typically at the outlets of stormwater diversion structures, channels, slope drains, construction site entrances, vehicle wash areas, or other runoff conveyances. The maximum drainage area is 5 acres. They should be located where sufficient access for sediment removal is available. See [MDNR Guide Section 6-177](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

Install sediment trap prior to disturbance of all other natural vegetation. When excavating an area for a sediment trap, make sure the side slopes are no steeper than 2:1 and the embankment height is no more than 5 feet from the original ground surface. Install an outlet pipe and riser if necessary. Place and compact fill to construct embankments and the spillway. To reduce velocity of runoff from the trap, line the outlet with rip rap and gravel over the riser pipe.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after rain events that cause stormwater runoff to occur on site. Remove trash accumulation. Remove sediment accumulations once sediment reaches ½ the design depth.

### SITE CONDITIONS FOR REMOVAL

Remove after upstream areas are stabilized. Grade surface as appropriate and vegetate.

### ROBUST ALTERNATIVES

- Sediment Basin

### COMPANION BMPs

- Gravel Bags and Compost Sock
- Composted Filter Sock and Triangular Foam Log



## **STOCKPILE PROTECTION**

### **DEFINITION & PURPOSE**

Geotextiles or plastic covers may be placed over stockpiles or disturbed soil areas to protect against wind and/or water erosion. Compost filter sock or sediment fence may also be used when necessary to retain stockpiled sediment.

### **CONDITIONS FOR EFFECTIVE USE**

Applications include small graded areas and stockpiles. The use of plastics and impermeable geotextiles may result in 100% runoff, which may cause erosion problems in the areas receiving the increased velocities and flow. Additional BMPs may need to be installed. Covers can be secured in place with wire staples or sandbags. Avoid stockpiling on impervious surfaces, near storm drains, and on steep slopes. Stockpile side slopes should not exceed 2:1. When installing on slopes, key into the top of the slope and along edges to prevent infiltration of surface water under the geotextile. Seams are typically taped or weighted down their entire length. Off-site borrow/fill areas should also be protected by adequate sediment and erosion control BMPs, and if part of a job  $\geq 1$  acre, their location should be noted within the SWPPP.

### **INSTALLATION/CONSTRUCTION PROCEDURES**

Installation should occur when stockpile is generated, dependent upon intended use.

### **OPERATION & MAINTENANCE PROCEDURES**

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site, checking for erosion, undermining, and anchorage failure. Any failures shall be repaired immediately. If wash-out or breakages occur, the material shall be re-installed after repairing the damage to the slope.

### **SITE CONDITIONS FOR REMOVAL**

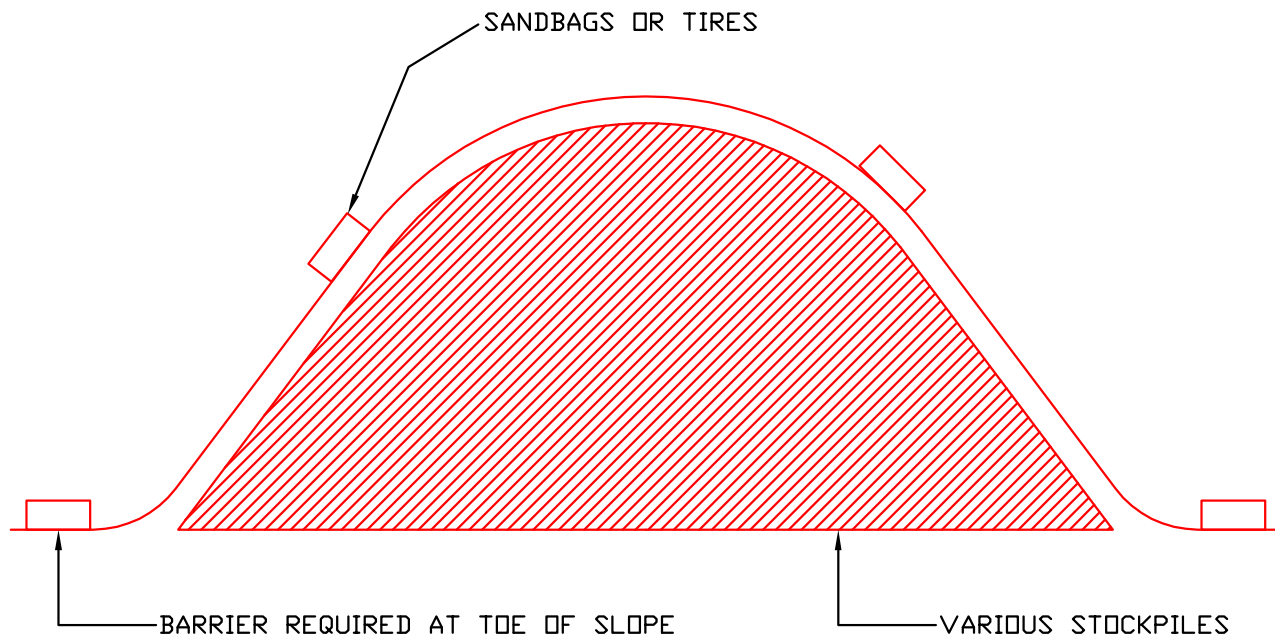
Remove upon establishment of other temporary stabilization BMPs, or after permanent stabilization has occurred.

### **ROBUST ALTERNATIVES**

- Stabilizing stockpile with vegetation.

### **COMPANION BMPs**

- Perimeter control BMP



NOTES:

1. MINIMUM 12" OVERLAP OF ALL SEAMS REQUIRED.
2. BARRIER REQUIRED AT TOE OF SLOPE
3. COVERING MAINTAINED TIGHTLY IN PLACE BY USING SANDBAGS OR TIRES ON ROPE WITH A MAXIMUM 10' SPACING IN ALL DIRECTION

NTS





## **PROTECTION OF PERMANENT INFILTRATION PRACTICES DURING CONSTRUCTION**

### **DEFINITION & PURPOSE**

Permanent infiltration practices are post-construction BMPs which are designed to improve the quality and manage the volume of stormwater runoff by encouraging natural infiltration on-site. These practices, which include, but are not limited to, grass swales, infiltration basins and trenches, and pervious pavement and pavers, must be protected during construction in order to prevent them from becoming clogged with sediment and/or compacted by equipment.

### **CONDITIONS FOR EFFECTIVE USE**

In areas where infiltration practices will be installed, soil compaction should be minimized by limiting equipment/vehicle traffic. The first step in protecting permanent infiltration practices during construction is to utilize phasing to minimize the exposure of these structures to sediment. Install pervious pavement, infiltration basins and trenches after all upstream areas have been stabilized. If this is not possible, protect pervious paving with a perimeter control BMP, or leave plastic used for curing in place until all upstream areas have been stabilized. Protect infiltration trenches and basins by placing inlet protection in curb cuts and perimeter control where necessary.

### **INSTALLATION/CONSTRUCTION PROCEDURES**

Before construction, utilize phasing to schedule installation of permanent infiltration practices after stabilization of upstream areas. Use the site map to locate the staging area and stockpiled material away from areas where infiltration practices will be installed. Install structural BMPs immediately following construction of the infiltration practice. See standards and specifications for the BMPs which will be utilized. BMPs may include Phasing, Compost Filter Sock, Gravel Bags, and Inlet Protection.

### **OPERATION & MAINTENANCE PROCEDURES**

Inspect every week and within 48 hours after rain events that cause stormwater to occur on site. Make sure that areas that will be used for permanent infiltration practices are not becoming compacted by equipment/vehicle traffic, material storage, or other construction activities. Loosen and prepare compacted soil as needed. Remove accumulated sediment from behind structural BMPs. Excavate sediment accumulation in infiltration basins, swales and trenches. If basins and/or trenches will be used as sediment traps during construction to manage stormwater volume, they must be completely excavated prior to adding subbase, base and surface materials for conversion into permanent infiltration practices. Sediment accumulation in pervious paving requires cleaning by sweeper/vacuum truck. Never use a broom to sweep dirt off pervious pavement.

### **SITE CONDITIONS FOR REMOVAL**

Remove after upstream areas are stabilized.

### **COMPANION BMPs**

- phasing/sequencing



## **HOUSEKEEPING**

### DEFINITION & PURPOSE

Housekeeping refers to construction site management measures that are designed and implemented to minimize discharge of pollutants from the site. Chemicals, hazardous materials, solid waste, human waste and construction debris are some materials stored on site that can be sources of stormwater pollution without proper BMPs and good housekeeping. Follow manufacturer's specifications and refer to material safety data sheets for proper use and disposal of chemicals.

### CONDITIONS FOR EFFECTIVE USE

An effective management system requires training and signage to promote proper storage, handling and disposal of materials. Storage areas should be regularly inspected for compliance. Plans should contain notes clearly stating requirements for addressing potential pollutants. Provide sufficient temporary toilet facilities to serve the number of workers on the site. Temporary sanitary facilities should not be placed on top of storm inlets or near waterways. Secondary containment can be added at the base of porta-potties to address leaks/spills. The porta-pottie can be tied down using t-posts to prevent tipping over. Collection of trash and construction debris should be in covered dumpsters. Products should be stored in original containers and tightly sealed. Fueling should be done in areas that do not receive a substantial amount of runoff and do not drain directly to lakes, creeks, streams, rivers, sewers, groundwater, wetlands, or road ditches. Place waste receptacles near area of work and empty them on a regular basis. All fueling activities present on the site shall adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers. Hazardous wastes shall be managed according to Missouri Hazardous Waste Laws and Regulations. Install appropriate signage. Post guidelines for proper handling, storage and disposal of materials, and emergency spill clean-up on site. See [MDNR Guide Section 2](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

Good housekeeping starts concurrently with work at the site.

### OPERATION & MAINTENANCE PROCEDURES

Inspect for good housekeeping in storage areas and throughout the site weekly and within 48 hours of every rain event which causes stormwater runoff to occur on site. Maintenance of temporary toilet facilities should be frequent and thorough. Make necessary corrections and repairs.

### SITE CONDITIONS FOR REMOVAL

Housekeeping measures can be removed at the completion of the project.



## **POLLUTION PREVENTION PROCEDURES (GENERAL POLLUTION NOTES)**

### **SPILL PREVENTION CONTROLS**

Keep a spill kit on-site with equipment necessary for spill clean-up. Equipment and materials include, but are not limited to: brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sawdust, oil-absorbent booms, and trash containers.

### **FUELING, MAINTENANCE OF EQUIPMENT & VEHICLES**

No fueling, servicing, maintenance or repair of equipment or machinery should be done within 100 feet of a stream, or within 150 feet of a classified stream, losing stream, or sinkhole. Tarps or drop cloths and drip pads should be used when servicing, repairing, or performing maintenance on construction equipment in the field. When work is complete, the contaminated materials should be disposed of appropriately.

### **WASHING OF EQUIPMENT & VEHICLES**

No wash water is allowed to discharge into storm drains or drainage way without proper treatment.

### **PESTICIDES, HERBICIDES, INSECTICIDES, FERTILIZERS & LANDSCAPE MATERIALS**

Exposure of these chemicals to precipitation and stormwater on-site should be minimized.

### **DIESEL FUEL, OIL, HYDRAULIC FLUIDS, OTHER PETROLEUM PRODUCTS & CHEMICALS**

All fueling facilities present on the site shall adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers. All fuel, oil, and other fluids exposed to precipitation shall be stored in watertight, structurally sound, closed containers. Minimize the discharge of fluids from spills and leaks by implementing chemical spill and leak prevention and response procedures, including, but not limited to, installation of containment berms and use of drip pans. Machinery should be kept out of the waterway as much as possible.

### **HAZARDOUS OR TOXIC WASTE**

Hazardous wastes shall be Missouri Hazardous Waste Laws and Regulations. Post guidelines for proper handling, storage and disposal of materials, and emergency spill cleanup on site. An accurate, up-to-date inventory of materials delivered and stored on-site should be kept. Retain original labels and material safety data sheets. All paint, solvents, petroleum products, petroleum waste products and storage containers such as drums, cans, or cartons shall be stored using best management practices. Materials exposed to precipitation shall be stored in watertight, structurally sound, closed containers with proper labels. Store bagged and boxed materials on pallets. Cover bagged and boxed materials during non-working days and prior to rain events. Incompatible materials, such as ammonia and chlorine, must not be stored in the same temporary containment facility. Containers for proper disposal of waste paints, solvents, and cleaning compounds shall be provided. All hazardous wastes that are transported, stored, or used for maintenance, cleaning, or repair shall be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations. For guidance, contact 1-800-361-4827.



## **CONCRETE WASH-OUT PIT**

### DEFINITION & PURPOSE

Concrete wash-out pits are used to contain concrete wash-out when truck chutes, drums and/or hoses are rinsed out after delivery to construction site. Disposal can occur when concrete wash-out becomes a solid. Concrete wash-out water is a pollutant because of the high pH level and chemical additives in the wash-out. Concrete wash-out management prevents the contamination of stormwater with high Ph and additives that may cause adverse impact to water quality.

### CONDITIONS FOR EFFECTIVE USE

Concrete wash-out pits must be implemented on construction projects where concrete slurries are generated. Wash-out should be located a minimum of 50 feet from storm drains, ditches, and 100 feet from classified streams, losing streams or sinkholes. Design concrete wash-out pits to sufficiently hold all liquid and concrete waste. Plastic liner should be a minimum of 10 mil. polyethylene sheeting. See [MDNR Guide Section 6-63](#) for additional guidance.

### INSTALLATION/CONSTRUCTION PROCEDURES

Install concrete wash-out pits prior to concrete pouring activities. See Typical Detail.

### OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after a rain event that causes stormwater runoff to occur on-site. Remove and dispose of solid concrete material. Wash-out facilities must be cleaned when volume reaches 75% of capacity. Cover the concrete wash-out pit before predicted rain events to prevent overflow.

### SITE CONDITIONS FOR REMOVAL

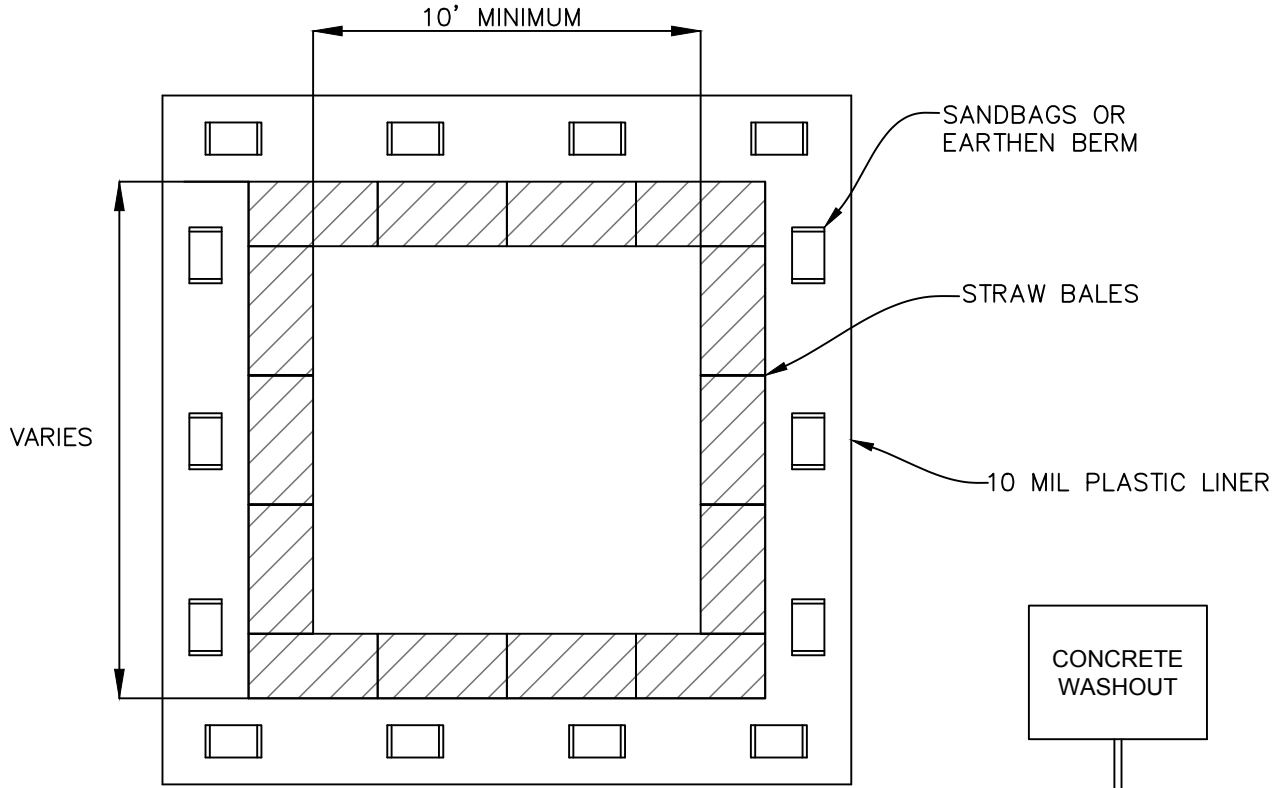
Remove concrete wash-out pit when concrete wash-out activity ceases.

### ALTERNATIVES

- Return unwanted concrete back to concrete batch plant to wash-out, proprietary disposal boxes, roll-off dumpster

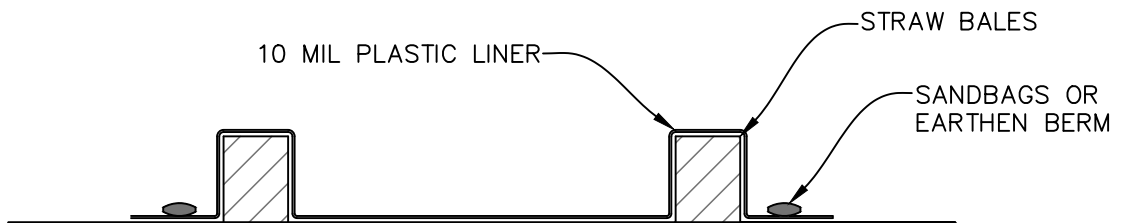
# CONCRETE WASHOUT NOTES

1. WASHOUT CONTAINMENT SHALL BE INSTALLED FOR DURATION OF CONCRETE WORK AND RETAIN CONCRETE AND OTHER WASHOUT LIQUIDS UNTIL EVAPORATION OR REMOVAL BY PUMP.
2. CONTAINMENT SHALL BE SIZED FOR EXPECTED WASHOUT VOLUMES.
3. AVOID PLACING NEAR STORM DRAINS, STREAMS, SINKHOLES, OUTFALLS OR OTHER LOW AREAS WHERE WATER PONDS OR FLOWS.
4. OTHER APPROVED LEAK-PROOF CONTAINMENT IS ACCEPTABLE.
5. TRAPS SHALL BE ROUTINELY MAINTAINED AT 75% CAPACITY AND REPLACED AS NECESSARY TO PERFORM.
6. THE WASHOUT PIT SHALL BE COVERED BEFORE PREDICTED RAIN EVENTS TO PREVENT OVERFLOW.
7. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30FT OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



**PLAN**

**SIGNAGE**



**SECTION**

## **APPENDIX 3**

### **MANHOLE INSPECTION LOGS AND PHOTOGRAPHS**

Manhole Inspection Table  
Ozark Correctional Center – Fordland, MO



<b><u>Manhole #</u></b>	<b><u>Survey #</u></b>
1	1911
2	1908
3	2077
4	2082
5	2391
6	2247
7	2299
8	1914
9	1922
10	2390
11	(not found)
12	2223
13	2070
14	2648
15	2075
16	2079
17	(not found)
18	2386
19	2369







# MANHOLE INSPECTION

Date: 10/ 20 / 2022 Manhole No. : ( 1(1911) ) \_\_\_\_\_

Address: 929 Honor Camp Lane, Fordland, MO 65652 Location: Ozark Correctional Facility

Precipitation: 1 1=None 2=Light Rain 3=Heavy Rain 4=Snow Crew: Andy , Jason

Ground Condition: 1 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected

Not Inspected:  Location: 7 Manhole Diameter: 4 (ft.) Depth \_\_\_\_\_ (ft.)

- |   |   |  |
|---|---|--|
| <ul style="list-style-type: none"> <li>1 = C.N.L</li> <li>2 = D.N.E</li> <li>3 = Buried</li> <li>4 = Haz/Atmos.</li> <li>5 = Unsafe</li> <li>6 = Sealed Lid</li> <li>7 = Traffic</li> <li>8 = Dog</li> <li>9 = Other</li> </ul> | <ul style="list-style-type: none"> <li>1 = Paved St.</li> <li>2 = Unpaved St.</li> <li>3 = Paved Intersection</li> <li>4 = Unpaved Intersection</li> <li>5 = Alley</li> <li>6 = Sidewalk</li> <li>7 = Parking Lot</li> <li>8 = BackYard</li> <li>9 = Ditch</li> <li>10 = Curb/Gutter</li> <li>11 = Easement</li> <li>12 = Private Res.</li> </ul> | <p><input type="checkbox"/> Subject to Ponding Ponding Depth: _____ (ft.)</p> <p>Grade Elevation: <u>2</u></p> <ul style="list-style-type: none"> <li>1 = Even</li> <li>2 = Above <u>2</u> (in)</li> <li>3 = Below _____ (in)</li> </ul> <p>Trib. Area _____ ((sq. ft.))</p> |
|---|---|--|

Condition: Gen Obs: Comments:

Cover: Diameter 26 (in.)  F P \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_  
 Thickness .875 (in.)  
 Type: 2 Vented # 2 Dia 1 (in.)  
 1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security

Cover-to-Frame Fit  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Frame:  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

a. Inside Dia. (in.) 26.5 b. Outside Dia. (in.) 28 c. Dwell (in.) \_\_\_\_\_ d. Height (in.) 4.5

Frame-to Chimney Seal: Type \_\_\_\_\_ G F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Chimney: Type 15  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_  
 Height: \_\_\_\_\_ (in.)

Corbel: Type 15  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Wall: Type 15  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Bench: Type 17 G  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ Debris present

Invert: Type 17 G  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Steps: Type \_\_\_\_\_  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

NO. Missing: 0

Comments: T-Lock Manhole Liner

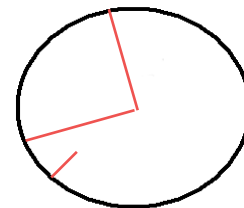
## Pipe Seal

- |                        |                        |
|------------------------|------------------------|
| 1. G F P I/I _____ GPM | 4. G F P I/I _____ GPM |
| 2. G F P I/I _____ GPM | 5. G F P I/I _____ GPM |
| 3. G F P I/I _____ GPM | 6. G F P I/I _____ GPM |

Evidence of Surcharge: Depth \_\_\_\_\_ (ft.)

### Structure Type

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Morter Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |



# VISUAL PIPE INSPECTION

Date 10 / 20 / 2022 Observation Manhole(                      ) 1 (1911) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
	( W )	( N )	( SW )	(      )	(      )	(      )
To Manhole:						
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	8.65	8.7	3			
Drop Drop Type: <small>1= Const. Ext. 2 = Const. Int. 3 = Not Const.</small>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pipe Size: (Dia. in Inches)	8	8	8			
Type of Pipe <small>1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP</small>	?	?	?			
Pipe Shape: <small>1=Circular 3=Elliptic 2=Rectangular 4=Other</small>	1	1	1			
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots <small>1-Lt. 2=Med. 3=Heavy</small>						
Deposition: <small>1=Medium 2=Heavy</small>						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: <small>1 = Minor 3 = Severe 2 = Moderate</small>						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



# MANHOLE INSPECTION

Date: 10/20/2022 Manhole No. : (2(1908))

Address: 929 Honor Camp Lane, Fordland, MO 65652 Location: Ozark Correctional Facility

Precipitation: 1 1=None 2=Light Rain 3=Heavy Rain 4=Snow Crew: Andy, Jason

Ground Condition: 1 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected  Not Inspected Location: 7 Manhole Diameter: 4 (ft.) Depth: 8.3 (ft.)

- 1 = C.N.L. 2 = D.N.E. 3 = Buried 4 = Haz/Atmos. 5 = Unsafe 6 = Sealed Lid 7 = Traffic 8 = Dog 9 = Other
- 1 = Paved St. 2 = Unpaved St. 3 = Paved Intersection 4 = Unpaved Intersection 5 = Alley 6 = Sidewalk
- 7 = Parking Lot 8 = BackYard 9 = Ditch 10 = Curb/Gutter 11 = Easement 12 = Private Res.

Subject to Ponding Ponding Depth: (ft.)  
Grade Elevation: 1  
1 = Even 2 = Above (in) 3 = Below (in)  
Trib. Area (sq. ft.)

Condition: Gen Obs: Comments:

Cover: Diameter 24 (in.) Thickness 0.875 (in.) Type: 2 Vented # 2 Dia 1 (in.)  
1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security  
Cover-to-Frame Fit (G) F P I/I GPM  
Frame: (G) F P I/I GPM  
a. Inside Dia. (in.) 26.5 b. Outside Dia. (in.) 28 c. Dwell (in.) d. Height (in.) 4.5

Frame-to Chimney Seal: Type G F P I/I GPM Offset Frame  
Chimney: Type 1 (G) F P I/I GPM Height: (in.)  
Corbel: Type 1 (G) F P I/I GPM  
Wall: Type 1 (G) F P I/I GPM  
Bench: Type 17 (G) F P I/I GPM  
Invert: Type 4 (G) F P I/I GPM  
Steps: Type 8 G F (P) I/I GPM Corroded  
NO. Missing: 0

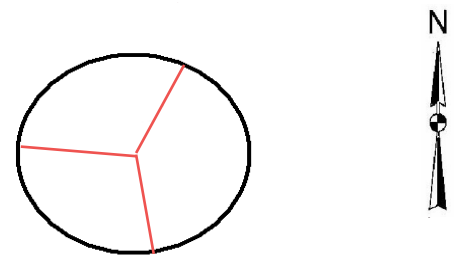
Comments:

### Pipe Seal

- 1. G F P I/I GPM 4. G F P I/I GPM
- 2. G F P I/I GPM 5. G F P I/I GPM
- 3. G F P I/I GPM 6. G F P I/I GPM

Evidence of Surcharge: Depth (ft.)  
Structure Type

- 1 = Brick 7 = Morter Mask 13 = Bitumastic
- 2 = Precast 8 = Cast Iron 14 = Grout
- 3 = Block 9 = PVC 15 = Other
- 4 = Clay pipe 10 = PVC Coated 16 = Flat Top
- 5 = Conc. Pipe 11 = Rebar 17 = Cementitious Material
- 6 = Poured 12 = None 18 = Cip Chimney Liner



# VISUAL PIPE INSPECTION

Date 10 / 20 / 2022 Observation Manhole ( ) 2 (1908) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
	( S )	( W )	( NE )	( )	( )	( )
To Manhole:						
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	8.3	8.2	8.22			
Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.						
Pipe Size: (Dia. in Inches)	8	8	8			
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	1	1	1			
Pipe Shape: 1=Circular 3=Elliptic 2=Rectangular 4=Other	1	1	1			
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 2 = Moderate 3 = Severe						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Comments** Slight blockage in south channel

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





# MANHOLE INSPECTION

**Date:** 10 / 20 / 2022      **Manhole No. :** ( 3 (2077) )

**Address:** 929 Honor Camp Lane, Fordland, MO 65652      **Location:** Ozark Correctional Facility

**Precipitation:** <sup>1</sup> 1=None 2=Light Rain 3=Heavy Rain 4=Snow      **Crew:** Andy , Jason

**Ground Condition:** <sup>1</sup> 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected

**Not Inspected:**       **Location:** <sup>1</sup>      **Manhole Diameter:** <sup>4</sup> (ft.)      **Depth:** 10.18 (ft.)

- 1 = C.N.L
- 2 = D.N.E
- 3 = Buried
- 4 = Haz/Atmos.
- 5 = Unsafe
- 6 = Sealed Lid
- 7 = Traffic
- 8 = Dog
- 9 = Other

- |                          |                   |
|--------------------------|-------------------|
| 1 = Paved St.            | 7 = Parking Lot   |
| 2 = Unpaved St.          | 8 = BackYard      |
| 3 = Paved Intersection   | 9 = Ditch         |
| 4 = Unpaved Intersection | 10 = Curb/Gutter  |
| 5 = Alley                | 11 = Easement     |
| 6 = Sidewalk             | 12 = Private Res. |

Subject to Ponding      **Ponding Depth:** \_\_\_\_\_ (ft.)

**Grade Elevation:** <sup>1</sup> \_\_\_\_\_

- 1 = Even
- 2 = Above \_\_\_\_\_ (in)
- 3 = Below \_\_\_\_\_ (in)

**Trib. Area** \_\_\_\_\_ ((sq. ft.))

**Condition:**

**Gen Obs:**

**Comments:**

**Cover:** Diameter <sup>24</sup> \_\_\_\_\_ (in.)      (G) F P \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Thickness <sup>1.5</sup> \_\_\_\_\_ (in.)

Type: <sup>2</sup> \_\_\_\_\_ Vented # <sup>0</sup> \_\_\_\_\_ Dia \_\_\_\_\_ (in.)

1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security

**Cover-to-Frame Fit**      (G) F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

**Frame:**      (G) F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

a. Inside Dia. (in.) \_\_\_\_\_      b. Outside Dia. (in.) \_\_\_\_\_      c. Dwell (in.) \_\_\_\_\_      d. Height (in.) \_\_\_\_\_

**Frame-to Chimney Seal:** Type \_\_\_\_\_ (G) F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

**Chimney:** Type <sup>1</sup> \_\_\_\_\_ (G) F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Height: \_\_\_\_\_ (in.)

**Corbel:** Type <sup>1</sup> \_\_\_\_\_ (G) F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

**Wall:** Type <sup>1</sup> \_\_\_\_\_ (G) F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

**Bench:** Type <sup>17</sup> \_\_\_\_\_ G F (P) I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_      Debris and spalling present

**Invert:** Type <sup>4</sup> \_\_\_\_\_ (G) F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

**Steps:** Type <sup>8</sup> \_\_\_\_\_ G F (P) I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_      Corroded

**NO. Missing:** <sup>0</sup> \_\_\_\_\_

**Comments:** \_\_\_\_\_

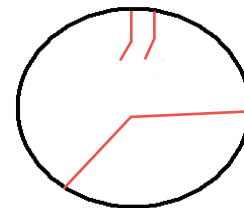
**Pipe Seal**

- |                        |                        |
|------------------------|------------------------|
| 1. G F P I/I _____ GPM | 4. G F P I/I _____ GPM |
| 2. G F P I/I _____ GPM | 5. G F P I/I _____ GPM |
| 3. G F P I/I _____ GPM | 6. G F P I/I _____ GPM |

Evidence of Surcharge: Depth \_\_\_\_\_ (ft.)

**Structure Type**

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Morter Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |



# VISUAL PIPE INSPECTION

Date 10 / 20 / 2022 Observation Manhole ( ) 3 (2077) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
	( SW )	( N )	( E )	( N-NE )	( )	( )
To Manhole:						
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	10.1	9.49	10.18	9.38		
Drop Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.	<input type="checkbox"/>	<input checked="" type="checkbox"/> 2	<input type="checkbox"/>	<input checked="" type="checkbox"/> 2	<input type="checkbox"/>	<input type="checkbox"/>
Pipe Size: (Dia. in Inches)	8	6	8	4		
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	1	2	1	3		
Pipe Shape: 1=Circular 3=Elliptic 2=Rectangular 4=Other	1	1	1	1		
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 3 = Severe 2 = Moderate						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments US #3 has significant corrosion

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# MANHOLE INSPECTION

Date: 10/20/2022 Manhole No. : (4 (2082)) \_\_\_\_\_

Address: 929 Honor Camp Lane, Fordland, MO 65652 Location: Ozark Correctional Facility

Precipitation: 1 1=None 2=Light Rain 3=Heavy Rain 4=Snow Crew: Andy, Jason

Ground Condition: 1 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected  Not Inspected Location: \_\_\_\_\_ Manhole Diameter: 4 (ft.) Depth 5.65 (ft.)

- |  |   |  |
|--|---|--|
| <p>1 = C.N.L<br/>2 = D.N.E<br/>3 = Buried<br/>4 = Haz/Atmos.<br/>5 = Unsafe<br/>6 = Sealed Lid<br/>7 = Traffic<br/>8 = Dog<br/>9 = Other</p> | <p>1 = Paved St.<br/>2 = Unpaved St.<br/>3 = Paved Intersection<br/>4 = Unpaved Intersection<br/>5 = Alley<br/>6 = Sidewalk</p> | <p>7 = Parking Lot<br/>8 = BackYard<br/>9 = Ditch<br/>10 = Curb/Gutter<br/>11 = Easement<br/>12 = Private Res.</p> |
|--|---|--|
- Subject to Ponding Ponding Depth: \_\_\_\_\_ (ft.)
- Grade Elevation: \_\_\_\_\_  
1 = Even  
2 = Above \_\_\_\_\_ (in)  
3 = Below 1 (in)  
Trib. Area \_\_\_\_\_ ((sq. ft.))

Condition: \_\_\_\_\_ Gen Obs: \_\_\_\_\_ Comments: \_\_\_\_\_

Cover: Diameter 24 (in.)  F P \_\_\_\_\_  
Thickness 1 (in.)  
Type: 2 Vented # \_\_\_\_\_ Dia \_\_\_\_\_ (in.)  
1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security

Cover-to-Frame Fit  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_  
Frame:  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ Corroded, but otherwise good shape

a. Inside Dia. (in.) 22.25 b. Outside Dia. (in.) 26.5 c. Dwell (in.) \_\_\_\_\_ d. Height (in.) 9

Frame-to Chimney Seal: Type  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_  
Chimney: Type 1  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_  
Height: \_\_\_\_\_ (in.)  
Corbel: Type 1  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_  
Wall: Type 1  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_  
Bench: Type 17  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_  
Invert: Type 17  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_  
Steps: Type 8 G F  I/I \_\_\_\_\_ GPM \_\_\_\_\_ Corroded  
NO. Missing: 0

Comments: \_\_\_\_\_

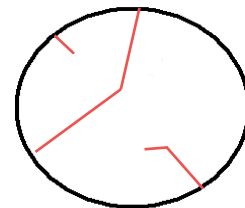
### Pipe Seal

- |                        |                        |
|------------------------|------------------------|
| 1. G F P I/I _____ GPM | 4. G F P I/I _____ GPM |
| 2. G F P I/I _____ GPM | 5. G F P I/I _____ GPM |
| 3. G F P I/I _____ GPM | 6. G F P I/I _____ GPM |

Evidence of Surcharge: Depth \_\_\_\_\_ (ft.)

### Structure Type

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Morter Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |



# VISUAL PIPE INSPECTION

Date 10 / 20 / 2022 Observation Manhole ( ) 4 (2082) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
To Manhole:	( S-SW )	( N )	( NW )	( SE )	( )	( )
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	5.65	5.55	5.15	4.4 (top of pipe)		
Drop Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pipe Size: (Dia. in Inches)	10	8	4	4		
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	1	1	2	8		
Pipe Shape: 1=Circular 3=Elliptic 2=Rectangular 4=Other	1	1	1	1		
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 3 = Severe 2 = Moderate						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments SE pipe has significant corrosion

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



Large hole in MH  
from invert of ditch



# MANHOLE INSPECTION

Date: 10/ 26 / 2022 Manhole No. : ( 5 (2391) ) \_\_\_\_\_

Address: 929 Honor Camp Lane, Fordland, MO 65652 Location: Ozark Correctional Facility

Precipitation: 1 1=None 2=Light Rain 3=Heavy Rain 4=Snow Crew: Andy, Jason

Ground Condition: 2 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected

Not Inspected:

Location: 9

Manhole Diameter: 4 (ft.) Depth 6.6 (ft.)

Subject to Ponding Ponding Depth: \_\_\_\_\_ (ft.)

- |                |                          |                   |
|----------------|--------------------------|-------------------|
| 1 = C.N.L      | 1 = Paved St.            | 7 = Parking Lot   |
| 2 = D.N.E      | 2 = Unpaved St.          | 8 = BackYard      |
| 3 = Buried     | 3 = Paved Intersection   | 9 = Ditch         |
| 4 = Haz/Atmos. | 4 = Unpaved Intersection | 10 = Curb/Gutter  |
| 5 = Unsafe     | 5 = Alley                | 11 = Easement     |
| 6 = Sealed Lid | 6 = Sidewalk             | 12 = Private Res. |
| 7 = Traffic    |                          |                   |
| 8 = Dog        |                          |                   |
| 9 = Other      |                          |                   |

Grade Elevation: \_\_\_\_\_

1 = Even

2 = Above \_\_\_\_\_ (in)

3 = Below 12 (in)

Trib. Area \_\_\_\_\_ ((sq. ft.))

Condition: \_\_\_\_\_

Gen Obs: \_\_\_\_\_

Comments: \_\_\_\_\_

Cover: Diameter 24 (in.)  F P  
Thickness 1.25 (in.) \_\_\_\_\_

Type: 2 Vented # 0 Dia \_\_\_\_\_ (in.)

1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security

Cover-to-Frame Fit  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

Frame: \_\_\_\_\_  P I/I \_\_\_\_\_ GPM \_\_\_\_\_ Corroded

a. Inside Dia. (in.) 20.25 b. Outside Dia. (in.) 26.5 c. Dwell (in.) \_\_\_\_\_ d. Height (in.) 8.5

Frame-to Chimney Seal: Type \_\_\_\_\_ G F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

Chimney: Type 2 G F  I/I \_\_\_\_\_ GPM \_\_\_\_\_ Large hole (~6") from invert of ditch into MH  
Height: \_\_\_\_\_ (in.)

Corbel: Type 1  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

Wall: Type 1  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

Bench: Type 17 G F  I/I \_\_\_\_\_ GPM \_\_\_\_\_ Spalling and significant debris/waste present

Invert: Type 4  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

Steps: Type 8 G F  I/I \_\_\_\_\_ GPM \_\_\_\_\_ Corroded

NO. Missing: 0

Comments: Significant source of I/I coming from hole in chimney

## Pipe Seal

1. G F P I/I \_\_\_\_\_ GPM 4. G F P I/I \_\_\_\_\_ GPM

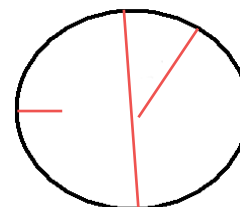
2. G F P I/I \_\_\_\_\_ GPM 5. G F P I/I \_\_\_\_\_ GPM

3. G F P I/I \_\_\_\_\_ GPM 6. G F P I/I \_\_\_\_\_ GPM

Evidence of Surcharge: Depth \_\_\_\_\_ (ft.)

## Structure Type

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Morter Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |



# VISUAL PIPE INSPECTION

Date 10 / 26 / 2022 Observation Manhole (                      ) 5 (2391) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
	( S )	( NE )	( N )	( W )	(   )	(   )
To Manhole:						
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	6.6	6.15	6.30	4.55		
Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.						
Pipe Size: (Dia. in Inches)	8	6	8	8		
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	1	2	1	1		
Pipe Shape: 1=Circular 3=Elliptic 2=Rectanqular 4=Other	1	1	1	1		
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 3 = Severe 2 = Moderate						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



# MANHOLE INSPECTION

**Date:** 10/ 26 / 2022      **Manhole No. :** ( 6 (2247) ) \_\_\_\_\_

**Address:** 929 Honor Camp Lane, Fordland, MO 65652      **Location:** Ozark Correctional Facility

**Precipitation:** 1    1=None 2=Light Rain 3=Heavy Rain 4=Snow      **Crew:** Andy , Jason

**Ground Condition:** 2    1=Dry 2=Damp 3=Wet 4=Standing Water

**Inspected**  
**Not Inspected:**       **Location:** 9      **Manhole Diameter:** 4 (ft.) **Depth:** \_\_\_\_\_ (ft.)

- |   |   |  |
|---|---|--|
| 1 = C.N.L<br>2 = D.N.E<br>3 = Buried<br>4 = Haz/Atmos.<br>5 = Unsafe<br>6 = Sealed Lid<br>7 = Traffic<br>8 = Dog<br>9 = Other | 1 = Paved St.<br>2 = Unpaved St.<br>3 = Paved Intersection<br>4 = Unpaved Intersection<br>5 = Alley<br>6 = Sidewalk | 7 = Parking Lot<br>8 = BackYard<br>9 = Ditch<br>10 = Curb/Gutter<br>11 = Easement<br>12 = Private Res. |
|---|---|--|
- Subject to Ponding**    **Ponding Depth:** \_\_\_\_\_ (ft.)
- Grade Elevation:** 2  
 1 = Even  
 2 = Above 3.5 (in)  
 3 = Below \_\_\_\_\_ (in)  
**Trib. Area** \_\_\_\_\_ ((sq. ft.))

Condition:	Gen Obs:	Comments:
<b>Cover:</b> Diameter <u>24.25</u> (in.) <input checked="" type="radio"/> F    P Thickness <u>1.5</u> (in.) Type: <u>2</u> Vented # _____ Dia _____ (in.) 1 = Light    2 = Heavy Duty    3 = Bolt down    4 = Locking    5 = Security Cover-to-Frame Fit <input checked="" type="radio"/> F    P    I/I _____ GPM _____ , _____ , _____		
<b>Frame:</b> G <input checked="" type="radio"/> F    P    I/I _____ GPM _____ , _____ , _____		Corroded
a. Inside Dia. (in.) <u>22.5</u> b. Outside Dia. (in.) <u>26.5</u> c. Dwell (in.) _____    d. Height (in.) <u>8.5</u>		

<b>Frame-to Chimney Seal:</b> Type _____ G    F    P    I/I _____ GPM _____ , _____ , _____		
<b>Chimney:</b> Type <u>1</u> <input checked="" type="radio"/> F    P    I/I _____ GPM _____ , _____ , _____ Height: _____ (in.)		
<b>Corbel:</b> Type <u>1</u> <input checked="" type="radio"/> F    P    I/I _____ GPM _____ , _____ , _____		
<b>Wall:</b> Type <u>1</u> <input checked="" type="radio"/> F    P    I/I _____ GPM _____ , _____ , _____		
<b>Bench:</b> Type <u>17</u> G    F <input checked="" type="radio"/> P    I/I _____ GPM _____ , _____ , _____		Significant spalling and debris
<b>Invert:</b> Type <u>?</u> G    F <input checked="" type="radio"/> P    I/I _____ GPM _____ , _____ , _____		Standing water. Channel wears into bench.
<b>Steps:</b> Type <u>8</u> G    F <input checked="" type="radio"/> P    I/I _____ GPM _____ , _____ , _____		Corroded

**NO. Missing:** 0

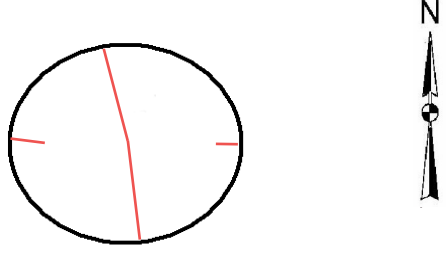
**Comments:** \_\_\_\_\_

**Pipe Seal**

- |                                 |                                 |
|---------------------------------|---------------------------------|
| 1. G    F    P    I/I _____ GPM | 4. G    F    P    I/I _____ GPM |
| 2. G    F    P    I/I _____ GPM | 5. G    F    P    I/I _____ GPM |
| 3. G    F    P    I/I _____ GPM | 6. G    F    P    I/I _____ GPM |

**Evidence of Surcharge:** Depth \_\_\_\_\_ (ft.)  
**Structure Type**

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Morter Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |





# VISUAL PIPE INSPECTION

Date 10 / 26 / 2022 Observation Manhole ( ) 6 (2247) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
	( S )	( N )	( W )	( E )	( )	( )
To Manhole:						
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	7.15	7.0	6.1	6.35		
Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.						
Pipe Size: (Dia. in Inches)	8	8	8	4		
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	1	1	1	8?		
Pipe Shape: 1=Circular 3=Elliptic 2=Rectangular 4=Other	1	1	1	1		
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 3 = Severe 2 = Moderate						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments 100% blockage from pipe to east

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# MANHOLE INSPECTION

**Date:** 10/ 26 / 2022      **Manhole No. :** ( 7 (2299) ) \_\_\_\_\_

**Address:** 929 Honor Camp Lane, Fordland, MO 65652      **Location:** Ozark Correctional Facility

**Precipitation:** 1    1=None 2=Light Rain 3=Heavy Rain 4=Snow      **Crew:** Andy , Jason

**Ground Condition:** 2    1=Dry 2=Damp 3=Wet 4=Standing Water

**Inspected**  
**Not Inspected:**       **Location:** 6      **Manhole Diameter:** 4 (ft.) **Depth:** 7.15 (ft.)

- |   |   |  |
|---|---|--|
| <ul style="list-style-type: none"> <li>1 = C.N.L</li> <li>2 = D.N.E</li> <li>3 = Buried</li> <li>4 = Haz/Atmos.</li> <li>5 = Unsafe</li> <li>6 = Sealed Lid</li> <li>7 = Traffic</li> <li>8 = Dog</li> <li>9 = Other</li> </ul> | <ul style="list-style-type: none"> <li>1 = Paved St.</li> <li>2 = Unpaved St.</li> <li>3 = Paved Intersection</li> <li>4 = Unpaved Intersection</li> <li>5 = Alley</li> <li>6 = Sidewalk</li> <li>7 = Parking Lot</li> <li>8 = BackYard</li> <li>9 = Ditch</li> <li>10 = Curb/Gutter</li> <li>11 = Easement</li> <li>12 = Private Res.</li> </ul> | <input type="checkbox"/> <b>Subject to Ponding</b> <b>Ponding Depth:</b> _____ (ft.)<br><br><b>Grade Elevation:</b> <u>2</u><br>1 = Even<br>2 = Above <u>5</u> (in)<br>3 = Below _____ (in)<br><b>Trib. Area</b> _____ ((sq. ft.)) |
|---|---|--|

	Condition:	Gen Obs:	Comments:
<b>Cover:</b> Diameter <u>26</u> (in.)    G <input checked="" type="radio"/> F P Thickness <u>1.5</u> (in.) Type: <u>2</u> Vented # <u>0</u> Dia _____ (in.) 1 = Light    2 = Heavy Duty    3 = Bolt down    4 = Locking    5 = Security Cover-to-Frame Fit <input checked="" type="radio"/> G F P I/I _____ GPM _____ Frame: <input checked="" type="radio"/> G F P I/I _____ GPM _____  a. Inside Dia. (in.) <u>23.75</u> b. Outside Dia. (in.) <u>28.25</u> c. Dwell (in.) _____    d. Height (in.) <u>7.5</u>			Broken latch on cover

Frame-to Chimney Seal:	Type _____	G	F	P	I/I _____	GPM _____	_____	_____
Chimney:	Type <u>1</u>	<input checked="" type="radio"/> G	F	P	I/I _____	GPM _____	_____	_____
Height: _____ (in.)								
Corbel:	Type <u>1</u>	<input checked="" type="radio"/> G	F	P	I/I _____	GPM _____	_____	_____
Wall:	Type <u>1</u>	<input checked="" type="radio"/> G	F	P	I/I _____	GPM _____	_____	_____
Bench:	Type <u>17</u>	G	<input checked="" type="radio"/> F	P	I/I _____	GPM _____	_____	Spalling & significant debris present
Invert:	Type <u>4</u>	<input checked="" type="radio"/> G	F	P	I/I _____	GPM _____	_____	_____
Steps:	Type <u>8</u>	G	F	<input checked="" type="radio"/> P	I/I _____	GPM _____	_____	Corroded
NO. Missing: <u>0</u>								

**Comments:** \_\_\_\_\_

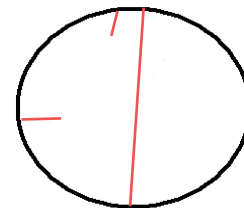
## Pipe Seal

1. G F P I/I _____ GPM	4. G F P I/I _____ GPM
2. G F P I/I _____ GPM	5. G F P I/I _____ GPM
3. G F P I/I _____ GPM	6. G F P I/I _____ GPM

**Evidence of Surcharge:** Depth \_\_\_\_\_ (ft.)

### Structure Type

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Mortar Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |









# MANHOLE INSPECTION

Date: 10/ 20 / 2022 Manhole No. : ( 8(1914) ) \_\_\_\_\_

Address: 929 Honor Camp Lane, Fordland, MO 65652 Location: Ozark Correctional Facility

Precipitation: 1 1=None 2=Light Rain 3=Heavy Rain 4=Snow Crew: Andy , Jason

Ground Condition: 1 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected

Not Inspected:

Location: 7

Manhole Diameter: 4 (ft.) Depth 8.7 (ft.)

Subject to Ponding Ponding Depth: \_\_\_\_\_ (ft.)

- 1 = C.N.L
- 2 = D.N.E
- 3 = Buried
- 4 = Haz/Atmos.
- 5 = Unsafe
- 6 = Sealed Lid
- 7 = Traffic
- 8 = Dog
- 9 = Other

- 1 = Paved St.
- 2 = Unpaved St.
- 3 = Paved Intersection
- 4 = Unpaved Intersection
- 5 = Alley
- 6 = Sidewalk
- 7 = Parking Lot
- 8 = BackYard
- 9 = Ditch
- 10 = Curb/Gutter
- 11 = Easement
- 12 = Private Res.

Grade Elevation: 3

- 1 = Even
- 2 = Above \_\_\_\_\_ (in)
- 3 = Below 12 (in)

Trib. Area \_\_\_\_\_ ((sq. ft.))

Condition:

Gen Obs:

Comments:

Cover: Diameter 24 (in.)  F P \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Thickness 1.5 (in.)

Type: 2 Vented # 0 Dia \_\_\_\_\_ (in.)

1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security

Cover-to-Frame Fit  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Frame:  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

a. Inside Dia. (in.) 22 b. Outside Dia. (in.) 26.5 c. Dwell (in.) \_\_\_\_\_ d. Height (in.) 9.5

Frame-to Chimney Seal: Type \_\_\_\_\_ G F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Chimney: Type 1  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Height: \_\_\_\_\_ (in.)

Corbel: Type 1  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Wall: Type 1  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Bench: Type 17 G  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ Significant debris present

Invert: Type ? G F  P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ Significant debris present; Spalling

Steps: Type 8 G F  P I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ Corroded

NO. Missing: 0

Comments: \_\_\_\_\_

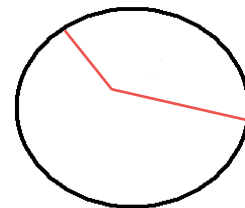
## Pipe Seal

- 1. G F P I/I \_\_\_\_\_ GPM 4. G F P I/I \_\_\_\_\_ GPM
- 2. G F P I/I \_\_\_\_\_ GPM 5. G F P I/I \_\_\_\_\_ GPM
- 3. G F P I/I \_\_\_\_\_ GPM 6. G F P I/I \_\_\_\_\_ GPM

Evidence of Surge: Depth \_\_\_\_\_ (ft.)

### Structure Type

- 1 = Brick 7 = Mortar Mask 13 = Bitumastic
- 2 = Precast 8 = Cast Iron 14 = Grout
- 3 = Block 9 = PVC 15 = Other
- 4 = Clay pipe 10 = PVC Coated 16 = Flat Top
- 5 = Conc. Pipe 11 = Rebar 17 = Cementitious Material
- 6 = Poured 12 = None 18 = Cip Chimney Liner









# MANHOLE INSPECTION

**Date:** 10/ 20 / 2022      **Manhole No. :** (9 (1922)) \_\_\_\_\_

**Address:** 929 Honor Camp Lane, Fordland, MO 65652      **Location:** Ozark Correctional Facility

**Precipitation:** 1    1=None 2=Light Rain 3=Heavy Rain 4=Snow      **Crew:** Andy , Jason

**Ground Condition:** \_\_\_\_\_ 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected

Not Inspected:

**Location:** 7

**Manhole Diameter:** 4 (ft.)    **Depth:** 4.9 (ft.)

Subject to Ponding    Ponding Depth: \_\_\_\_\_ (ft.)

- 1 = C.N.L
- 2 = D.N.E
- 3 = Buried
- 4 = Haz/Atmos.
- 5 = Unsafe
- 6 = Sealed Lid
- 7 = Traffic
- 8 = Dog
- 9 = Other

- |                          |                   |
|--------------------------|-------------------|
| 1 = Paved St.            | 7 = Parking Lot   |
| 2 = Unpaved St.          | 8 = BackYard      |
| 3 = Paved Intersection   | 9 = Ditch         |
| 4 = Unpaved Intersection | 10 = Curb/Gutter  |
| 5 = Alley                | 11 = Easement     |
| 6 = Sidewalk             | 12 = Private Res. |

**Grade Elevation:** 1

- 1 = Even
- 2 = Above \_\_\_\_\_ (in)
- 3 = Below \_\_\_\_\_ (in)

**Trib. Area** \_\_\_\_\_ ((sq. ft.))

**Condition:**

**Gen Obs:**

**Comments:**

**Cover:** Diameter 24 (in.)     G     F     P    \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Thickness 1.5 (in.)

Type: 2    Vented # 0    Dia \_\_\_\_\_ (in.)

1 = Light    2 = Heavy Duty    3 = Bolt down    4 = Locking    5 = Security

**Cover-to-Frame Fit**     G     F     P    I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

**Frame:**     G     F     P    I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_    Corrosion present

a. Inside Dia. (in.) 24    b. Outside Dia. (in.) 26.5    c. Dwell (in.) \_\_\_\_\_    d. Height (in.) 9.5

**Frame-to Chimney Seal:** Type \_\_\_\_\_ G     F     P    I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

**Chimney:** Type 1     G     F     P    I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

Height: \_\_\_\_\_ (in.)

**Corbel:** Type 1     G     F     P    I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

**Wall:** Type 1     G     F     P    I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

**Bench:** Type 17    G     F     P    I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_    Roots present

**Invert:** Type 4    G     F     P    I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_    Debris present. Couldn't see bottom.

**Steps:** Type 8    G     F     P    I/I \_\_\_\_\_ GPM \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_    Corroded

NO. Missing: 0

**Comments:** Evidence of I/I

## Pipe Seal

1. G     F     P    I/I \_\_\_\_\_ GPM    4. G     F     P    I/I \_\_\_\_\_ GPM

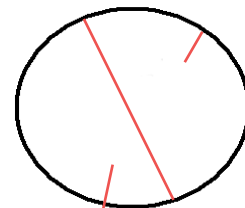
2. G     F     P    I/I \_\_\_\_\_ GPM    5. G     F     P    I/I \_\_\_\_\_ GPM

3. G     F     P    I/I \_\_\_\_\_ GPM    6. G     F     P    I/I \_\_\_\_\_ GPM

Evidence of Surcharge: Depth \_\_\_\_\_ (ft.)

### Structure Type

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Morter Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |



# VISUAL PIPE INSPECTION

Date 10 / 20 / 2022 Observation Manhole ( ) 9 (1922) Crew: Andy, Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
To Manhole:	( SE )	( NW )	( NE )	( SW )	( )	( )
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	4.9	4.5	4.2	2.75		
Drop Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pipe Size: (Dia. in Inches)	8	8	4	4		
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	1	1	3	2		
Pipe Shape: 1=Circular 3=Elliptic 2=Rectangular 4=Other	1	1	1	1		
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 2 = Moderate 3 = Severe						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



# MANHOLE INSPECTION

Date: 10/ 26 / 2022 Manhole No. : ( 10 (2390) ) \_\_\_\_\_

Address: 929 Honor Camp Lane, Fordland, MO 65652 Location: Ozark Correctional Facility

Precipitation: 1 1=None 2=Light Rain 3=Heavy Rain 4=Snow Crew: Andy , Jason

Ground Condition: 2 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected  
 Not Inspected:  Location: 9 Manhole Diameter: 4 (ft.) Depth 6.20 (ft.)

- |   |   |  |
|---|---|--|
| 1 = C.N.L<br>2 = D.N.E<br>3 = Buried<br>4 = Haz/Atmos.<br>5 = Unsafe<br>6 = Sealed Lid<br>7 = Traffic<br>8 = Dog<br>9 = Other | 1 = Paved St.<br>2 = Unpaved St.<br>3 = Paved Intersection<br>4 = Unpaved Intersection<br>5 = Alley<br>6 = Sidewalk | 7 = Parking Lot<br>8 = BackYard<br>9 = Ditch<br>10 = Curb/Gutter<br>11 = Easement<br>12 = Private Res. |
|---|---|--|
- Subject to Ponding Ponding Depth: \_\_\_\_\_ (ft.)  
 Grade Elevation: 3  
 1 = Even  
 2 = Above \_\_\_\_\_ (in)  
 3 = Below 3 (in)  
 Trib. Area \_\_\_\_\_ ((sq. ft.))

Condition:	Gen Obs:	Comments:
Cover: Diameter <u>26</u> (in.) <input checked="" type="radio"/> F P _____		
Thickness <u>1.375</u> (in.) _____		
Type: <u>2</u> Vented # <u>0</u> Dia _____ (in.)		
1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security		
Cover-to-Frame Fit <input checked="" type="radio"/> F P I/I _____ GPM _____		
Frame: _____ G F P I/I _____ GPM _____		
a. Inside Dia. (in.) <u>24</u> b. Outside Dia. (in.) <u>28.25</u> c. Dwell (in.) _____ d. Height (in.) <u>7.25</u>		

Frame-to Chimney Seal: Type _____ G F P I/I _____ GPM _____		
Chimney: Type <u>2</u> <input checked="" type="radio"/> F P I/I _____ GPM _____		
Height: _____ (in.) _____		
Corbel: Type <u>2</u> <input checked="" type="radio"/> F P I/I _____ GPM _____		
Wall: Type <u>2</u> <input checked="" type="radio"/> F P I/I _____ GPM _____		
Bench: Type <u>6</u> <input checked="" type="radio"/> F P I/I _____ GPM _____		
Invert: Type <u>6</u> <input checked="" type="radio"/> F P I/I _____ GPM _____		
Steps: Type <u>8</u> G F <input checked="" type="radio"/> I/I _____ GPM _____ Corroded		
NO. Missing: <u>0</u>		

Comments: \_\_\_\_\_

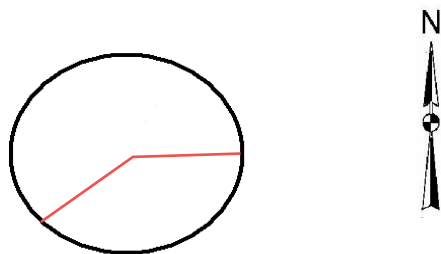
**Pipe Seal**

1. G F P I/I _____ GPM	4. G F P I/I _____ GPM
2. G F P I/I _____ GPM	5. G F P I/I _____ GPM
3. G F P I/I _____ GPM	6. G F P I/I _____ GPM

Evidence of Surcharge: Depth \_\_\_\_\_ (ft.)

**Structure Type**

1 = Brick	7 = Morter Mask	13 = Bitumastic
2 = Precast	8 = Cast Iron	14 = Grout
3 = Block	9 = PVC	15 = Other
4 = Clay pipe	10 = PVC Coated	16 = Flat Top
5 = Conc. Pipe	11 = Rebar	17 = Cementitious Material
6 = Poured	12 = None	18 = Cip Chimney Liner



# VISUAL PIPE INSPECTION

Date 10 / 26 / 2022 Observation Manhole (            ) 10 (2390) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
	( SW )	( E )	( )	( )	( )	( )
To Manhole:						
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	6.20	5.85				
Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.						
Pipe Size: (Dia. in Inches)	6	6				
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	2	2				
Pipe Shape: 1=Circular 3=Elliptic 2=Rectangular 4=Other	1	1				
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 3 = Severe 2 = Moderate						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





# MANHOLE INSPECTION

Date: 10/ 26 / 2022 Manhole No. : ( 12 (2223) )

Address: 929 Honor Camp Lane, Fordland, MO 65652 Location: Ozark Correctional Facility

Precipitation: 1 1=None 2=Light Rain 3=Heavy Rain 4=Snow Crew: Andy , Jason

Ground Condition: 2 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected  Not Inspected Location: 8 Manhole Diameter: 4 (ft.) Depth \_\_\_\_\_ (ft.)

- |               |                 |                        |                          |            |                |                              |              |           |                  |               |                   |  |
|---------------|-----------------|------------------------|--------------------------|------------|----------------|------------------------------|--------------|-----------|------------------|---------------|-------------------|--|
| 1 = C.N.L     | 2 = D.N.E       | 3 = Buried             | 4 = Haz/Atmos.           | 5 = Unsafe | 6 = Sealed Lid | 7 = Traffic                  | 8 = Dog      | 9 = Other |                  |               |                   |  |
| 1 = Paved St. | 2 = Unpaved St. | 3 = Paved Intersection | 4 = Unpaved Intersection | 5 = Alley  | 6 = Sidewalk   | 7 = Parking Lot              | 8 = BackYard | 9 = Ditch | 10 = Curb/Gutter | 11 = Easement | 12 = Private Res. |  |
|               |                 |                        |                          |            |                | Grade Elevation: <u>1</u>    |              |           |                  |               |                   |  |
|               |                 |                        |                          |            |                | 1 = Even                     |              |           |                  |               |                   |  |
|               |                 |                        |                          |            |                | 2 = Above _____ (in)         |              |           |                  |               |                   |  |
|               |                 |                        |                          |            |                | 3 = Below _____ (in)         |              |           |                  |               |                   |  |
|               |                 |                        |                          |            |                | Trib. Area _____ ((sq. ft.)) |              |           |                  |               |                   |  |

Subject to Ponding Ponding Depth: \_\_\_\_\_ (ft.)

Condition: Gen Obs: Comments:

Cover: Diameter 24 (in.)  F P  
Thickness 1.25 (in.)  
Type: 2 Vented # 0 Dia \_\_\_\_\_ (in.)  
1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security

Cover-to-Frame Fit  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

Frame:  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

a. Inside Dia. (in.) 22.5 b. Outside Dia. (in.) 26.5 c. Dwell (in.) \_\_\_\_\_ d. Height (in.) 8.5

Frame-to Chimney Seal: Type \_\_\_\_\_ G F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

Chimney: Type 1  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_  
Height: \_\_\_\_\_ (in.)

Corbel: Type 1  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

Wall: Type 1  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

Bench: Type 17  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ Some debris present

Invert: Type 4 G  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ Debris present

Steps: Type 8 G  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

NO. Missing: 0

Comments: \_\_\_\_\_

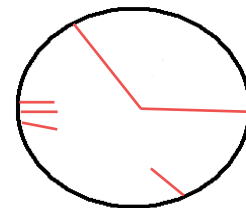
## Pipe Seal

- |                        |                        |
|------------------------|------------------------|
| 1. G F P I/I _____ GPM | 4. G F P I/I _____ GPM |
| 2. G F P I/I _____ GPM | 5. G F P I/I _____ GPM |
| 3. G F P I/I _____ GPM | 6. G F P I/I _____ GPM |

Evidence of Surcharge: Depth \_\_\_\_\_ (ft.)

## Structure Type

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Morter Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |









# MANHOLE INSPECTION

Date: 10/ 20 / 2022 Manhole No. : ( 13 (2070) )

Address: 929 Honor Camp Lane, Fordland, MO 65652 Location: Ozark Correctional Facility

Precipitation: 1 1=None 2=Light Rain 3=Heavy Rain 4=Snow Crew: Andy , Jason

Ground Condition: 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected

Not Inspected:

Location: 7

Manhole Diameter: 4 (ft.) Depth 4.55 (ft.)

Subject to Ponding Ponding Depth: (ft.)

- 1 = C.N.L
- 2 = D.N.E
- 3 = Buried
- 4 = Haz/Atmos.
- 5 = Unsafe
- 6 = Sealed Lid
- 7 = Traffic
- 8 = Dog
- 9 = Other

- 1 = Paved St.
- 2 = Unpaved St.
- 3 = Paved Intersection
- 4 = Unpaved Intersection
- 5 = Alley
- 6 = Sidewalk
- 7 = Parking Lot
- 8 = BackYard
- 9 = Ditch
- 10 = Curb/Gutter
- 11 = Easement
- 12 = Private Res.

Grade Elevation: 1

- 1 = Even
- 2 = Above (in)
- 3 = Below (in)

Trib. Area ((sq. ft.))

Condition:

Gen Obs:

Comments:

Cover: Diameter 24 (in.) (G) F P

Thickness 1 (in.)

Type: 2 Vented # 1 Dia 1 (in.)

1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security

Cover-to-Frame Fit G F (P) I/I GPM

Frame: G F (P) I/I GPM Chipped Frame

a. Inside Dia. (in.) 23 b. Outside Dia. (in.) 25.5 c. Dwell (in.) d. Height (in.) 5

Frame-to Chimney Seal: Type Spallii G F P I/I GPM

Chimney: Type 2 G (F) P I/I GPM Spalling

Height: (in.)

Corbel: Type 2 G (F) P I/I GPM Spalling

Wall: Type 2 G (F) P I/I GPM Spalling

Bench: Type 17 G (F) P I/I GPM Spalling

Invert: Type 17 G (F) P I/I GPM Spalling

Steps: Type 8 G F (P) I/I GPM Corroded

NO. Missing: 0

Comments:

## Pipe Seal

1. G F P I/I GPM 4. G F P I/I GPM

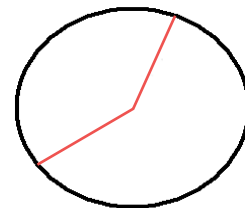
2. G F P I/I GPM 5. G F P I/I GPM

3. G F P I/I GPM 6. G F P I/I GPM

Evidence of Surcharge: Depth (ft.)

## Structure Type

- 1 = Brick
- 2 = Precast
- 3 = Block
- 4 = Clay pipe
- 5 = Conc. Pipe
- 6 = Poured
- 7 = Morter Mask
- 8 = Cast Iron
- 9 = PVC
- 10 = PVC Coated
- 11 = Rebar
- 12 = None
- 13 = Bitumastic
- 14 = Grout
- 15 = Other
- 16 = Flat Top
- 17 = Cementitious Material
- 18 = Cip Chimney Liner



# VISUAL PIPE INSPECTION

Date 10 / 20 / 2022 Observation Manhole ( ) 13 (2070) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
	( S )	( N )	( )	( )	( )	( )
To Manhole:						
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	4.55	4.55				
Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drop Type: <small>1= Const. Ext. 2 = Const. Int. 3 = Not Const.</small>						
Pipe Size: (Dia. in Inches)	6	6				
Type of Pipe <small>1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP</small>	1	1				
Pipe Shape: <small>1=Circular 3=Elliptic 2=Rectangular 4=Other</small>	1	1				
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots <small>1-Lt. 2=Med. 3=Heavy</small>						
Deposition: <small>1=Medium 2=Heavy</small>						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: <small>1 = Minor 3 = Severe 2 = Moderate</small>						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





# MANHOLE INSPECTION

**Date:** 10/ 26 / 2022      **Manhole No. :** ( 14 (2648) ) \_\_\_\_\_

**Address:** 929 Honor Camp Lane, Fordland, MO 65652      **Location:** Ozark Correctional Facility

**Precipitation:** 1    1=None 2=Light Rain 3=Heavy Rain 4=Snow      **Crew:** Andy , Jason

**Ground Condition:** 1    1=Dry 2=Damp 3=Wet 4=Standing Water

**Inspected**  
**Not Inspected:**       **Location:** 7      **Manhole Diameter:** 4 (ft.) **Depth** 6.0 (ft.)

- |   |   |  |
|---|---|--|
| 1 = C.N.L<br>2 = D.N.E<br>3 = Buried<br>4 = Haz/Atmos.<br>5 = Unsafe<br>6 = Sealed Lid<br>7 = Traffic<br>8 = Dog<br>9 = Other | 1 = Paved St.<br>2 = Unpaved St.<br>3 = Paved Intersection<br>4 = Unpaved Intersection<br>5 = Alley<br>6 = Sidewalk | 7 = Parking Lot<br>8 = BackYard<br>9 = Ditch<br>10 = Curb/Gutter<br>11 = Easement<br>12 = Private Res. |
|---|---|--|
- Subject to Ponding**    **Ponding Depth:** \_\_\_\_\_ (ft.)
- Grade Elevation:** 3  
 1 = Even  
 2 = Above \_\_\_\_\_ (in)  
 3 = Below 1 (in)  
**Trib. Area** \_\_\_\_\_ ((sq. ft.))

<b>Condition:</b>	<b>Gen Obs:</b>	<b>Comments:</b>
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**Cover:** Diameter 24.25 (in.)     F     P    \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_    MH was slightly buried due to gravel cover  
 Thickness 1 (in.)  
 Type: 2    Vented # 1    Dia 1 (in.)  
 1 = Light    2 = Heavy Duty    3 = Bolt down    4 = Locking    5 = Security

**Cover-to-Frame Fit**     F     P    I/I \_\_\_\_\_ GPM \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
**Frame:**     F     P    I/I \_\_\_\_\_ GPM \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

a. Inside Dia. (in.) 22.75    b. Outside Dia. (in.) 25.5    c. Dwell (in.) \_\_\_\_\_    d. Height (in.) 5

<b>Frame-to Chimney Seal:</b>	Type <u>Spallii</u>	G <input type="radio"/> F <input type="radio"/> P <input type="radio"/> I/I _____ GPM _____, _____, _____	
<b>Chimney:</b>	Type <u>2</u>	G <input checked="" type="radio"/> F <input type="radio"/> P <input type="radio"/> I/I _____ GPM _____, _____, _____	<u>Spalling</u>
Height: _____ (in.)			
<b>Corbel:</b>	Type <u>2</u>	G <input checked="" type="radio"/> F <input type="radio"/> P <input type="radio"/> I/I _____ GPM _____, _____, _____	<u>Spalling</u>
<b>Wall:</b>	Type <u>2</u>	G <input checked="" type="radio"/> F <input type="radio"/> P <input type="radio"/> I/I _____ GPM _____, _____, _____	<u>Spalling</u>
<b>Bench:</b>	Type <u>17</u>	G <input checked="" type="radio"/> F <input type="radio"/> P <input type="radio"/> I/I _____ GPM _____, _____, _____	<u>Spalling</u>
<b>Invert:</b>	Type <u>6</u>	G <input type="radio"/> F <input checked="" type="radio"/> P <input type="radio"/> I/I _____ GPM _____, _____, _____	<u>Almost flat grade. Debris present.</u>
<b>Steps:</b>	Type <u>8</u>	G <input type="radio"/> F <input checked="" type="radio"/> P <input type="radio"/> I/I _____ GPM _____, _____, _____	<u>Corroded</u>

NO. Missing: 0

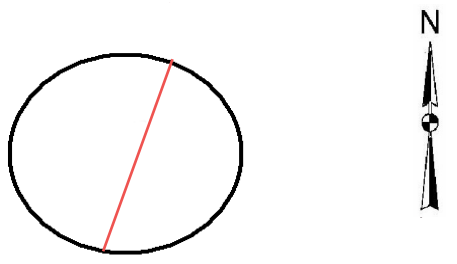
**Comments:** \_\_\_\_\_

**Pipe Seal**

- |                        |                        |
|------------------------|------------------------|
| 1. G F P I/I _____ GPM | 4. G F P I/I _____ GPM |
| 2. G F P I/I _____ GPM | 5. G F P I/I _____ GPM |
| 3. G F P I/I _____ GPM | 6. G F P I/I _____ GPM |

**Evidence of Surcharge:** Depth \_\_\_\_\_ (ft.)  
**Structure Type**

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Morter Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |



# VISUAL PIPE INSPECTION

Date 10 / 26 / 2022 Observation Manhole (                      ) 14 (2648) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
	( SW )	( NE )	(     )	(     )	(     )	(     )
To Manhole:						
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	6.00	5.95				
Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.						
Pipe Size: (Dia. in Inches)	6	6				
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	1	1				
Pipe Shape: 1=Circular 3=Elliptic 2=Rectangular 4=Other	1	1				
Depth of Flow: (in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 3 = Severe 2 = Moderate						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments Significant blockage in both pipes. Only 0.05' elevation change between in/out pipe inverts. Annular space present between wall and pipes.

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# MANHOLE INSPECTION

**Date:** 10/ 20 / 2022      **Manhole No. :** ( 15 (2075) ) \_\_\_\_\_

**Address:** 929 Honor Camp Lane, Fordland, MO 65652      **Location:** Ozark Correctional Facility

**Precipitation:** 1    1=None 2=Light Rain 3=Heavy Rain 4=Snow      **Crew:** Andy , Jason

**Ground Condition:** 1    1=Dry 2=Damp 3=Wet 4=Standing Water

**Inspected**  
**Not Inspected:**       **Location:** 1      **Manhole Diameter:** 4 (ft.) **Depth** 9.2 (ft.)

- |   |   |  |
|---|---|--|
| 1 = C.N.L<br>2 = D.N.E<br>3 = Buried<br>4 = Haz/Atmos.<br>5 = Unsafe<br>6 = Sealed Lid<br>7 = Traffic<br>8 = Dog<br>9 = Other | 1 = Paved St.<br>2 = Unpaved St.<br>3 = Paved Intersection<br>4 = Unpaved Intersection<br>5 = Alley<br>6 = Sidewalk | 7 = Parking Lot<br>8 = BackYard<br>9 = Ditch<br>10 = Curb/Gutter<br>11 = Easement<br>12 = Private Res. |
|---|---|--|
- Subject to Ponding**    **Ponding Depth:** \_\_\_\_\_ (ft.)
- Grade Elevation:** 1  
 1 = Even  
 2 = Above \_\_\_\_\_ (in)  
 3 = Below \_\_\_\_\_ (in)  
**Trib. Area** \_\_\_\_\_ ((sq. ft.))

Condition:	Gen Obs:	Comments:
<b>Cover:</b> Diameter <u>24.25</u> (in.) <input checked="" type="radio"/> F P Thickness <u>1</u> (in.) Type: <u>1</u> Vented # <u>1</u> Dia <u>1</u> (in.) 1 = Light    2 = Heavy Duty    3 = Bolt down    4 = Locking    5 = Security Cover-to-Frame Fit <input checked="" type="radio"/> F P I/I _____ GPM _____ Frame: <input checked="" type="radio"/> F P I/I _____ GPM _____		
a. Inside Dia. (in.) <u>22.75</u> b. Outside Dia. (in.) <u>25.5</u> c. Dwell (in.) _____    d. Height (in.) <u>5</u>		

<b>Frame-to Chimney Seal:</b>	Type _____	G	F	P	I/I _____	GPM _____	_____	_____
<b>Chimney:</b>	Type <u>2</u>	G	<input checked="" type="radio"/> F	P	I/I _____	GPM _____	_____	Spalling
Height: _____ (in.)								
<b>Corbel:</b>	Type <u>2</u>	G	<input checked="" type="radio"/> F	P	I/I _____	GPM _____	_____	Spalling
<b>Wall:</b>	Type <u>2</u>	G	<input checked="" type="radio"/> F	P	I/I _____	GPM _____	_____	Spalling
<b>Bench:</b>	Type <u>17</u>	G	<input checked="" type="radio"/> F	P	I/I _____	GPM _____	_____	Spalling
<b>Invert:</b>	Type <u>17</u>	G	<input checked="" type="radio"/> F	P	I/I _____	GPM _____	_____	Spalling; Debris in channel.
<b>Steps:</b>	Type <u>8</u>	G	F	<input checked="" type="radio"/> P	I/I _____	GPM _____	_____	Corroded
NO. Missing: <u>0</u>								

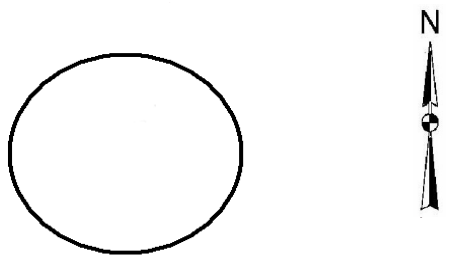
**Comments:** \_\_\_\_\_

**Pipe Seal**

- |                        |                        |
|------------------------|------------------------|
| 1. G F P I/I _____ GPM | 4. G F P I/I _____ GPM |
| 2. G F P I/I _____ GPM | 5. G F P I/I _____ GPM |
| 3. G F P I/I _____ GPM | 6. G F P I/I _____ GPM |

**Evidence of Surcharge:** Depth \_\_\_\_\_ (ft.)  
**Structure Type**

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Morter Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |





# VISUAL PIPE INSPECTION

Date 10 / 20 / 2022 Observation Manhole ( ) 15 (2075) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
	( W )	( E )	( )	( )	( )	( )
To Manhole:						
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	9.20	7.60				
Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.						
Pipe Size: (Dia. in Inches)	8	6				
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	?	2				
Pipe Shape: 1=Circular 3=Elliptic 2=Rectangular 4=Other	1	1				
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 3 = Severe 2 = Moderate						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments N pipe has significant mineral buildup. Channel is full of debris. W pipe is partially blocked with debris.

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# MANHOLE INSPECTION

**Date:** 10/ 20 / 2022      **Manhole No. :** ( 16 (2079) ) \_\_\_\_\_

**Address:** 929 Honor Camp Lane, Fordland, MO 65652      **Location:** Ozark Correctional Facility

**Precipitation:** 1      1=None 2=Light Rain 3=Heavy Rain 4=Snow      **Crew:** Andy , Jason

**Ground Condition:** 1      1=Dry 2=Damp 3=Wet 4=Standing Water

**Inspected**  
**Not Inspected:**       **Location:** 1      **Manhole Diameter:** 4 (ft.) **Depth:** 9.6 (ft.)

- |   |   |  |
|---|---|--|
| 1 = C.N.L<br>2 = D.N.E<br>3 = Buried<br>4 = Haz/Atmos.<br>5 = Unsafe<br>6 = Sealed Lid<br>7 = Traffic<br>8 = Dog<br>9 = Other | 1 = Paved St.<br>2 = Unpaved St.<br>3 = Paved Intersection<br>4 = Unpaved Intersection<br>5 = Alley<br>6 = Sidewalk | 7 = Parking Lot<br>8 = BackYard<br>9 = Ditch<br>10 = Curb/Gutter<br>11 = Easement<br>12 = Private Res. |
|---|---|--|
- Subject to Ponding**      **Ponding Depth:** \_\_\_\_\_ (ft.)
- Grade Elevation:** 2 \_\_\_\_\_
- 1 = Even  
 2 = Above 4 (in)  
 3 = Below \_\_\_\_\_ (in)  
**Trib. Area** \_\_\_\_\_ ((sq. ft.))

Condition:	Gen Obs:	Comments:
<b>Cover:</b> Diameter <sup>24.25</sup> (in.)      (G) F P _____ Thickness <sup>1</sup> (in.) _____ Type: <sup>2</sup> Vented # <sup>1</sup> Dia <sup>1</sup> (in.) 1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security Cover-to-Frame Fit      (G) F P I/I _____ GPM _____ Frame:      (G) F P I/I _____ GPM _____		
a. Inside Dia. (in.) <sup>23</sup> b. Outside Dia. (in.) <sup>25.5</sup> c. Dwell (in.) _____      d. Height (in.) <sup>5</sup>		

<b>Frame-to Chimney Seal:</b>	Type _____	G F P I/I _____	GPM _____
<b>Chimney:</b>	Type <sup>2</sup> (G) F P I/I _____	GPM _____	
Height: _____ (in.)			
<b>Corbel:</b>	Type <sup>2</sup> (G) F P I/I _____	GPM _____	
<b>Wall:</b>	Type <sup>2</sup> (G) F P I/I _____	GPM _____	
<b>Bench:</b>	Type <sup>17</sup> G (F) P I/I _____	GPM _____	Spalling
<b>Invert:</b>	Type <sup>17</sup> G (F) P I/I _____	GPM _____	Spalling
<b>Steps:</b>	Type <sup>8</sup> G F (E) I/I _____	GPM _____	Corroded
NO. Missing: <sup>0</sup> _____			

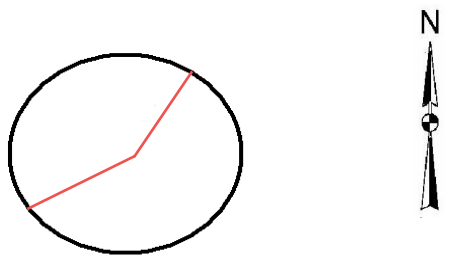
**Comments:** \_\_\_\_\_

**Pipe Seal**

- |                        |                        |
|------------------------|------------------------|
| 1. G F P I/I _____ GPM | 4. G F P I/I _____ GPM |
| 2. G F P I/I _____ GPM | 5. G F P I/I _____ GPM |
| 3. G F P I/I _____ GPM | 6. G F P I/I _____ GPM |

**Evidence of Surcharge:** Depth \_\_\_\_\_ (ft.)  
**Structure Type**

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Morter Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |



# VISUAL PIPE INSPECTION

Date 10 / 20 / 2022 Observation Manhole ( ) 16 (2079) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
To Manhole:	( SW )	( NE )	( )	( )	( )	( )
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	5.60	5.45				
Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.						
Pipe Size: (Dia. in Inches)	6	6				
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	1	1				
Pipe Shape: 1=Circular 3=Elliptic 2=Rectangular 4=Other	1	1				
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 2 = Moderate 3 = Severe						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_





# MANHOLE INSPECTION

Date: 10/ 26 / 2022 Manhole No. : ( 18 (2386) )

Address: 929 Honor Camp Lane, Fordland, MO 65652 Location: Ozark Correctional Facility

Precipitation: 1 1=None 2=Light Rain 3=Heavy Rain 4=Snow Crew: Andy , Jason

Ground Condition: 2 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected

Not Inspected:

Location: 9

Manhole Diameter: 4 (ft.) Depth 4.28 (ft.)

Subject to Ponding Ponding Depth:      (ft.)

- 1 = C.N.L
- 2 = D.N.E
- 3 = Buried
- 4 = Haz/Atmos.
- 5 = Unsafe
- 6 = Sealed Lid
- 7 = Traffic
- 8 = Dog
- 9 = Other

- 1 = Paved St.
- 2 = Unpaved St.
- 3 = Paved Intersection
- 4 = Unpaved Intersection
- 5 = Alley
- 6 = Sidewalk
- 7 = Parking Lot
- 8 = BackYard
- 9 = Ditch
- 10 = Curb/Gutter
- 11 = Easement
- 12 = Private Res.

Grade Elevation: 1

- 1 = Even
- 2 = Above      (in)
- 3 = Below      (in)

Trib. Area      ((sq. ft.))

Condition:

Gen Obs:

Comments:

Cover: Diameter 24 (in.)  F P      ,      ,     

Thickness 1 (in.)

Type: 2 Vented # 1 Dia 1 (in.)

1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security

Cover-to-Frame Fit  F P I/I      GPM      ,      ,     

Frame: G  F P I/I      GPM      ,      ,      Corroded

a. Inside Dia. (in.) 22.75 b. Outside Dia. (in.) 25.75 c. Dwell (in.)      d. Height (in.) 5.25

Frame-to Chimney Seal: Type 2 G F P I/I      GPM      ,      ,      Corrosion

Chimney: Type 2 G  F P I/I      GPM      ,      ,      Corrosion

Height:      (in.)

Corbel: Type 2 G  F P I/I      GPM      ,      ,      2

Wall: Type 2 G  F P I/I      GPM      ,      ,      Corrosion

Bench: Type 6 G F  P I/I      GPM      ,      ,      Significant corrosion

Invert: Type 6 G  F P I/I      GPM      ,      ,      Spalling

Steps: Type 8 G F  P I/I      GPM      ,      ,      Corroded

NO. Missing: 0

Comments:     

## Pipe Seal

1. G F P I/I      GPM 4. G F P I/I      GPM

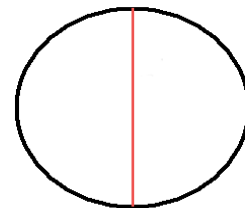
2. G F P I/I      GPM 5. G F P I/I      GPM

3. G F P I/I      GPM 6. G F P I/I      GPM

Evidence of Surcharge: Depth      (ft.)

## Structure Type

- 1 = Brick
- 2 = Precast
- 3 = Block
- 4 = Clay pipe
- 5 = Conc. Pipe
- 6 = Poured
- 7 = Mortar Mask
- 8 = Cast Iron
- 9 = PVC
- 10 = PVC Coated
- 11 = Rebar
- 12 = None
- 13 = Bitumastic
- 14 = Grout
- 15 = Other
- 16 = Flat Top
- 17 = Cementitious Material
- 18 = Cip Chimney Liner



# VISUAL PIPE INSPECTION

Date 10 / 26 / 2022 Observation Manhole ( ) 18 (2386) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
	( S )	( N )	( )	( )	( )	( )
To Manhole:						
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	4.28	4.18				
Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.						
Pipe Size: (Dia. in Inches)	6	6				
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	1	1				
Pipe Shape: 1=Circular 3=Elliptic 2=Rectangular 4=Other	1	1				
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 3 = Severe 2 = Moderate						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_





# MANHOLE INSPECTION

Date: 10/ 26 / 2022 Manhole No. : ( 19 (2369) ) \_\_\_\_\_

Address: 929 Honor Camp Lane, Fordland, MO 65652 Location: Ozark Correctional Facility

Precipitation: 1 1=None 2=Light Rain 3=Heavy Rain 4=Snow Crew: Andy, Jason

Ground Condition: 2 1=Dry 2=Damp 3=Wet 4=Standing Water

Inspected  Not Inspected: \_\_\_\_\_ Location: 5 Manhole Diameter: 4 (ft.) Depth 5.20 (ft.)

- |           |           |            |                |            |                |             |         |           |               |                 |                        |                          |           |              |                 |              |           |                  |               |                   |  |                           |          |                      |                      |                              |
|-----------|-----------|------------|----------------|------------|----------------|-------------|---------|-----------|---------------|-----------------|------------------------|--------------------------|-----------|--------------|-----------------|--------------|-----------|------------------|---------------|-------------------|--|---------------------------|----------|----------------------|----------------------|------------------------------|
| 1 = C.N.L | 2 = D.N.E | 3 = Buried | 4 = Haz/Atmos. | 5 = Unsafe | 6 = Sealed Lid | 7 = Traffic | 8 = Dog | 9 = Other | 1 = Paved St. | 2 = Unpaved St. | 3 = Paved Intersection | 4 = Unpaved Intersection | 5 = Alley | 6 = Sidewalk | 7 = Parking Lot | 8 = BackYard | 9 = Ditch | 10 = Curb/Gutter | 11 = Easement | 12 = Private Res. | <input type="checkbox"/> Subject to Ponding Ponding Depth: _____ (ft.) | Grade Elevation: <u>1</u> | 1 = Even | 2 = Above _____ (in) | 3 = Below _____ (in) | Trib. Area _____ ((sq. ft.)) |
|-----------|-----------|------------|----------------|------------|----------------|-------------|---------|-----------|---------------|-----------------|------------------------|--------------------------|-----------|--------------|-----------------|--------------|-----------|------------------|---------------|-------------------|--|---------------------------|----------|----------------------|----------------------|------------------------------|

Condition: Gen Obs: Comments:

Cover: Diameter 24.5 (in.)  F P \_\_\_\_\_  
 Thickness 1 (in.)  
 Type: 2 Vented # 1 Dia 1 (in.)  
 1 = Light 2 = Heavy Duty 3 = Bolt down 4 = Locking 5 = Security  
 Cover-to-Frame Fit  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_  
 Frame:  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

a. Inside Dia. (in.) 22.75 b. Outside Dia. (in.) 25.5 c. Dwell (in.) \_\_\_\_\_ d. Height (in.) 5

Frame-to Chimney Seal: Type Spallii G  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_

Chimney: Type \_\_\_\_\_ G  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ Spalling  
 Height: \_\_\_\_\_ (in.)

Corbel: Type \_\_\_\_\_ G  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ Spalling

Wall: Type \_\_\_\_\_ G  F P I/I \_\_\_\_\_ GPM \_\_\_\_\_ Spalling

Bench: Type \_\_\_\_\_ G F  P I/I \_\_\_\_\_ GPM \_\_\_\_\_ Spalling present and uneven grade

Invert: Type \_\_\_\_\_ G F  P I/I \_\_\_\_\_ GPM \_\_\_\_\_ Channel is cracked and misformed. Debris present.

Steps: Type \_\_\_\_\_ G F  P I/I \_\_\_\_\_ GPM \_\_\_\_\_ Corroded

NO. Missing: 0

Comments: \_\_\_\_\_

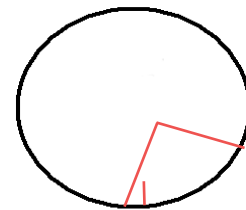
## Pipe Seal

1. G F P I/I _____ GPM	4. G F P I/I _____ GPM
2. G F P I/I _____ GPM	5. G F P I/I _____ GPM
3. G F P I/I _____ GPM	6. G F P I/I _____ GPM

Evidence of Surcharge: Depth \_\_\_\_\_ (ft.)

## Structure Type

- |                |                 |                            |
|----------------|-----------------|----------------------------|
| 1 = Brick      | 7 = Morter Mask | 13 = Bitumastic            |
| 2 = Precast    | 8 = Cast Iron   | 14 = Grout                 |
| 3 = Block      | 9 = PVC         | 15 = Other                 |
| 4 = Clay pipe  | 10 = PVC Coated | 16 = Flat Top              |
| 5 = Conc. Pipe | 11 = Rebar      | 17 = Cementitious Material |
| 6 = Poured     | 12 = None       | 18 = Cip Chimney Liner     |



# VISUAL PIPE INSPECTION

Date 10 / 26 / 2022 Observation Manhole ( ) 19 (2369) Crew: Andy , Jason

Lamping Direction	DS	US #1	US #2	US #3	US #4	US #5
	( S )	( E )	( S )	( )	( )	( )
To Manhole:						
Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rim-to Invert Elevation: (nearest tenth of foot)	5.20	4.90	3.55			
Drop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drop Type: 1= Const. Ext. 2 = Const. Int. 3 = Not Const.						
Pipe Size: (Dia. in Inches)	6	4	4			
Type of Pipe 1=VCP 4=RCP 7=OBG 2=PVC 5=CMP 8=Other 3=DIP 6=CIP	1	2	2			
Pipe Shape: 1=Circular 3=Elliptic 2=Rectanqular 4=Other	1	1	1			
Depth of Flow:(in.)						
Velocity of Flow(ft./Sec)						
Roots 1-Lt. 2=Med. 3=Heavy						
Deposition: 1=Medium 2=Heavy						
Grease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mineral Deposit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Circular Cracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broken Pipe	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collapsed Pipe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joint Infiltration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Offset Joint: 1 = Minor 3 = Severe 2 = Moderate						
Protruding Tap	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Line Grade Poor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Abandoned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Permanent Plug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments A plugged pipe under the bench to the west may exist. Channel is shaped poorly. Pipe to east is broken. Debris present in south channel.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_