



City of Kansas City, Missouri
Water Services Department
Kelly Postlewait, Interim Director

Project Manual

FOR

PROJECT/CONTRACT NO. 81000975/1689

**Green Infrastructure Project 1-2: Paseo
Gateway/KCU - Bid #2**

BIDDER/ADDRESS

Company	_____
Contact	_____
Address	_____

Phone	_____
Fax	_____
Email	_____

Project Manager: Madison Gibler, P.E.
Telephone: 816-448-7506
Email: mgibler@burnsmcd.com

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

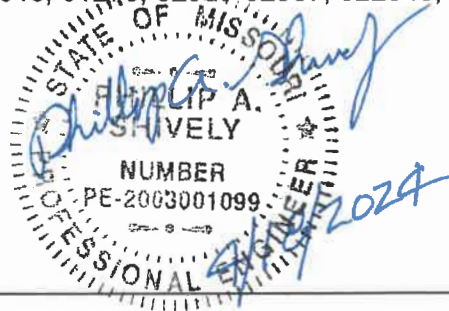
CERTIFICATION PAGE

Project/Contract Number 1689 / 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

I am responsible for the following specifications and drawings:

Specifications: All Divisions except 00412, 01015, 01270, 02937-02957, 322843, 260519-265619, 330513, and 406900



(SEAL)

I certify under penalty of law that the 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, and that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

[The above note must be at the bottom of every page, Be certain to delete this note before final contract document is printed]

CITY OF FOUNTAINS
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CERTIFICATION PAGE

Project Number: 81000975

Project Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU

I am responsible for the following specifications and drawings:

Drawings: Sheet 1 & 22

Specifications: 00005, 00412, 01270



Coby Crowl, P.E.

I am responsible for the following specifications and drawings:

Drawings: Sheets – 23-28

Specifications: 260519, 260526, 260529, 260533, 260544, 260553, 260573.16, 260573.19, 262416, 262726, 262816



04-12-2024


Craig Brewster, P.E.

I am responsible for the following specifications and drawings:

Drawings: Sheets – 2-21

Specifications: 01015, 02937, 02938, 02946, 02948, 02955, 330513



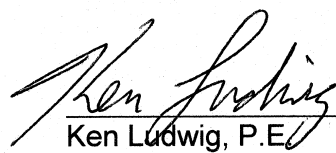

Daniel Snead, P.E.

I am responsible for the following specifications and drawings:

Drawings: Sheets – 31-33

Specifications: 406900




Ken Ludwig, P.E.

I am responsible for the following specifications and drawings:

Drawings: Sheets – 34-52

Specifications: 02947, 02949, 02951, 02953, 02957, 328423



Matt Evett, PLA, ASLA

I am responsible for the following specifications and drawings:

Drawings: Sheets – 29-30

Specifications: 265613, 265619



Kathi S. Vandel, P.E.

EACH PROFESSIONAL WHOSE SIGNATURE AND PERSONAL SEAL APPEARS ABOVE ASSUMES RESPONSIBILITY IN THESE BIDDING DOCUMENTS ONLY FOR WHAT IS LISTED ABOVE AND DISCLAIMS (PURSUANT TO SECTION 327.411 RSMO) ANY RESPONSIBILITY FOR ALL OTHER PLANS, SPECIFICATIONS, ESTIMATES, REPORTS, OR OTHER DOCUMENTS OR INSTRUMENTS NOT SEALED BY THE SIGNED PROFESSIONAL RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE PROJECT.



OVERFLOW CONTROL PLAN CONSENT DECREE TABLE OF CONTENTS

Project/Contract Number: 81000975 / 1689

Project Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU

INTRODUCTORY INFORMATION

00005	Certification Page
00010	OCP Consent Decree Table of Contents
00015	List of Drawings

BIDDING REQUIREMENTS

00130	Invitation to Bid
00210	OCP Consent Decree Instructions to Bidders
00410	Bid Form
00410.01	Experience Reference Form
00410.02	Experience and Reference Summary
00410.03	List of Equipment and Staffing
00412	Unit Prices
00413	Allowance Form
00430	Bid Bond
00440	CREO KC 5: Construction Contract Instructions
00450	CREO KC 8: Contractor Utilization Plan/Request for Waiver
00450.01	CREO KC Letter of Intent to Subcontract
00460	CREO KC 10: Timetable for MBE/WBE Utilization
00470	CREO KC 11: Request for Modification or Substitution
00485	CREO KC Monthly Reporting Instructions
	CREO KC Affidavit of Training Program
00485.01	MWBE Monthly Utilization Report
00485.01.1	MWBE Monthly Utilization Report Instructions
00485.02	Project Workforce Monthly Report
00485.02.1	Workforce Monthly Report Instructions
00485.03	Company-Wide Workforce Monthly Report
00485.04	Construction Employee Identification Report
00490	Pre-Contract Bidder's Certification Form

CONTRACTING REQUIREMENTS

00515	Construction Contract Required Submissions
00515.01	Employee Eligibility Verification Affidavit
	Affidavit of Compliance with the Federal Consent Decree Regarding KCMO OCP
00560	Missouri Project Exemption Certificate
00560.01	Kansas City Missouri Tax Exempt Certificate
00610	Performance and Maintenance Bond Form
00615	Payment Bond Form
00616	Performance Bond Form
00620	Insurance Certificate Forms
00630	Revenue Clearance Release Authorization

	Revenue Clearance Letter (Sample)
00700	OCP Consent Decree General Conditions
00800	OCP Consent Decree Supplementary Conditions
	Non-Conformance Notice/Defective Work Form
00830	Prevailing Wage Order - Jackson County, Missouri
00910	Construction Addenda
00930	Request for Interpretation Form
00930.01	Request for Interpretation Form Log
00931	Supplemental Design Instructions
00932	Request for Proposal
00933	Request for Proposal Log
00940	Change Order Form
00945	Work Change Directive

DIVISION 1 - GENERAL REQUIREMENTS

01000	General Project Requirements
01015	Specific Project Requirements
01020	Record Documents
01210	Allowances
01210.01	Allowance Authorization
01270	Adjustment Unit Price and Measurement Procedures
01290.01	Application for Payment
01290.02	Schedule of Values
01290.03	Certified Payroll Report Instructions
01290.05	Certified Payroll Report Form
01290.07	Payroll Certification
01290.09	Subcontractors and Major Material Suppliers List
01290.11	Daily Labor Force Report
01290.12	Certificate of Substantial Completion
01290.13	Punch List
01290.14	Contractor Affidavit for Final Payment
01290.15	Subcontractor Affidavit for Final Payment
01300	Submittals
01320	Construction Progress Documentation
01320.01	Daily Field Observation Report
01320.02	Periodic Field Observation Report
01320.03	Working Day Report
01322	Photographic and Video Documentation
01330.01	Transmittal Letter
01335	Document Management
01500	Temporary Facilities
01566	Cleanup Operations
01570	Temporary Erosion and Sediment Control
01580	Project Signs
01581	Public Communications
01630	Substitution Request
01700	Traffic Control
01900	Contract Closeout

DIVISION 2 - SITEWORK

02100	Clearing and Site Preparation (Kansas City Metro Chapter APWA)
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02200	Earthwork
02250	Trenching, Pipe Embedment and Backfill
02575	Surface Restoration
02605	Drainage Structures
02624	Polyvinyl Chloride (PVC) Gravity Sewer Pipe
02630	Stormwater Pipe and Structures
02641	Water Valves
02675	Flushing, Testing And Disinfection of Water Mains
02686	Cleaning and Assessment of Gravity Lines
02700	Structures (Kansas City Metro Chapter APWA)
02702	Testing Requirements for Sanitary: Mains and Manholes
02937	Green Stormwater Infrastructure Site Activity Plan
02938	Green Stormwater Infrastructure Control and Protection
02946	Green Stormwater Infrastructure Aggregate Media
02947	Green Stormwater Infrastructure Growing Media & Soil Amendments
02948	Green Stormwater Infrastructure Media Liners
02949	Green Stormwater Infrastructure Tree Protection, Removal & Replacement
02951	Green Stormwater Infrastructure Plants
02953	Green Stormwater Infrastructure Non-Native Seeding and Sodding
02955	Green Stormwater Infrastructure Outlets
02957	Green Stormwater Infrastructure Establishment

DIVISION 3 - CONCRETE

03000	Miscellaneous Concrete
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DIVISION 5 - METALS

05011	Stormwater Castings
05012	Water Castings

DIVISION 13 - SPECIAL CONSTRUCTION

328423	Underground Sprinklers
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DIVISION 26 - ELECTRICAL

260519	Low-Voltage Electrical Power Conductors and Cables
260526	Grounding and Bonding for Electrical Systems
260529	Hangers and Supports for Electrical Systems
260533	Raceways and Boxes for Electrical Systems
260544	Sleeves and Sleeve Seals for Electrical Raceways and Cabling
260553	Identification for Electrical Systems
260573.16	Coordination Studies
260573.19	Arc Flash Hazard Analysis
262416	Panelboards
262726	Wiring Devices
262816	Enclosed Switched and Circuit Breakers
265613	Lighting Poles and Standards
265619	LED Exterior Lighting

DIVISION 33 - UTILITIES

330513	Waterfall/Recirculation Pumps, Strainer Baskets, Piping and Vault
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DIVISION 40 - PROCESS INTEGRATION

406900 Continuous Monitoring and Adaptive Control (CMAC)



LIST OF DRAWINGS

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

Item	Set /Title /Description /Designation	Drawing No(s).	Dated
001	COVER SHEET	D-1116.06	04/12/2024
002	GENERAL NOTES	D-1116.06	04/12/2024
003	EXISTING SURVEY	D-1116.06	04/12/2024
004	DEMOLITION PLAN	D-1116.06	04/12/2024
005	OVERALL GRADING PLAN	D-1116.06	04/12/2024
006	UPPER POND GRADING PLAN	D-1116.06	04/12/2024
007	ALTERNATE 1 UPPER POND GRADING PLAN	D-1116.06	04/12/2024
008	LOWER POND GRADING PLAN	D-1116.06	04/12/2024
009	UTILITY PLAN	D-1116.06	04/12/2024
010	STORM SEWER PLAN & PROFILE	D-1116.06	04/12/2024
011	EROSION CONTROL PLAN	D-1116.06	04/12/2024
012	CIVIL DETAILS	D-1116.06	04/12/2024
013	CIVIL DETAILS	D-1116.06	04/12/2024
014	STORM SEWER DETAILS	D-1116.06	04/12/2024
015	EROSION CONTROL DETAILS	D-1116.06	04/12/2024
016	EROSION CONTROL DETAILS	D-1116.06	04/12/2024
017	EROSION CONTROL DETAILS	D-1116.06	04/12/2024
018	DRAINAGE AREA MAP	D-1116.06	04/12/2024
019	STORM SEWER CALCULATIONS	D-1116.06	04/12/2024
020	POND DRAINAGE AREA MAP	D-1116.06	04/12/2024
021	INTERIM COND DRAINAGE AREA MAP	D-1116.06	04/12/2024
022	BIKE PATH/SIDEWALK PLAN	D-1116.06	04/12/2024
023	ELECTRICAL SYMBOLS & NOTES	D-1116.06	04/12/2024
024	OVERALL ELECTRIC PLAN	D-1116.06	04/12/2024
025	ENLARGED ELECTRICAL PLANS	D-1116.06	04/12/2024
026	ONE LINE DIAGRAM & PANEL SCHEDULE	D-1116.06	04/12/2024
027	ELECTRICAL DETAILS	D-1116.06	04/12/2024
028	ELECTRICAL DETAILS	D-1116.06	04/12/2024
029	LIGHTING GENERAL NOTES	D-1116.06	04/12/2024
030	SITE LIGHTING PLAN	D-1116.06	04/12/2024
031	P&ID	D-1116.06	04/12/2024
032	ACTUATOR WIRING DIAGRAM	D-1116.06	04/12/2024
033	INSTRUMENT INSTALLATION DETAILS	D-1116.06	04/12/2024

Item	Set /Title /Description /Designation	Drawing No(s).	Dated
034	SITE PLAN NOTES	D-1116.06	04/12/2024
035	SITE PLAN	D-1116.06	04/12/2024
036	SITE PLAN ENLARGEMENT	D-1116.06	04/12/2024
037	SITE PLAN ENLARGEMENT	D-1116.06	04/12/2024
038	LAYOUT PLAN ENLARGEMENT	D-1116.06	04/12/2024
039	LAYOUT PLAN ENLARGEMENT	D-1116.06	04/12/2024
040	LAYOUT PLAN ENLARGEMENT (BID 1- ALTERNATE)	D-1116.06	04/12/2024
041	LAYOUT PLAN ENLARGEMENT	D-1116.06	04/12/2024
042	SITE PLAN ENLARGEMENT	D-1116.06	04/12/2024
043	SITE DETAILS ROCK SECTIONS	D-1116.06	04/12/2024
044	SITE DETAILS	D-1116.06	04/12/2024
045	SITE DETAILS PED BRIDGE	D-1116.06	04/12/2024
046	SITE DETAILS WOOD DOCK - ALTERNATE	D-1116.06	04/12/2024
047	LANDSCAPE PLAN NOTES	D-1116.06	04/12/2024
048	LANDSCAPE PLAN	D-1116.06	04/12/2024
049	LANDSCAPE PLAN ENLARGEMENT	D-1116.06	04/12/2024
050	LANDSCAPE PLAN ENLARGEMENT	D-1116.06	04/12/2024
051	LANDSCAPE DETAILS	D-1116.06	04/12/2024
052	LANDSCAPE PLAN RENDERING	D-1116.06	04/12/2024

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INVITATION TO BID

Project Number: 81000975Project Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU

The Water Services Department of Kansas City, Missouri will receive sealed Bids until 2:00 PM, on May 21, 2024 at 4800 East 63rd Street, Kansas City, MO (NE door) for **Project No. 81000975 Green Infrastructure Project 1-2: Paseo Gateway/KCU**. Bids will be opened after that time inside a KCMO Water Service Conference Room (room to be determined at Bid Opening).

City desires that Minority Business Enterprises (MBE) and Women's Business Enterprises (WBE) have a maximum opportunity to participate in the performance of City contracts. The goals for this specific Project are (13%) MBE participation and (13%) WBE participation.

Bidding Documents will be available online to all interested parties at the Kansas City, Missouri Plan Room, <http://www.kcmoplanroom.org>. All addenda will be posted at this location. Any document or plan may be viewed or downloaded from this location.

Bidders are requested to attend the non-mandatory Pre-Bid Conference at **9 AM, May 2, 2024** via Microsoft TEAMS link below:

[Join the meeting now](#)

Meeting ID: 213 120 757 262

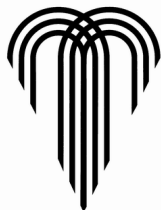
Passcode: 4Phdk6

Project Manager: Madison Gibler, P.E.
Phone Number: 816-448-7506
E-mail: mgibler@burnsmcd.com

Contract Administrator: Jamie Driskell
Phone Number: 816-652-2927
E-mail: jdriskell@burnsmcd.com

View all procurement and contracting opportunities at <http://www.kcmo.org>

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INSTRUCTIONS TO BIDDERS

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

1. Sealed Bids for **Green Infrastructure Project 1-2: Paseo Gateway/KCU, PN# 81000975**, will be received by the Water Services Department at **4800 East 63rd Street, Kansas City, MO (NE doors)** until 2:00 P.M., May 21, 2024, at which time bidding will be closed.

- a. All Bids will be opened and read aloud. The Bid Envelope must contain all required submissions to be included with the Bid. No Bid may be withdrawn for a period of ninety (90) days after the Bid is opened. Bid security shall likewise continue for the same ninety (90) days unless earlier released by the City. The successful Bidder shall comply with all Bidding and contract requirements. Bids, once opened and read, may not be withdrawn without forfeiture of the Bid security.
- b. All Bids shall be addressed to the Director of Water Services, shall state on the outside of the sealed Bid envelope "Bid Enclosed", title and Project number, and shall be deposited in the locked Bid box. All Bids must comply with the Bidding Requirements of Kansas City, Missouri (CITY).

2. Consideration of Bids

- a. The City will determine the lowest, responsive and responsible Bid. The City may reject any or all bids. If the City rejects all Bids, the City may: (1) resolicit Bids following the City's normal solicitation procedure; or (2) solicit Bids only from those Bidders that submitted a Bid pursuant to the original solicitation; or (3) use an expedited Bid submission schedule with or without readvertising or issuing any other public notice when the City determines that the delay from the normal City solicitation procedure would not be in the City's best interests.
- b. Alternates. If this solicitation includes Bid Alternates, the City, in its sole discretion, may include any, all or none of the Alternates in determining the lowest, responsive and responsible Bid. In determining lowest, responsive and responsible Bid, the City may include the Alternates in any combination and in any order or priority or choose none of the Alternates. The City may make this determination at any time after Bid Closing and prior to Contract award. The City will act in the best interest of the City in determining whether to include any, all or none of the Alternates and the combination and priority of any Alternates selected. If additional funding becomes available after Contract award, City may add any or all of the Alternates to the Contract by change order.

3. Evidence of Competency to Perform. Each bidder shall furnish with the bid satisfactory evidence of Bidder's competency to perform the proposed work. Such evidence of competency shall consist of the following:

- a. Completed Form 00410.01 Experience Reference Summary for three projects of similar scope performed within the past 5 years including the name, address and telephone number of the contact person having knowledge of the project and the dollar value of the project.
- b. Statement that, during the three (3) years immediately preceding the date of the Bid, Bidder has received no written notices of violations of any federal or state prevailing wage statute in which prevailing wage penalties were assessed against the Bidder or Bidder has been found in such but has made restitution to affected workmen and complied with any statutory penalty; and a

statement that Bidder is current on payment of Federal and State income tax withholdings and unemployment insurance payments

- c. Statement that Bidder participates in a training program that facilitates entry into the construction industry and which may include an on-the-job or in-house training program. By submitting its Bid, Bidder is agreeing to timely submit during the 48 hours after Bid opening an affidavit of describing such program and Bidder's participation.
- d. Identify the following Key Personnel proposed for the Project. (**NOTE:** Key Personnel must be committed to the Project for its duration and may not be removed or substituted without the City's prior written consent.)
 - (1) GC Project Manager
 - (2) On-Site Field Superintendent
 - (3) QC/QA Manager
 - (4) Safety Officer
- e. For each of the Key Personnel, provide the following background information.
 - (1) Years of employment with current employer
 - (2) City of residence
 - (3) Identify any other projects this person will be involved with concurrently with the Project, and state the time commitment for the Project and each other project
 - (4) Discuss professional registrations, education, certifications, and credentials held by this person that are applicable to the Project
- f. Discuss generally the tasks involved in the Project.
- g. Illustrate clearly and concisely Bidder's understanding of the technical elements that must be addressed for successful completion of the Project.
- h. Submit a bid schedule with anticipated milestones for the Project using Microsoft Project 2007 or later format.
- i. Describe key issues that might affect the Project schedule and how Bidder proposes to address them.
- j. Summary of the Project Safety Plan for the Project.
 - (1) Describe how Bidder proposes to address any unique safety issues for the Project
 - (2) Describe your safety record and environmental compliance record along with your Firm's OSHA reportable accident rates on recent comparable size projects
 - (3) Statement of Bidder's Experience Modification Ratio (EMR)
- k. Discuss Bidder's understanding of the traffic control required for the Project, if applicable, and how traffic control will impact the Project schedule. Discuss any major traffic control issues that need to be addressed and Bidder's proposed solutions.
- l. Identify any other special issues or problems that are likely to be encountered. Outline the manner in which Bidder suggests resolving them.
- m. Outline key community relations issues and how they might be resolved.
- n. Describe any difficulties Bidder anticipates encountering in serving the City, in light of the City's status as a municipality and public entity. Explain how Bidder plans to manage them.
- o. Summary of Bidder's Quality Assurance/Quality Control Plan for this project
- p. Statement regarding all work performed two (2) years immediately preceding the date of the Bid, that contains either (a) a contract by contract listing of any written notices of violations of any

federal, state or local DBE/MBE/WBE Program and any damages assessed; or (b) a statement that there have been no such written notices of violations or such penalties assessed; and a statement that Program requirements have been met.

- q. Statement that the Bidder has not been rescinded or debarred from any bidding, contractual, procurement, or other such programs by federal, state or local entities.
- r. Statement that Bidder is current on payment of Federal and State income tax withholdings and unemployment insurance payments
- s. Statement of Bidder's litigation and/or arbitration history over the past five (5) years including final ruling.
- t. Statement of Bidder's bond history over the past five (5) years including any incidences of failure to perform.
- u. MBE / WBE past project performance and compliance with participation goals in comparable size commercial projects
- v. Fully executed Affidavit of Compliance with the Federal Consent Decree regarding the City of Kansas City, Missouri Overflow Control Plan ("OCP") Civil Action No. 4:10-cv-0497-GAF.

4. Waiver of Bid Requirements The Director of Water Services or his delegate at any time may waive any requirements imposed by this solicitation or by any City regulation when failure to grant the waiver will result in an increased cost to the City and the requirement waived would be waived for all Bidders for this solicitation and it is in the best interest of the City to grant the waiver. The City Council at any time may waive any requirements imposed in this solicitation by the City's Code of Ordinances when it finds failure to grant the waiver will result in an increased cost to the City and the waived requirement would be waived for all Bidders for this solicitation and it is in the best interest of the City to grant the waiver. The City reserves the right to waive any irregularities and/or formalities as deemed appropriate.

5. Late Bids Bids and modifications of Bids received after the exact hour and date specified for receipt will not be considered unless: (1) the Bid is sent via the U.S. Postal Service, common carrier or contract carrier, by a delivery method that guarantees the Bid will be delivered to the City prior to the submission deadline; or (2) if the Bid is submitted by mail, common carrier or contract carrier it is determined by the City that the late receipt was due solely to an error by the U.S Postal Service, common carrier or contract carrier; or (3) the Bid is timely delivered to the City but is at a different City location than that specified in this IFB; or (4) the City extends the time after the deadline for a force majeure event that could potentially affect any or all Bidders meeting the deadline.

6. Interpretations and Addenda All questions about the meaning or intent of the Bidding Documents may be directed to the Project Manager listed at the end of these Instructions to Bidders. Interpretations or clarifications considered necessary by the Project Manager in response to such questions will be issued by Addenda to all parties recorded as having received the Bidding Documents. Questions received less than ten (10) days prior to the date for opening of Bids may not be answered. Only answers issued by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Addenda may also be issued to modify the Bidding Documents as deemed advisable by the City.

7. Bid Security Requirements All Bids submitted must be accompanied by a Bid deposit in the amount of five percent (5%) of the base Bid which shall be in the form of a Bid Bond (on the form provided in these Bidding Documents), Cashier's Check, Letter of Credit, Certificate of Deposit or other instrument approved in advance by the City. Prior to submittal of the Bid the City Treasurer must approve both the financial institution and text of a Letter of Credit. A Cashier's Check or a Certificate of Deposit shall be payable to the City Treasurer.

8. Forfeiture of Security If a Bidder fails or refuses to execute the Contract when requested by the City, any Bid security given to the City shall immediately become due and payable and forfeited to the City as liquidated damages.

9. Mistake in Bid Security By submitting a Bid, Bidder is agreeing to correct any mistakes on a Bid security submission when requested by the City. When such a mistake occurs and a Bidder fails or

refuses to correct the mistake or execute the Contract when requested by the City, any Bid security shall be forfeited to the City and the Bidder shall also be subject to debarment and damages.

10. Bids that Exceed the Engineer's Estimate The City may offer the apparent lowest, responsive and responsible Bidders the option of performing the Work for the Engineer's estimate for the Project with no changes to the Bid requirements or scope of the Project if the Bid is not more than five percent higher than the Engineer's estimate.

11. Escalation. If during the bid review and approval of the contract, the price of material increases, through no fault of the Contractor, the contract price may be equitably adjusted and subject to escalation. Escalation will be based on cost increases without additional profit, overhead or margin, and shall include material costs only that occur between the bid date and within the 90-day period immediately following the Notice to Proceed date. Such price increases shall be documented through third party sources. See Section 00700, Article 11 and Section 00800 Article 11, Paragraph 11.01.F. for additional information.

12. Post Bid Required Submissions. The successful Bidder will be required to submit the following documents with the signed copies of the Bid Form/Contract or within the timeframes specified in the Notice of Intent to Contract letter. Copies of the City's forms that the successful Bidder will be required to sign are bound into this Project Manual for information:

- a. Properly signed, dated, and sealed Performance and Maintenance Bond and Payment Bond;
- b. Properly completed certificates of insurance;
- c. Copies of licenses required by the City to do the Work;
- d. A copy of CONTRACTOR's current Certificate of Good Standing or Fictitious Name Registration from the Missouri Secretary of State, or other acceptable proof; and

13. Indemnification – City of Kansas City. The contract documents contains a requirement that Contractor shall indemnify, defend and hold harmless the City and any of its agencies, officials, officers, or employees from and against all claims, damages, liability, losses, costs, and expenses, including reasonable attorneys' fees, arising out of or resulting from any acts or omissions in connection with the contract, caused in whole or in part by Contractor, its employees, agents, or Subcontractors, or caused by others for whom Contractor is liable, including negligent acts or omissions of the City, its agencies, officials, officers, or employees. The contract requires Contractor to obtain specified limits of insurance to insure the indemnity obligation. Contractor has the opportunity to recover the cost of the required insurance in the Contract Price by including the cost of that insurance in the Bid amount.

14. City's Buy American and Missouri Preference Policies. It is the policy of the City that any manufactured goods or commodities used or supplied in the performance of any City contract or any subcontract thereto shall be manufactured or produced in the United States whenever possible. When Bids offer quality, price, conformity with specifications, term of delivery and other conditions imposed in the specifications that are equal, the City shall select the Bid that uses manufactured goods or commodities that are manufactured or produced in the United States. The City shall give preference to all commodities manufactured, produced, or grown within the State of Missouri and to all firms, corporations, or individuals doing business as Missouri firms, corporations or individuals, when quality is equal or better and delivered price is the same or less. It is the bidder's responsibility to claim these preferences.

15. Affirmative Action. It is the policy of the City that any person or entity entering into a contract with the City, will employ applicants and treat employees equally without regard to their race, color, sex, religion, national origin or ancestry, disability, sexual orientation, gender identity or age. Bidder will be required to comply with the City's Affirmative Action ordinance if Bidder is awarded a contract from the City totaling more than \$300,000.00. If you have any questions regarding the City's Affirmative Action requirements, please contact CREO KC at (816) 513-1836 or visit the City's website at www.kcmo.gov.

16. Tax Clearance. Bidder will be required to furnish to CITY sufficient proof from City's Commissioner of Revenue, verifying that Bidder is in compliance with the license and tax ordinances administered by City's Revenue Division as a precondition to CITY making its first payment under any

CONTRACT over \$160,000.00. Bidder will also be required to obtain proof of City tax compliance from all of its Subcontractors prior to the Subcontractors performing any Work.

17. Substitutions or "Or-Equal" Items The procedure for submission of substitutions or "or-equal" items is set forth in the General Conditions and Supplementary Conditions.

18. Prevailing Wage Requirements. The successful Bidder shall pay the prevailing hourly rate of wages as determined by the Missouri Annual Wage Order and/or Federal Wage Determination set forth in the Project Manual. In case of a conflict between Missouri and Federal wage rates, the higher rate shall apply.

Successful Bidder shall be required to use City's Internet web based Prevailing Wage Reporting System provided by City and protocols included in that software during the term of this Contract. When requested by the City, Bidder shall submit user applications to City's provided Prevailing Wage Reporting System for all applicable personnel and shall require subcontractors to submit same.

19. Contract Information Management System. Successful Bidder shall be required to use City's Internet web-based Contract Information Management System/Project Management Communications Tool provided by City and protocols included in that software during the term of this Contract. Bidder/Proposer shall submit user applications to City's provided Contract Information Management System for all personnel, subcontractors or suppliers as applicable.

20. MBE/WBE Program Requirements. City desires that Minority Business Enterprises (MBE) and Women's Business Enterprises (WBE) have a maximum opportunity to participate in the performance of City contracts. The goals for this specific Project are (13%) MBE participation and (13%) WBE participation. The City's CREO KC Forms and CREO KC Instructions for Construction Projects are incorporated into these Bidding Documents and the Contract Documents. The MBE/WBE Directory is available on the City's website at www.kcmo.gov. Please call the CREO KC at (816) 513-1836 for assistance.

Successful Bidder shall be required to use City's Internet web based MBE/WBE Program Reporting System provided by City and protocols included in that software during the term of this Contract. When requested by the City, Bidder shall submit user applications to City's provided MBE/WBE Program Reporting System for all applicable personnel and shall require subcontractors/subconsultants to submit same.

21. Waiver of MBE/WBE Requirements. The City Council may waive any and all MBE/WBE requirements imposed by any Bidding Document or the MBE/WBE Ordinance and Contract with the lowest, responsive and responsible Bidder if the City Council determines a waiver is in the best interests of the City.

22. Forfeiture of Bid Bond for Failure to Make MBE/WBE Submissions. By submitting its Bid, Bidder is agreeing to the following: (1) Bidder has made by Bid opening a good faith effort to meet the MBE/WBE goals established for the Project; or Bidder will continue to make during the 48 hours after Bid opening a good faith effort to meet the MBE/WBE goals established for the Project; and (2) Bidder will timely submit its 00450 CREO KC Construction Contractor Utilization Plan/Request for Waiver (CREO KC Form 8) and 00450.01 Letter of Intent to Subcontract for each MBE/WBE listed on the 00450 CREO KC Construction Contractor Utilization Plan/Request for Waiver, and 00460 CREO KC Timetable for MBE WBE Utilization (CREO KC Form 10); and (3) Bidder will submit documentation of its good faith efforts to meet the MBE/WBE goals when requested by the City. Failure to meet these requirements in good faith will result in Bidder being debarred and forfeiting its Bid Bond.

23. Workforce Program Requirements. City desires that minorities and women have a maximum opportunity to practice their trades on city construction projects. The minimum company-wide goals are a ten percent (10%) minority workforce and two percent (2%) women workforce. The City's CREO KC Forms and CREO KC Instructions for Construction Projects are incorporated into these Bidding Documents and the Contract Documents.

Successful Bidder shall be required to use City's Internet web based Workforce Program Reporting System provided by City and protocols included in that software during the term of this Contract. When requested by the City, Bidder shall submit user applications to City's provided Workforce Program Reporting System for all applicable personnel and shall require subcontractors to submit same.

24. Subcontractors, Suppliers and Others

a. If the Contract Documents require the identity of certain Subcontractors, Suppliers and other persons and organizations (including those who are to furnish the principal items of material and equipment) to be submitted to City, the apparent lowest, responsive and responsible Bidder, and any other Bidder so requested, shall submit to City a list of all such Subcontractors, Suppliers and other persons and organizations proposed for those portions of the Work for which such identification is required. An experience statement shall accompany such list with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier or organization if requested by City. If City has reasonable objection to any proposed Subcontractor, Supplier or other person or organization, City may request the apparent lowest, responsive and responsible Bidder to submit an acceptable substitute without an increase in Bid price.

b. By submitting its Bid, Bidder agrees that it has read and understands all the provisions of General Condition No. 6.07, Concerning Subcontractors, Suppliers and Others, and that it will comply with all those provisions including but not limited to mandatory mediation of disputes and the prohibition against paid-if-paid and paid-when-paid contract clauses. It is the City's expectation that all Subcontractors and Suppliers will be treated fairly and in good faith by the successful Bidders and that the successful Bidder will make all reasonable efforts to resolve contract disputes with a Subcontractor or Supplier in a prompt and fair manner. If the City is notified by a Subcontractor or Supplier of a contract claim with the successful Bidder, City will notify the successful Bidder and will request prompt resolution of the claim. City will provide any such Subcontractor or Supplier information regarding mandatory mediation as well as a copy of the Payment Bond. City may notify the Surety that City has taken cognizance of such claim.

c. In accordance with the Missouri Prompt Payment Act, City reserves the right to withhold payment(s) in good faith from the successful Bidder due to: i) the successful Bidder's failure to comply with any material provision of the contract; ii) third party claims filed or reasonable evidence that a claim will be filed; iii) the successful Bidder's failure to make timely payments for labor, equipment or materials; or iv) for damage to a Subcontractor or Supplier.

d. By submitting its Bid, Bidder agrees it will not deny any Subcontractor subcontracting opportunities solely because the Subcontractor is not a signatory to collective bargaining agreements with organized labor.

e. The provisions of GC 6.07 are a material term of the Contract with the City and failure by the successful Bidder to comply with the provisions of this section will be taken into consideration by City in making the determination of lowest, responsive and responsible bidder in any subsequent City contracts.

25. Pre-Bid Conference The Water Services Department will hold a pre-Bid conference on May 2, 2024, at 9:00 AM via Microsoft TEAMS. Attendance at the pre-Bid conference is encouraged for all Bidders on this Project.

TEAMS Link:

https://nam12.safelinks.protection.outlook.com/ap/t-59584e83/?url=https%3A%2F%2Fteams.microsoft.com%2F%2Fmeetup-join%2F19%253ameeting_NjUxNjUzZmltNzJmNC00ZDVILWJhYTUtYzM5YTE4ZWVINjJl%2540thread.v2%2F0%3Fcontext%3D%257b%2522Tid%2522%253a%2522bfb9a2b-6d99-4e78-b3c7-95005d555c8b%2522%252c%2522Oid%2522%253a%25227e51bb05-129f-4702-aa72-68d4addf08b3%2522%257d&data=05%7C02%7Cjdriskell%40burnsmcd.com%7C52da1ee10bbd417d652a08dc5d61320f%7Cbfb9a2b6d994e78b3c795005d555c8b%7C0%7C0%7C638487919238347641%7CUnknown%7CTWfpbGZsb3d8eyJWljoimC4wLjAwMDAiLCJQljoiv2luMzliLCJBTil6lk1haWwiLCJXVCi6Mn0%3D%7C0%7C%7C%7C&sdata=%2BGewUigdRORomLex8QcUklCIGLecB4u1hJfRtWtWZOU%3D&reserved=0

26. On-Site Inspection The Project Site will be available for inspection by Bidders. Bidders visiting the Project Site shall be responsible for their own safety. The Project Site shall be available for inspection by appointment from 10 AM to 3 PM each day Monday through Friday (holidays excepted). Bidders may contact the following individual from the Water Services Department, Smart Sewer Program for an appointment.

Contact: Madison Gibler, P.E., Project Manager

Phone: (816) 448-7506

E-mail: mgibler@burnsmcd.com

27. Signatures Each copy of the Bid Form/Contract must be signed and properly dated by the following, as applicable:

Limited Liability Company:

- ☐ a member of the limited liability Company authorized to sign on behalf of the company.

Partnership:

- ☐ a partner authorized to sign on behalf of the partnership.

Sole Proprietor:

- ☐ the proprietor.

Joint Venture:

- ☐ the parties to the Joint Venture authorized to sign on behalf of each party to the Joint Venture, or a person authorized by each party to the Joint Venture to sign on behalf of all parties to the Joint Venture.

Corporation:

- ☐ a corporate office authorized to sign on behalf of the corporation. Corporation's seal must be attached to the signature.

28. Forward all questions in writing to the following Project Manager and Contract Administrator. Questions received less than seven (7) days prior to the Bid Date may not be answered. Interpretations or clarifications considered necessary by the Project Manager in response to such questions will be issued by Addenda to all Bidders. Oral or other interpretations or clarifications shall be without legal effect, even if made at a Pre-Bid Meeting.

Madison Gibler, P.E., Project Manager

Phone Number: 816-448-7506

E-mail: mgibler@burnsmcd.com

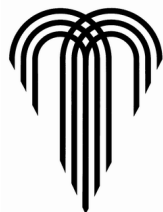
Jamie Driskell, Contract Administration

Phone Number: 816-652-2927

E-mail: Jdriskell@burnsmcd.com



For persons with disabilities needing reasonable accommodations please contact Jean Lawson at 816-513-6566. If you need to use the Relay Service, please dial 711.

CITY OF FOUNTAINS
HEART OF THE NATIONKANSAS CITY
MISSOURI

BID FORM/CONTRACT

Project/Contract Number: 81000975

Project Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU

1. Bidder, having examined the Bidding Documents, related documents and the Site of the Work, and being familiar with all the conditions affecting the construction of the proposed Work, including Laws and Regulations and the availability of materials and supplies, agrees, if this Bid is selected by CITY, this Bid Form/Contract will become the Contract between Bidder and CITY for Bidder to furnish all labor and materials, equipment and services necessary for the proper completion of the Work in accordance with the Contract Documents, including general construction work at the price(s) stated below, which stated sums include fees and all other charges applicable to materials, appliances, labor and all things subject to and upon which other charges may be levied.
2. Bidder agrees the Contract Documents will comprise the entire agreement between CITY and Bidder. The Contract Documents are identified in the General Conditions and are incorporated into and made part hereof this Bid Form/Contract by reference.
3. Bidder agrees that if this Bid Form/Contract is executed by CITY, Bidder's offer is accepted and this Bid Form/Contract that incorporates all other Contract Documents shall constitute the Contract between the parties. Bidder authorizes the CITY to fill in the Contract Price on this Bid Form/Contract in accordance with Bidder's Bid. Bidder agrees that this Bid Form/Contract may be executed in one or more counterparts, each of which will be deemed an original copy of this Bid Form/Contract and all of which, when taken together, will be deemed to constitute one and the same Bid Form/Contract. This Bid Form/Contract shall be effective upon the execution of counterparts by both parties, notwithstanding that both parties may not sign the same counterpart. The parties' signatures transmitted by facsimile or by other electronic means shall be proof of the execution of this Bid Form/Contract and shall be acceptable in a court of law. A copy of this Bid Form/Contract shall constitute an original and shall be acceptable in a court of law.
4. **The Bid Prices shall be the totals as Calculated in TABLE A – BASE BID, and TABLE B – BID ALTERNATES, Form 00412. In determining lowest, responsive, and responsible Bid, the lowest will be the combination of BASE BID and BID ALTERNATES selected by the City during the bid evaluation. The City may determine the lowest, responsive, and responsible bid solely on the BASE BID or the BASE BID plus BID ALTERNATES 1 AND/OR 2 in any combination. The City may make this determination at any time after Bid Closing and prior to Contract award. The City will act in the best interest of the City in determining whether to include any, all, or none of the Alternates and the combination and priority of any Alternates selected.**
5. **The Bid Price(s) shall be shown in numeric figures only and shall be paid at the Adjustment Unit Prices shown in Tables A and B.**

TOTAL SUM TABLE A - BASE BID IN NUMERIC FIGURES

\$ _____

TOTAL SUM BID TABLE B – BID ALTERNATE 1 IN NUMERIC FIGURES

\$ _____

TOTAL SUM BID TABLE B – BID ALTERNATE 2 IN NUMERIC FIGURES

\$ _____

6. The undersigned Bidder has given CITY'S Project Manager written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by the Project Manager or by the DESIGN PROFESSIONAL is acceptable to Bidder.
7. The undersigned Bidder agrees that this Bid shall remain subject to selection by CITY, and may not be withdrawn for one hundred twenty (120) days after the day Bids are opened.
8. The undersigned Bidder certifies that this Bid contains no modifications, deviations, riders or qualifications.
9. **Form 00412 Adjustment Unit Prices contains prices included in the Base Bid, Bid Alternate 1, and Bid Alternate 2, are incorporated into this bid. Form 00412 must be completed and returned with this bid. Bidder agrees that all profit, overhead, markups, labor, equipment, materials, ancillary work, permits, coordination, submittals, bonds, insurance and other costs required to provide the work listed in the Adjustment Unit Prices is included in the Adjustment Unit Price for each item of work listed. The City may add or delete any quantity of work to the project, by Work Change Directive or Change Order, at the prices indicated in TABLE A and TABLE B. The adjustment to the Contract Price will be based upon the awarded bid, plus or minus the work added or deleted based upon the Adjustment Unit Prices.**
10. Form(s) 00412 Adjustment Unit Prices and 00413 Allowances contain prices included in the Base Bid, and are incorporated into this Bid. Form(s) must be completed and returned with this Bid.
11. The undersigned Bidder acknowledges receipt of the following addenda listed by number and date appearing on each addendum:

Addendum Number	Dated	Addendum Number	Dated
(_____)	(_____)	(_____)	(_____)
(_____)	(_____)	(_____)	(_____)
(_____)	(_____)	(_____)	(_____)
(_____)	(_____)	(_____)	(_____)
(_____)	(_____)	(_____)	(_____)

12. By submitting its bid, Bidder is agreeing to meet or exceed the minimum employment goals of 10% minority and 2% women during the term of its contract with the City, or request a waiver of the goals. If a waiver is requested, Bidder must establish good faith efforts towards meeting the goals as set forth in the HRD Instructions for Construction Contracts and the City's Construction Employment Program Ordinance (commonly known as the "Workforce Ordinance") (City Code Section 3-515). Within forty-eight (48) hours after bid opening, the construction contractor shall submit HRD Employee Identification Report Form-Rev. 102715 which shall include: the name, home address, job title, sex and race/ethnicity of each person the contractor anticipates will be performing construction labor hours creditable towards the minimum workforce goals applicable to the construction contractor individually.
13. Should Bidder fail to meet or exceed the minimum employment goals or otherwise establish that Bidder is entitled to a waiver under circumstances in which Bidder has previously failed to meet or exceed the goals on one or more occasions with the twenty-four month period immediately preceding the completion of the Work under this Bid Form/Contract, Bidder may be suspended from participating, either as a contractor or subcontractor, on any future contract with the City for a period

ranging from thirty days to six months as further specified in the Contract Documents. This program is distinguished from the M/WBE Program in that it is not based on company ownership but rather is based on workforce hours instead of a budgetary allocation of work.

By submitting its bid, Bidder warrants that if its bid should exceed \$300,000.00 and Bidder employs fifty (50) or more people, Bidder has an affirmative action program in place and will maintain the affirmative action program in place for the duration of its contract with the City. Bidder further warrants that it will comply with the affirmative action requirements contained in the General Conditions as incorporated by reference into this Bid Form/Contract.

14. Section 15 through Section 18 constitutes the Affidavit of Intended Utilization required to be submitted by Bidders.
15. By submitting its bid, Bidder is agreeing to the following: (1) Bidder has made by bid opening a good faith effort to meet the MBE/WBE/DBE goals established for the project; or Bidder will continue to make during the 48 hours after bid opening a good faith effort to meet the MBE/WBE/DBE goals established for the project; and (2) Bidder will timely submit its **00450 HRD 08 Contractor Utilization Plan/Request for Waiver, 00450.01 Letter of Intent to Subcontract** for each MBE/WBE listed on the 00450 HRD 08 Construction Contractor Utilization Plan/Request for Waiver, and **00460 HRD Timetable for MBE WBE Utilization (HRD Form 10)**; and (3) Bidder will submit documentation of its good faith efforts to meet the MBE/WBE/DBE goals when requested by the City. Failure to meet these requirements in good faith will result in Bidder forfeiting its bid bond.

PROJECT GOALS: **13% MBE 13% WBE 0% DBE**

BIDDER PARTICIPATION:	% MBE	% WBE	% DBE
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16. To the best of Bidder's knowledge, the following are names of certified MBEs and/or WBEs with whom Bidder, or Bidder's subcontractors, presently intend to contract with if awarded the Contract on the above project: **(All firms must currently be certified by Kansas City, Missouri Human Relations Department)**

A. Name of M/WBE Firm _____
 Address _____
 Telephone No. _____
 I.R.S. No. _____
 Area/Scope of work _____
 Subcontract amount _____

B. Name of M/WBE Firm _____
 Address _____
 Telephone No. _____
 I.R.S. No. _____
 Area/Scope of work _____
 Subcontract amount _____

C. Name of M/WBE Firm _____
 Address _____
 Telephone No. _____
 I.R.S. No. _____
 Area/Scope of work _____
 Subcontract amount _____

D. Name of M/WBE Firm _____
Address _____

Telephone No. _____
 I.R.S. No. _____
 Area/Scope of work _____
 Subcontract amount _____

E. Name of M/WBE Firm _____
 Address _____
 Telephone No. _____
 I.R.S. No. _____
 Area/Scope of work _____
 Subcontract amount _____

F. Name of M/WBE Firm _____
 Address _____
 Telephone No. _____
 I.R.S. No. _____
 Area/Scope of work _____
 Subcontract amount _____

(List additional MBE/WBEs, if any, on additional pages and attach to this form)

17. By submitting its bid, Bidder is agreeing it will identify and timely submit within 48 Hours after Bid opening those MBE/WBE subcontractors with dollar amounts and scopes of work, which apply to or exceed the MBE/WBE goals for the Project on the **00450 HRD 08 Contractor Utilization Plan/Request for Waiver**.

18. Bidder agrees that failure to meet or exceed the MBE/WBE Goals for the above project will require the Director of Human Relations to recommend disapproval of the bid unless the Director of Human Relations finds the Bidder established good faith efforts towards meeting the goals as set forth in the HRD Forms and Instructions for Construction Projects and the City's MBE/WBE Ordinance.

For subcontractor's, indicate either the subcontractor to be provided, indicate "self-performed," or indicate "not-applicable" if there is not work (for example – Pipe Bursting is optional).

<u>Work to be Performed</u>	<u>Specification Section</u>	<u>Subcontractor to be Provided</u>
a. Grading/Soil		_____
b. Concrete Flatwork		_____
c. Concrete Retaining Walls		_____
d. Storm Structures and Piping	02630	_____
e. Landscaping	02951, 02953	_____
f. Irrigation	328423	_____
g. CMAC	406900	_____
h. Lighting	260519 - 262816	_____

Business Entity Type:

- ☐ Missouri Corporation
- ☐ Foreign Corporation
- ☐ Fictitious Name Registration
- ☐ Sole Proprietor
- ☐ Limited Liability Company
- ☐ Partnership
- ☐ Joint Venture
- ☐ Other: (Specify) _____

BIDDER

Legal name & address of Bidder, person
firm, partnership, corporation, or
association submitting Bid:

Phone No: _____

Cell No: _____

Facsimile No: _____

Bidder's E-Mail: _____

Federal ID. No. _____

I hereby certify that I have authority to execute this document on
behalf of Bidder, person, firm, partnership, corporation or association
submitting Bid.

By: _____
(Signature)

(Print Name)

Title: _____

Date: _____

(Attach corporate seal if applicable)

NOTARY

Subscribed and sworn to before me this _____ day of _____, 20__.

My Commission Expires: _____

ACCEPTANCE OF BID

CITY, by executing this Bid Form/Contract, hereby accepts Bidder's Bid and this Bid Form/Contract that incorporates all other Contract Documents shall constitute the Contract between the Parties.

CITY shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents a maximum amount of _____ Dollars, (\$ _____). The Contract Price includes:

00412 Unit Prices, included in the Bid, a copy of which is attached

00413 Allowances, included in the Bid, a copy of which is attached

By executing this Bid Form/Contract, CITY accepts Bidder's offer for the Contract Price stated above and this Bid Form/Contract that incorporates all other Contract Documents shall constitute the Contract between the parties

City of Kansas City, Missouri (OWNER or City)

Approved as to form:

Assistant City Attorney

I hereby certify that there is a balance, otherwise unencumbered, to the credit of the appropriation to which the foregoing expenditure is to be charged, and a cash balance, otherwise unencumbered, in the treasury, to the credit of the fund from which payment is to be made, each sufficient to meet the obligation hereby incurred.

Director of Finance

(Date)



EXPERIENCE AND REFERENCE SUMMARY

Project Number: 81000975

Project Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU

Firm's Legal Name	
Mailing Address	
Contact – Name & Email	
Contact – Phone & Fax	

NO.	PROJECT & LOCATION	OWNER NAME & ADDRESS CONTACT & PHONE NUMBER	PROJECT DURATION & DATE COMPLETED	\$ VALUE
1.				
2.				
3.				
4				
5				
6				
7				
9				
10				

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

EXPERIENCE AND REFERENCE SUMMARY – CURRENT PROJECTS

Project/ Contract Number: 81000975

Project Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU

Page ____ of ____

Firm's Legal Name	
Mailing Address	
Contact – Name & E-Mail	
Contact – Phone & Fax	

NO.	PROJECT & LOCATION	CONTRACT AMOUNT/ % COMPLETE	OWNER NAME & ADDRESS CONTACT & PHONE NUMBER	LENGTH, DIAMETER & MATERIAL OF CONSTRUCTION OR DESCRIPTION OF REPAIRS	START DATE
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					



LIST OF EQUIPMENT AND STAFFING AVAILABLE FOR PROJECT

Project/ Contract Number: 81000975

Project Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU.

Page ____ of ____

	EQUIPMENT AVAILABLE FOR CONSTRUCTION (OR ATTACH LIST)		STAFFING BREAKDOWN	NUMBER OF EACH CATEGORY
1.		1.	OFFICE STAFF	
2.		2.	SUPERVISORS	
3.		3.	FIELD STAFF – CREW FOREMEN	
4.		4.	FIELD STAFF – OPERATORS (NOT FOREMEN)	
5.		5.	FIELD STAFF – LABORERS (NOT FOREMEN)	
6.		6.		

Section 00412

Bidder: _____



Adjustment Unit Prices

Project Number: 81000975 / Contract Number: 1650

Project Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU

TABLE A - BASE BID

NOTE: IN THE EVENT OF DISCREPANCY, UNIT PRICE SHALL GOVERN. THE LUMP SUM CONTRACT PRICE WILL BE SUBJECT TO ADJUSTMENT ACCORDING TO FINAL MEASURED, USED, OR DELIVERED QUANTITIES BASED ON THE ADJUSTMENT UNIT PRICES LISTED BELOW. THE CITY MAY ADD OR DELETE ANY QUANTITY OF WORK TO THE PROJECT AS SPECIFIED IN SUPPLEMENTARY CONDITION SC-11.04 C. THE ADJUSTMENT OF THE CONTRACT PRICE WILL BE BASED UPON THE LUMP SUM BID PLUS OR MINUS THE WORK ADDED OR DELETED BASED UPON THE ADJUSTMENT UNIT PRICES.

Item	Unit	Qty.	Item Description	Unit Price	Extension
1	LS	1	Erosion & Sediment Control		\$ -
2	LF	150	Removal of Storm Sewer System		\$ -
3	SF	250	Removal of Sidewalk		\$ -
4	LS	1	Grading (Fine Grading)		\$ -
5	EA	2	Trash Racks		\$ -
6	EA	3	Adjust Storm Sewer Structure Top		\$ -
7	LF	150	12" PVC Storm Sewer Pipe		\$ -
8	EA	4	24" Nyloplast Drain Basin w/ Standard Grate		\$ -
9	LS	1	CMAC Valves and Controls		\$ -
10	LS	1	Electrical Power to Valves and Controls		\$ -
11	LS	1	Fiber Optic Connection		\$ -
12	EA	2	Waterfall/Recirculation Pumps		\$ -
13	EA	2	Waterfall/Recirculation Strainer Baskets		\$ -
14	EA	1	Waterfall/Recirculation 6'x6' Precast Concrete Pump Vault		\$ -
15	LF	26	Waterfall/Recirculation 6" PVC Intake Pipe		\$ -
16	LF	800	Waterfall/Recirculation 3" Flexible PVC Discharge Pipe		\$ -
17	EA	2	Bridge Abutments		\$ -
18	CY	84	Concrete Retaining Wall		\$ -
19	CY	73	Turndown Sidewalk Curb		\$ -
20	CY	30	Rip Rap		\$ -
21	LS	1	Impermeable Clay Liner		\$ -
22	SF	3,183	Paseo Gateway Bike Path		\$ -
23	SF	2,142	Paseo Gateway Sidewalk		\$ -
24	SF	6,307	Concrete Maintenance Path		\$ -
25	SF	301	Concrete Sidewalk		\$ -
26	EA	4	Stairs with Handrails		\$ -
27	LS	1	ADA Ramp with Guard Rails		\$ -
28	LS	1	Pedestrian Bridge (excludes footings)		\$ -
29	EA	2	Bridge Extended Guard Rail + Footing (15' Section)		\$ -
30	SF	230	Grasspave		\$ -
31	LF	678	Decorative Fence		\$ -
32	EA	1	Decorative Gate (Double Leaf)		\$ -
33	EA	1	Weir Wall Stainless Steel Weir		\$ -
34	TON	441	Limestone Retaining Wall Slabs		\$ -
35	TON	1	Pea Gravel Infill at Limestone Wall Edge Along Walk		\$ -
36	EA	20	Overstory Trees		\$ -
37	EA	63	Understory Trees		\$ -
38	EA	12,918	Perennials and Grasses - QT Size		\$ -
39	EA	1,740	Submerged Perennials and Grasses - Plug Size		\$ -
40	CY	282	Mulch		\$ -
41	SY	1,485	Turf		\$ -
42	SF	33,922	Irrigation		\$ -
43	CY	1,568	Planting Soil		\$ -
44	TON	20	Cobble Stone (4"-10" Gray Cobble)		\$ -
45	SSF	350	Weir Wall Veneer		\$ -
46	LF	52	Weir Wall Cap		\$ -
47	LF	46	Landscape Edging		\$ -
48	EA	8	Concrete Lightpole Bases		\$ -

49	EA	8	LS2 Pedestrian Pole - HESS		\$	-
50	LF	1,500	Trenching and Backfilling		\$	-
51	LF	4,500	#10 THHN/ Copper Conductors		\$	-
52	LF	1,500	1" PVC Schedule 40 Conduit		\$	-
ALLOWANCE						
53	LS	1	Allowance		\$	200,000.00
Adjustment Unit Price Extension Subtotal Table A - Base Bid (Add Line Items 1-53)						
<p>THE LUMP SUM ITEMS BELOW SHALL NOT BE ADJUSTED REGARDLESS OF THE FINAL QUANTITY OF THE ADJUSTMENT UNIT PRICE ITEMS LISTED ABOVE. THE CONTRACTOR REMAINS RESPONSIBLE FOR MAINTAINING THE BONDS AND INSURANCE AS NECESSARY TO COVER THE FINAL CONTRACT VALUE AS ADJUSTED USING THE ADJUSTMENT UNIT PRICE ITEMS ABOVE. BID PRICE FOR LUMP SUM ITEMS 54 AND 55 SHALL NOT EXCEED THE LIMITS INDICATED IN THE ITEM DESCRIPTION.</p>						
Item	Unit	Qty.	Item Description	Extension		
54	LS	1	Mobilization (Shall not exceed 3.5% of Table A - Base Bid Adjustment Unit Price Extension Subtotal)			
55	LS	1	Bonds and Insurance (Shall not exceed 1.5% of Table A - Base Bid Adjustment Unit Price Extension Subtotal)			
56	LS	1	Final Completion, Demobilization, Record Drawings, Close-Out (Shall not be less than \$20,000)			
Lump Sum Unit Price Subtotal Table A - Base Bid (Add Line Items 54-56)					\$	-
TOTAL TABLE A - BASE BID (Adjustment Unit Price Extension Subtotal plus Lump Sum Unit Price Subtotal)					\$	-

TABLE B - BID ALTERNATES						
Item	Unit	Qty.	Item Description	Unit Price	Extension	
BID ALTERNATE 1						
57	EA	1	Southern Staircase + Handrails		\$	-
TOTAL - BID ALTERNATE 1					\$	-
BID ALTERNATE 2						
58	TON	49	Limestone Outcroppings at Upper Pond Waters Edge		\$	-
TOTAL - BID ALTERNATE 2					\$	-
BID ALTERNATE 3						
59	CY	31	Dock Foundation Piers		\$	-
60	LS	1	Lower Pond Dock (excludes piers)		\$	-
TOTAL - BID ALTERNATE 3					\$	-

Project Number: 81000975

Project Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU

[illegible]

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

BID BOND

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

Bond Number _____

KNOW ALL MEN BY THESE PRESENTS: That _____ of _____, as Principal, and _____ as Surety, hereby bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents unto KANSAS CITY, MISSOURI, a constitutionally chartered municipal corporation, as Obligee, in the sum of _____ Dollars (\$_____), lawful money of the United States.

WHEREAS, Principal is herewith submitting its Bid to enter into a contract with Kansas City for the above referenced project,

NOW, THEREFORE the condition of this obligation is such that if the Principal is awarded the contract the Principal will, within the time required, enter into a contract and give a good and sufficient surety bonds to secure the performance of the terms and conditions of the contract and for the prompt payment of all labor and material furnished in the prosecution thereof as required by the contract documents, then this obligation shall be void; otherwise the Principal and Surety will immediately pay unto the Obligee the full amount of this bond as liquidated damages for failure to fulfill the conditions of this obligation, but in no event shall the Surety's liability exceed the penal sum hereof.

Signed, sealed and delivered this _____ day of _____.

BIDDER AND PRINCIPAL

Name, address and facsimile number of Bidder and Principal

I hereby certify that I have authority to execute this document on behalf of Bidder and Principal.

By: _____

Title: _____

(Attach corporate seal if applicable)

SURETY

Name, address and facsimile number of Surety:

I hereby certify that (1) I have authority to execute this document on behalf of Surety; (2) Surety has an A.M. Best rating of A- or better; (3) Surety is named in the current list of “Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Circular 570 (most current revision) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury; and (4) Surety is duly licensed to issue bonds in the State of Missouri and in the jurisdiction in which the Project is located.

By: _____

Title: _____

Date: _____

(Attach seal and Power of Attorney)

CREO KC INSTRUCTIONS FOR CONSTRUCTION CONTRACTS

PART A. ECONOMIC EQUITY & INCLUSION GOALS--MBE/WBE PROGRAM

I. City's Economic Equity & Inclusion Goals--MBE/WBE Program.

- A. The City has adopted an Economic Equity & Inclusion Goals--Minority/Women Business Enterprise ("MBE/WBE") Program (Sections 3-421 through 3-469, Code of Ordinances) (the "Program") to implement the City's policy of supporting the fullest possible participation in City contracts and change orders of firms owned and controlled by minorities and women. Each construction contract may have an MBE and/or WBE goal for participation. An MBE or WBE goal is a numerical objective the City has set for the contract that may be awarded pursuant to these bid specifications. Goals are stated as a percentage of contract dollars. For example, if an MBE goal for a contract is 10% and a Bidder submits a bid of \$100,000, the goal for MBE participation would equal \$10,000. The specific MBE/WBE goals on this contract are set forth elsewhere in the bid specifications.
- B. These Civil Rights & Equal Opportunity Department ("CREO KC") Forms & Instructions are part of the BIDDING DOCUMENTS and CONTRACT DOCUMENTS as defined in the General Conditions. By submitting a Bid, the Bidder agrees, as a material term of the contract, to carry out the City's MBE/WBE Program by making good faith efforts to include certified MBE/WBEs in the contract work to the extent of the goals listed for the contract and to the fullest extent consistent with submitting the lowest and best bid to the City. Bidder agrees that the Program is incorporated into this document and agrees to follow the Program. Although it is not a requirement that a Bidder in fact meet or exceed both the MBE and WBE Goals, it is a requirement for approval of the Bid that a Bidder objectively demonstrate to the City that good faith efforts have been made to meet the Goals. Bidders must attempt to meet both the MBE and WBE goals and request a waiver if either is not met.
- C. The following CREO KC Forms are attached and must be used for MBE/WBE submittals:
 1. Contractor Utilization Plan/Request for Waiver (CREO KC Form 8); and
 2. Letter of Intent to Subcontract (CREO KC Form 00450.01); and
 3. Timetable for MBE/WBE Utilization (CREO KC Form 10); and
 4. Request for Modification or Substitution (CREO KC Form 11); and
 5. Contractor Affidavit for Final Payment (Form 01290.14); and
 6. Subcontractor Affidavit for Final Payment (Form 01290.15).

Warning: The City only gives MBE/WBE credit for a Bidder's use of City certified MBE/WBEs. A certified MBE/WBE firm is a firm that has been certified by the City's Civil Rights & Equal Opportunity Department as such. An MBE/WBE firm must be certified before the date on which the contractor utilization plan is due. Certified MBEs and WBEs are listed in the M/W/DBE Kansas City Mo. Online Directory, which is available on the City's website at www.kcmo.org. Before a Bidder submits a bid, Bidder



should contact CREO KC and consult the directory to make sure any firm proposed for use for MBE/WBE participation has been certified.

II. Required Submissions Following Bid Opening.

A. Bidder must submit the following documents within forty-eight (48) hours of bid opening:

1. **Contractor Utilization Plan/Request for Waiver (CREO KC Form 8).** This form states a Bidder's plan to use specific certified MBE/WBEs in the performance of the contract and includes the following:
 - a. The work to be performed by each MBE/WBE and the amounts each is to be paid for the work; and
 - b. The name, address, race or ethnic origin, gender and employer identification number or social security number of each MBE/WBE that will perform the work.
 - c. An automatic request for waiver in the event Bidder has not met or exceeded the MBE and/or WBE goals for the contract but believes that it has made good faith efforts to meet or exceed the goals and desires a waiver of the goals. If a waiver is requested, CREO KC will examine the Bidder's documentation of good faith efforts and make a recommendation to grant or deny the waiver. CREO KC will recommend a waiver be granted only if the Bidder has made good faith efforts to obtain MBE/WBE participation.
2. **Letter(s) of Intent to Subcontract (CREO KC Form 00450.01).** A letter must be provided from each MBE/WBE listed on the Contractor Utilization Plan. These letters verify that the MBE/WBE has agreed to execute a formal agreement for the work and indicate the scope of work to be performed and the price agreed upon for the work.

III. Required Submission when Requested by City.

A. Bidder must submit the following documents when requested by City:

1. **Timetable for MBE/WBE Utilization (CREO KC Form 10).**
2. **Documentation of good faith efforts.**

IV. Required Monthly Submissions during term of Contract.

A. Bidder must submit the following report on a monthly basis if awarded the contract:

1. **M/WBE Monthly Utilization Report.** This report must be submitted to the Director by the 15th of each month. Failure to submit timely reports may result in delays in processing of current and future contract approvals and payment applications. The method of submission of this report is through the B2GNow Diversity Management System (B2GNow).

V. Required Submittals for Final Contract Payment.

A. Contractor must submit the following documents with its request for final payment under

the contract:

1. **Contractor Affidavit for Final Payment (Form 01290.14)**
2. **Subcontractor Affidavit(s) for Final Payment (Form 01290.15)**
3. **Final B2GNow Monthly Contract Audit Report with all payment audits confirmed.**

VI. Additional Submittals.

- A. Contractor may be required to make additional submittals during the term of the Contract, including **Request for Modification or Substitution (CREO KC Form 11)**. Refer to Section IX, Modification of the Contractor Utilization Plan or Substitution of an MBE/WBE, for additional instructions on when this form must be submitted.

VII. MBE/WBE Participation Credit.

- A. The following shall be credited towards achieving the goals:
 1. The total contract dollar amount that a prime contractor has paid or is obligated to pay to a subcontractor that is a certified MBE or WBE, except as otherwise expressly provided for herein.
 2. The total contract dollar amount that a prime contractor that is a certified MBE or WBE performed itself.
 3. Sixty percent (60%) of the total dollar amount paid or to be paid by a prime contractor to obtain supplies or goods from a supplier who is a certified MBE or WBE.
 4. Ten percent (10%) of the total dollar amount paid or to be paid by a prime contractor to obtain supplies or goods from a supply broker who is a certified MBE or WBE.
 5. One hundred percent (100%) of the total dollar amount paid or to be paid by a prime contractor to a manufacturer of construction supplies who is a certified MBE or WBE.
 6. Subcontractor participation with a lower tier MBE/WBE subcontractor using one of the above methods of participation.
- B. **NO CREDIT**, however, will be given for the following:
 1. Participation in a contract by a MBE or WBE that does not perform a commercially useful function as defined by the Program; and
 2. Any portion of the value of the contract that an MBE or WBE subcontractor subcontracts back to the prime contractor or any other contractor who is not a qualified MBE/WBE; and
 3. Materials and supplies used on the contract unless the MBE/WBE is responsible for negotiating the price, determining quality and quantity, ordering the materials and installing (where applicable) and paying for material itself; and
 4. Work performed by an MBE or WBE in a scope of work other than that in which the MBE or WBE is currently certified.



VIII. Methods for Securing Participation of MBE/WBEs and Good Faith Efforts.

- A. A bidder is required to make good faith efforts to achieve the MBE/WBE goals. Good faith efforts are efforts that, given all relevant circumstances, a Bidder actively and aggressively seeking to meet the goals can reasonably be expected to make. Good faith efforts must be made before the Bidder submits a Contractor Utilization Plan, in other words, within 48 hours of bid opening. However, efforts made to increase participation of MBEs and WBEs following submission of the CUP can be considered as evidence of good faith efforts to meet the goals.
- B. In evaluating good faith efforts, the Director of CREO KC will consider whether the Bidder has performed the following, along with any other relevant factors:
 1. Advertised for at least 15 calendar days prior to the bid or proposal due date opportunities to participate in the contract in general circulation media, trade and professional association publications, small and minority business media, and publications of minority and women's business organizations which are included in a list along with their current contact information identified on the directory as the list of publications available to publish such advertisements, which list shall be updated by CREO KC no less than every three (3) month.
 2. Sent written notices at least fifteen (15) calendar days prior to the bid or proposal due date containing the information required in section (9) below, by certified mail, e-mail, or facsimile, to at least 80% of MBEs and WBEs which are included in a list along with their contact information identified on the directory as the list of organizations available to receive such notices, which list shall be updated by CREO KC no less than every three (3) months.
 3. Sent written notices, containing the information required by section (9) below, by certified mail, e-mail or facsimile, to at least 80% of MBEs and WBEs listed on the directory certified in the applicable scopes of work for the particular bid soliciting their participation in the contract at least 15 calendar days prior to the bid or proposal due date.
 4. Attempted to identify portions of the work for qualified MBE and/or WBE participation in order to increase the likelihood of meeting the goals, including breaking down contracts into economically feasible units that take into consideration the capacity of available MBE/WBEs appearing on the CREO KC directory.
 5. At any time prior to submission of the CUP or submittal of a request for modification of a CUP, requested assistance in achieving the goals from the Director and acted on the Director's recommendations.
 6. Conferred with certified MBEs and WBEs which inquired about or responded to the bid solicitation and explained to such MBEs and WBEs the scope and requirements of the work for which their bids or proposals were solicited, and if not all certified MBEs and WBEs in the particular scopes listed on the directory have inquired about or responded to the bid solicitation for each scope of work, then contact by certified mail, e-mail or telephone the greater of ten (10) or 80% of additional certified MBEs and WBEs in the particular scopes of work listed on the directory and offer to confer with such MBEs and WBEs for such particular scope of work and request such MBEs

and WBEs to submit a proposal.

7. Attempted to negotiate in good faith with certified MBEs and WBEs which responded to the bid solicitation or those certified MBEs and WBEs that were conferred with as contemplated in section (6) above, and other qualified MBEs and WBEs, at the option of the bidder, proposer, or contractor, as applicable, to perform specific subcontracts, not rejecting them as unqualified without sound reasons based on a thorough investigation of their capabilities by the bidder, proposer, or contractor; in the event an MBE or WBE is the low bid, but rejected as unqualified, the bidder, proposer, or contractor and the director or board, as applicable, shall provide sound reasons for rejecting such MBE or WBE.
8. Attended pre-bid meeting when such meetings were indicated in the solicitation of bids or otherwise by the bidder, proposer, or contractor, as applicable or by the director provided the director provides written direction to the bidder, proposer, or contractor at the time the goals are recommended.
9. Written notices and advertisements to be provided pursuant to sections (1), (2) and (3) above shall include the following information:
 - a. The bid due date;
 - b. The name of the project;
 - c. The address or general location of the project;
 - d. The location of plans and specifications for viewing;
 - e. Contact information of the prime contractor;
 - f. A general description of the scopes of work that are the subject of the solicitation;
 - g. The goals established for the applicable contract, and if the goals are still subject to board approval, then a statement that the goals as stated are preliminary and are subject to board approval;
 - h. If the project or any portion of the project is subject to prevailing wage then a statement that all or a portion of the project will be subject to prevailing wage, as applicable; and if only a portion of the scopes are subject to prevailing wage, then identification of such scopes provided that such scopes are known as of the time of bid solicitation;
 - i. The date and time of any pre-bid meeting(s), if any, which have been scheduled by the bidder, proposer, contractor or developer as of the bid solicitation; and

Any other information deemed relevant by the bidder, proposer, contractor or developer, as applicable, or the director to the extent the director provides written direction to the bidder, proposer, contractor or developer of such additional information at the time the goals are recommended by the director. 8. Within five (5) working days after drawing the bid specifications, sent certified letters, verifiable e-mails or proof of facsimiles to certified MBEs and WBEs listed in the M/W/DBE Kansas City Mo. Online Directory.

- C. A Bidder may be required to give the City documentation to prove that it made good faith efforts. The Bidder will be contacted by the City with further instructions about when this documentation must be submitted.

IX. Modification of the Contractor Utilization Plan or Substitution of an MBE/WBE.

- A. After bid opening, a Bidder or Contractor may need to substitute an MBE and/or WBE or request that the amount of MBE/WBE participation listed in its Contractor Utilization Plan be modified. Bidder or Contractor must file a **Request for Modification or Substitution (CREO KC Form 11) prior to actual substitution and within a reasonable time after learning that a modification or substitution is necessary.** The Director may approve substitutions or modifications and upon approval, the modifications and substitutions will become an amendment to the Contractor Utilization Plan. Modifications or substitutions may be approved when:
 - 1. The Director finds that the Bidder or Contractor made and provided evidence of good faith efforts to substitute the MBE/WBE listed on the Contractor Utilization Plan with other certified MBE/WBEs for the scope of work or any other scope of work in the contract; and
 - 2. The Bidder or Contractor has not attempted intentionally to evade the requirements of the program and it is in the best interests of the City to allow a modification or substitution; and
 - 3. The Director also finds one of the following:
 - a. The listed MBE/WBE is non-responsive or cannot perform; or
 - b. The listed MBE/WBE has increased its previously quoted price to the bidder, proposer or contractor without a corresponding change in the scope of the work; or
 - c. The listed MBE/WBE has committed a material default or breach of its contract with the contractor; or
 - d. Requirements of the scope of work of the contract have changed and render subcontracting not feasible or not feasible at the levels required by the goals established for the contract; or
 - e. The listed MBE/WBE is unacceptable to the contracting department; or
 - f. The listed MBE/WBE thereafter had its certification revoked; or
- B. A modification shall not be made unless the modification or substitution has first been requested and approved by the Director. Once a modification has been made, a Construction Contractor Employee Identification Report (CREO KC Form 0485.04) for the newly approved subcontractor must be submitted at least ten (10) days prior to the approved subcontractor commencing work on a City contract.

X. Appeals.

- A. In conformance with the Act, appeals may be made to the City Fairness in Construction Board or Fairness in Professional Services and Goods Board on the following:

1. The grant or denial of a Request for Waiver;
 2. Substitution for an MBE/WBE listed on a Contractor Utilization Plan;
 3. Modification of the percentage of MBE/WBE participation on a Contractor Utilization Plan;
 4. Liquidated Damages;
 5. The amount of MBE/WBE credit the Contractor may receive for MBE/WBE participation identified in the contractor utilization plan.
- B. Any appeal must be filed in writing with the Director within fifteen (15) calendar days of notice of the determination. Mailing, faxing, personal delivery or posting at CREO KC of determinations shall constitute notice. The appeal shall state with specificity why the Bidder or Contractor believes the determination is incorrect
- C. Failure to file a timely appeal shall constitute a waiver of a Bidder's or Contractor's right to appeal such determination and such person shall be estopped to deny the validity of any determination which could have been timely appealed.

XI. Access to Documents and Records.

- A. By submitting a Bid, each Bidder agrees to permit the City, its duly authorized agents or employees, access at all reasonable times to all books and business records of Bidder as may be necessary to ascertain compliance with the requirements of this document and the Act, within ten (10) calendar days of the date of the written request.
- B. All Bidders agree to cooperate with the contracting department and CREO KC in studies and surveys regarding the MBE/WBE program.

XII. Miscellaneous.

- A. A Bidder or Contractor shall bear the burden of proof with regard to all issues on appeal.
- B. In the event of any conflict between this document and the Program, the provisions of the Program shall control. The terms used in this document are defined in the Program.
- C. Oral representations are not binding on the City.
- D. The City Council may waive the requirements of this document and the Program and award the contract to the lowest and best bidder if the City Council determines a waiver is in the best interests of the City.
- E. The Director may grant extensions of time to Bidders to submit Letters of Intent to Subcontract (CREO KC Form 00450.01).

XIII. Liquidated Damages – Economic Equity & Inclusion Goals--MBE/WBE Program.

- A. If Contractor fails to achieve the MBE/WBE goals stated in its Contractor Utilization Plan, as amended, the City will sustain damages, the exact extent of which would be difficult or impossible to ascertain. Therefore, in order to liquidate those damages, the monetary difference between either (1) the amount of the MBE/WBE goals set forth in the Contractor Utilization Plan, as amended, or (2) the goals established (whichever is lower) and the amount actually paid to qualified MBEs and WBEs for performing a commercially useful function will be deducted from the Contractor's payments as

liquidated damages. In determining the amount actually paid to qualified MBEs and WBEs, no credit will be given for the portion of participation that was not approved by the Director, unless the Director determines that the Contractor acted in good faith. No deduction for liquidated damages will be made when, for reasons beyond the control of the Contractor, the MBE/WBE participation stated in the Contractor Utilization Plan, as amended and approved by the Director is not met.

PART B. CONSTRUCTION EMPLOYMENT PROGRAM REQUIREMENTS

IMPORTANT: This Part B is applicable to City construction contracts estimated by the City prior to solicitation as: (1) requiring more than 800 construction labor hours and (2) valued in excess of \$300,000.00. This program is distinguished from the M/WBE Program in that it is based on workforce hours of the Bidder and *all* its participating subcontractors rather than the actual contract value of work. The instructions herein detail the specifics related to this program. This program is in *addition* to the M/WBE program.

I. City's Construction Employment Program.

- A. The City has adopted a Construction Employment Program (Sections 3-501 through 3-525, Code of Ordinances) (the "Workforce Program" or "Program") to implement the City's policy of supporting the fullest possible utilization of minority and women workers in the construction industry.
- B. The minimum workforce goals are currently set by ordinance at 10% for minorities and 2% for women. These goals are separate from M/WBE goals. Public recognition may be provided if the bidder achieves at least twice the minimum participation.
- C. Construction contracts subject to the Workforce Program and the company-wide and project-specific workforce goals ("workforce goals") are those contracts to construct, reconstruct, improve, enlarge or alter any fixed work that is estimated by the City prior to solicitation to: (1) require more than 800 construction labor hours, (2) has estimated costs that exceed \$300,000.00, and (3) involve the expenditure of public funds.
- D. The successful bidder may meet company-wide goals by counting the bidder's utilization of minorities and women throughout the Kansas City metropolitan statistical area. In addition, the successful Bidder is responsible to ensure that it and its subcontractors cumulatively make good faith efforts to meet project-specific goals for utilization of minorities and women.
- E. These Civil Rights & Equal Opportunity Department ("CREO KC") Forms & Instructions are part of the BIDDING DOCUMENTS and CONTRACT DOCUMENTS as defined in the General Conditions. By submitting a Bid, the Bidder agrees, as a material term of the contract, to carry out the City's Construction Employment Program by making good faith efforts to utilize minority and women workers to the fullest extent consistent with submitting the lowest and best bid to the City. Bidder agrees that the Program is incorporated into this document and agrees to follow the Program. Although it is not a requirement that a Bidder in fact meet or exceed the construction employment goals to receive approval from CREO KC, a Bidder not doing so is required to



objectively demonstrate to CREO KC that good faith efforts have been made.

F. The following reports are to be used for Construction Employment Program submittals:

1. Project Workforce Monthly Report
2. Company-Wide Workforce Monthly Report

II. Required Submissions.

A. Within forty-eight (48) hours after bid opening, the construction contractor shall submit the **Construction Employee Identification Report** (CREO KC Form 00485.04) and shall include: the name, home address, job title, sex and race/ethnicity of each person working for the Prime. The individuals to be listed on the form are those which the construction contractor *anticipates* will be performing construction labor hours creditable towards the minimum workforce goals applicable to the construction contractor individually.

The following circumstances also require the submission of a Construction Employee Identification Report:

- a. Prior to contract execution for those City construction contracts awarded pursuant to a request for proposals (RFP), the construction contractor shall submit a **Construction Employee Identification Report** (CREO KC Form 00485.04).
 - b. At least ten (10) days prior to the date upon which any subcontractor is to commence work under a City construction contract, the Prime shall submit a **Construction Employee Identification Report** (CREO KC Form 00485.04) for the subcontractor.
- B. The CREO KC Director has established the B2GNow Diversity Management System (“B2GNOW”) (an online reporting tool) as the preferred method for fulfilling reporting requirements of the Workforce Program. The CREO KC Director will allow paper submission in lieu of on-line submission if the on-line submission process presents a hardship to the contractor.
- C. Bidder must submit the following documents through B2GNow on a monthly basis if awarded the contract:
1. **Project Workforce Monthly Report.** This report is contract specific. This report must be submitted to the Director by the 15th of each month for the Contractor and each subcontractor. It will be utilized to report the Contractor’s own workforce compliance data with regard to the City’s construction contract. Failure to submit timely reports may result in delays in processing of current and future contract approvals and payment applications.
 2. **Company-Wide Workforce Monthly Report.** This report is not contract specific; it is used to report on the utilization of women and minorities, by trade, company-wide. This report must be submitted to the Director by the 15th of each month. It will be utilized to report the Contractor’s own workforce compliance data with regard to



every contract (both privately and publicly funded) that the Contractor has in progress throughout the Kansas City Metropolitan Statistical Area. Failure to submit timely reports may result in delays in processing of current and future contract approvals and payment applications.

III. Submittal Required for Final Contract Payment.

- A. The final Project Workforce Monthly Report(s) and Company-Wide Workforce Monthly Report must be submitted before final payment will be made and/or retainage released. Contractor shall note the submittal of the final reports by notation in the box entitled “Final Report”

IV. Methods for Securing Workforce Participation and Good Faith Efforts.

- A. A bidder is required to make good faith efforts to achieve the construction employment goals and ensure its subcontractors are making good faith efforts to achieve the construction employment goals. If a Bidder or its subcontractors will be unable to secure enough minority and female participation to meet or exceed the construction employment goals, a bidder must, within a reasonable time after so learning, request a waiver or modification of the goals by the Director of CREO KC. The Director will request evidence of the Bidder’s and its’ subcontractors’ good faith efforts to meet the goals. The Director will examine the Bidder’s request and the Bidder’s documentation of good faith efforts for itself and its subcontractors. The Director will examine the Bidder’s request and the Bidder’s documentation of good faith efforts and grant or deny a waiver or modification. The Director will grant a waiver or modification only if the Bidder has made good faith efforts to secure minority and female participation.

IMPORTANT: The Bidder’s subcontractors on a city construction contract must meet the workforce goals collectively. The bidder is responsible to ensure the subcontractors make good faith efforts to meet the workforce goals. Bidders are required to include language in its subcontracts that ensure the subcontractors make good faith efforts to meet or exceed the workforce goals.

- B. In evaluating good faith efforts, the Director will consider whether the Bidder and its subcontractors have performed the following:
 - 1. For those bidders that are not signatories to a collective bargaining agreement with organized labor:
 - a. Requested in writing the assistance of the Director with respect to efforts to promote the utilization of minorities and women in the workforce and acted upon the Director’s recommendations; and
 - b. Advertised in minority or women trade association newsletters and/or minority or women owned media at least 15 calendar days prior to the utilization of any construction services on the city construction contract and used terminology that sufficiently describes the work available, the pay scale, the application process, and anything else that one might reasonably be expected to be informed of relevant to the position being advertised; and
 - c. Maintained copies of each advertisement and a log identifying the publication and date of publication; and

- d. Conducted real and substantial recruitment efforts, both oral and written, targeting resident, minority and women community-based organization, schools with a significant minority student population, and training organizations serving the recruitment area; and
 - e. Established and maintained a current list of resident, minority and women recruitment sources, providing written notification to the recruitment sources of available employment opportunities, and maintained records of the notices submitted to the organizations and any responses thereto; and
 - f. Maintained a current file for the time period of the city construction contract with the name, address, and telephone number of each resident, minority and woman job applicant, the source of the referral, whether or not the person was hired, and in the event that the applicant was not hired, the reason therefore; and
 - g. Promoted the retention of minorities and women in its workforce with the goals of achieving sufficient annual hours for minorities and women to qualify for applicable benefits; and
 - h. Required by written contract that all subcontractors comply with the above efforts.
2. For those bidders that are signatories to collective bargaining agreements with organized labor:
- a. Requested in writing from each labor union representing crafts to be employed that:
 - i. the labor union make efforts to promote the utilization of residents of the City, minorities and women in the workforce; and
 - ii. the labor union identify any residents of the City, minorities and women in its membership eligible for employment; and
 - b. Collaborated with labor unions in promoting mentoring programs for journeypersons intended to assist minorities and women in increasing retention with the goals of achieving sufficient annual hours to qualify for applicable benefits; and
 - c. Maintained a current file with the name, address, and telephone number of each resident, minority and women worker identified by the labor union, whether or not the person was hired, and in the event the person was not hired, the reason therefore.
 - d. To the extent the good-faith efforts applicable to bidders that are signatories to collective bargaining agreements with organized labor conflict with the procedures implemented by the bidder in order to comply with the relevant bargaining agreement, the bidder shall substitute other procedures as may be approved by the Director in writing, in order to accomplish the purpose and intent of this section.

C. In the event workforce goals are not met or there is anticipation that goals will not be

met, a Bidder will be required to give the City documentation to prove that it and/or its subcontractors made good faith efforts. The Bidder will be contacted by the City with further instructions about when this documentation must be submitted.

V. Access to Documents and Records.

- A. By submitting a Bid, each Bidder agrees to permit the City, its duly authorized agents or employees, access at all reasonable times to all books and business records of Bidder as may be necessary to ascertain compliance with the requirements of this document and the Program, within ten (10) days of the date of the written request. Each bidder further agrees to require, if awarded the contract, that every subcontractor permit the City the same access to documents and records.
- B. All Bidders agree to cooperate with the contracting department and CREO KC in studies and surveys regarding the construction employment program.

VI. Appeals.

- A. In conformance with the Program, appeals may be made to the Construction Workforce Board on the following:
 - 1. Determinations by the Director that a contractor did not meet the construction employment goals and did not make a good faith effort to meet the goals;
 - 2. Recommendations by the Director to assess liquidated damages;
 - 3. Recommendation by the Director that a contractor be declared ineligible to receive any city construction contract for a period of time up to one year.
- B. Any appeal must be filed in writing with the Director within ten (10) working days of notice of the recommendation or determination. The appeal shall state with specificity why the Bidder or Contractor believes the recommendation or determination is incorrect.
- C. Failure to file a timely appeal shall constitute a waiver of a Bidder's or Contractor's right to appeal such determination or recommendation and such person shall be estopped to deny the validity of any order, determination, recommendation or action of CREO KC which could have been timely appealed.

VII. Miscellaneous.

- A. A Bidder or Contractor shall bear the burden of proof with regard to all issues on appeal.
- B. The successful bidder may be required to meet with the Director of CREO KC or the Director's designee for the purpose of discussing the construction employment program, the bidder's efforts to realize the goals, and any other problems and/or issues affecting the realization of the goals or the program in general.
- C. In the event of any conflict between this document and the Program, the provisions of the Program shall control. The terms used in this document are defined in the Program.
- D. Oral representations are not binding on the City.

VIII. Failure to Meet Workforce Goals

- A. If Contractor or its subcontractors fail to achieve the construction employment goals or make good faith efforts to achieve those goals without having previously obtained a



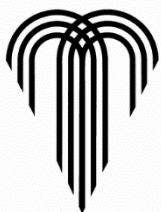
waiver or modification of those goals, the City will sustain damages, the exact extent of which would be difficult or impossible to ascertain. These damages are magnified if the failure to abide by the requirements of the Workforce Program is recurring. Therefore, if the directory finds that the contractor or subcontractor have not met, or made good faith efforts to meet, the construction employment goals for any quarter, the director may:

1. Assess liquidated damages against the construction contractor, as specified in the city construction contract;
2. Require the contractor to attend mandatory training, as specified in the construction contract;
3. Declare the contractor ineligible to receive any city construction contract or participate as a subcontractor under any city construction contract for a period of time up to six months, as specified in the construction contract.

IX. First Source Program

- A. The City has established a labor force recruiting program intended to assist contractors in identifying, interviewing and hiring qualified job applicants residing in Kansas City, Missouri. While the contractor awarded a City construction contract is not prohibited from hiring persons residing outside Kansas City, Missouri, the recruiting resource provided for herein (the “First Source Program”) must be utilized by the contractor subject to the construction employment goals as set forth in this **PART B, CONSTRUCTION EMPLOYMENT PROGRAM REQUIREMENTS**.
- B. The City utilizes the services of the Full Employment Council, Inc., to administer the First Source Program. The contractor shall contact the Full Employment Council within 48 hours of contract award, regardless of whether the contractor has any hiring needs at that time, and within 48 hours following any job vacancy which the contractor reasonably anticipates filling during the term of the City construction contract. The contractor shall comply with the First Source Program requirements as implemented by the Full Employment Council unless otherwise excused in writing by the Director of CREO KC for good cause shown. To ensure compliance with the First Source Program, the contractor shall contact those persons at the Full Employment Council responsible for administering the program, which may be identified by visiting their website at www.feckc.org and clicking on the link for KCMO First Source Hiring Program. The contractor shall not hire any individual to provide construction services on a City construction contract unless the contractor has met the requirements of the First Source Program.
- C. The contractor shall require that its subcontractors utilize the First Source Program to the same extent that the contractor is required to do so, and shall incorporate the requirements of this Section IX into every subcontract. Every subcontractor shall be required to contact the Full Employment Council within 48 hours of subcontract award, regardless of whether the subcontractor has any hiring needs at that time, and within 48 hours following any job vacancy which the subcontractor reasonably anticipates filling during the term of their subcontract on a City construction project.



CITY OF FOUNTAINS
HEART OF THE NATIONKANSAS CITY
MISSOURI**CONTRACTOR UTILIZATION PLAN/REQUEST FOR WAIVER**

Project Number _____

Project Title _____

(Department Project)_____
Department_____
(Bidder/Proposer)

STATE OF _____)

) ss

COUNTY OF _____)

I, _____, of lawful age and upon my oath state as follows:

1. This Affidavit is made for the purpose of complying with the provisions of the MBE/WBE submittal requirements on the above project and the MBE/WBE Program and is given on behalf of the Bidder/Proposer listed below. It sets out the Bidder/Proposer's plan to utilize MBE and/or WBE contractors on the project.
2. The project target goals are _____% MBE and _____% WBE.
3. Bidder/Proposer assures that it will utilize a minimum of the following percentages of MBE/WBE participation in the above project:

BIDDER/PROPOSER PARTICIPATION: _____% MBE _____% WBE

POST-BID/POST-RFP ESTIMATED BUDGET: \$ _____

4. The following are the M/WBE subcontractors whose utilization Bidder/Proposer warrants will meet or exceed the above-listed Bidder/Proposer Participation. Bidder/Proposer warrants that it will utilize the M/WBE subcontractors to provide the goods/services described in the applicable Letter(s) of Intent to Subcontract, copies of which shall collectively be deemed incorporated herein). (*All firms must currently be certified by Kansas City, Missouri*)

Name of M/WBE Firm _____

Address _____

Telephone No. _____

I.R.S. No. _____



Name of M/WBE Firm _____
 Address _____
 Telephone No. _____
 I.R.S. No. _____

Name of M/WBE Firm _____
 Address _____
 Telephone No. _____
 I.R.S. No. _____

Name of M/WBE Firm _____
 Address _____
 Telephone No. _____
 I.R.S. No. _____

Name of M/WBE Firm _____
 Address _____
 Telephone No. _____
 I.R.S. No. _____

Name of M/WBE Firm _____
 Address _____
 Telephone No. _____
 I.R.S. No. _____

(List additional M/WBEs, if any, on additional page and attach to this form)

4. The following is a breakdown of the percentage of the total contract amount that Bidder/Proposer agrees to pay to each listed M/WBE:

MBE/WBE BREAKDOWN SHEET

MBE FIRMS:

Name of MBE Firm	Supplier/Broker/Contractor	Subcontract Amount*	Weighted Value**	% of Total Contract
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____



TOTAL MBE \$ / TOTAL MBE %: \$ _____ %

WBE FIRMS:

Name of WBE Firm	Supplier/Broker/Contractor	Subcontract Amount*	Weighted Value**	% of Total Contract
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
TOTAL WBE \$ / TOTAL WBE %:		\$ _____		_____ %

*“Subcontract Amount” refers to the dollar amount that Bidder/Proposer has agreed to pay each M/WBE subcontractor as of the date of contracting and is indicated here solely for the purpose of calculating the percentage that this sum represents in proportion to the total contract amount. Any contract amendments and/or change orders changing the total contract amount may alter the amount due an M/WBE under their subcontract for purposes of meeting or exceeding the Bidder/Proposer participation.

**“Weighted Value” means the portion of the subcontract amount that will be credited towards meeting the Bidder/Proposer participation. See CREO KC Forms and Instructions for allowable credit and special instructions for suppliers.

- Bidder/Proposer acknowledges that the monetary amount to be paid each listed M/WBE for their work, and which is approved herein, is an amount corresponding to the percentage of the total contract amount allocable to each listed M/WBE as calculated in the MBE/WBE Breakdown Sheet. Bidder/Proposer further acknowledges that this amount may be higher than the subcontract amount listed therein as change orders and/or amendments changing the total contract amount may correspondingly increase the amount of compensation due an M/WBE for purposes of meeting or exceeding the Bidder/Proposer participation



6. Bidder/Proposer acknowledges that it is responsible for considering the effect that any change orders and/or amendments changing the total contract amount may have on its ability to meet or exceed the Bidder/Proposer participation. Bidder/Proposer further acknowledges that it is responsible for submitting a Request for Modification or Substitution if it will be unable to meet or exceed the Bidder/Proposer participation set forth herein.
7. If Bidder/Proposer has not achieved both the M/WBE goal(s) set for this Project, Bidder/Proposer hereby requests a waiver of the MBE and/or WBE goal(s) that Bidder/Proposer has failed to achieve
8. Bidder/Proposer will present documentation of its good faith efforts, a narrative summary detailing its efforts and the reasons its efforts were unsuccessful when requested by the City.
9. I hereby certify that I am authorized to make this Affidavit on behalf of the Bidder/Proposer named below and who shall abide by the terms set forth herein:

Bidder/Proposer primary contact: _____

Address: _____

Phone Number: _____

Facsimile number: _____

E-mail Address: _____

By: _____

Title: _____

Date: _____

(Attach corporate seal if applicable)

Subscribed and sworn to before me this _____ day of _____, 20____.

My Commission Expires: _____

Notary Public



LETTER OF INTENT TO SUBCONTRACT

Bid #2

Check one:

Original LOI: ☐

Updated LOI: ☐

Project Name/Title _____

Project Location/Number _____

PART I: Prime Contractor _____ agrees to enter into a contractual agreement with M/W/DBE Subcontractor _____ who will provide the following goods/services in connection with the above-reference contract: [Insert a brief narrative describing goods/services to be provided. Broad Categorizations (e.g., "electrical," "plumbing," etc.) or the listing of NAICS Codes in which M/W/DBE Subcontractor is certified are insufficient and may result in denial of this Letter of Intent to Subcontract.]

for an estimated amount of \$ _____ (or _____ % of the total estimated contract value.)

M/WBE Vendor type: ☐ Subcontractor/manufacturer (counts as 100% of contract value towards goals)
☐ Supplier (counts as 60% of the total dollar amount paid or to be paid by a prime contractor for supplies or goods towards goals)
☐ Broker (counts as 10% of the total dollar amount paid or to be paid by a prime contractor for supplies or goods towards goals)

M/W/DBE Subcontractor is, to the best of Prime Contractor's knowledge, currently certified with the City of Kansas City's Civil Rights & Equal Opportunity Department to perform in the capacities indicated herein. Prime Contractor agrees to utilize M/W/DBE Subcontractor in the capacities indicated herein, and M/W/DBE Subcontractor agrees to work on the above-referenced contract in the capacities indicated herein, contingent upon award of the contract to Prime Contractor.

PART 2: This section is to be completed by the M/W/DBE subcontractor listed above. Please attach additional sheets as needed for more than one intended sub-tier contract. **IMPORTANT: Falsification of this document will result in denial and other remedies available under City Code.**

Select one: ☐ The M/W/DBE Subcontractor listed above **IS NOT** subcontracting any portions of the above-stated scope of work(s). (Continue to Part 3.)
☐ The M/W/DBE Subcontractor listed above **IS** subcontracting certain portions of the above stated scope of work(s) to:

(1) Company name: _____

Full address: _____

Street number and name

City, State and Zip Code

Primary contact: _____

Name

Phone

a) This subcontractor is (select one): MBE WBE DBE N/A

i: If this subcontractor is an M/W/DBE certified with the City of Kansas City, Missouri, a separate Letter of Intent must be attached to this document.

ii. If this subcontractor is NOT a certified M/W/DBE certified with the City of Kansas City, Missouri, the firm must still be listed for reporting purposes but a Letter of Intent is not required.

b) Scope of work to be performed: _____

c) The dollar value of this agreement is: _____



PART 3:

Bid #2

**NOTE: SIGNATURES AND NOTARIZATIONS REQUIRED FOR NEW LETTERS OF INTENT (LOI);
SIGNATURES ONLY FOR UPDATED LOI (ADDING VALUE TO EXISTING CONTRACT).**

PRIME CONTRACTOR BUSINESS NAME: _____

Signature: Prime Contractor

Print Name

Title

Date

State of _____)

County of _____)

I, _____, state that the above and foregoing is based on my best knowledge and belief.

Subscribed and sworn to before me, a notary public, on this
day of _____, 20____

My Commission Expires: _____

Notary Public

STAMP:

MWDBE SUBCONTRACTOR BUSINESS NAME: _____

Signature: Subcontractor

Print Name

Title

Date

State of _____)

County of _____)

I, _____, state that the above and foregoing is based on my best knowledge and belief.

Subscribed and sworn to before me, a notary public, on this
day of _____, 20____

My Commission Expires: _____

Notary Public

STAMP:



TIMETABLE FOR MBE/WBE UTILIZATION

(This form should be submitted to the City after contract award.)

I, _____, acting in my capacity as _____
(Name) (Position with Firm)
of _____, with the submittal of this Timetable, certify that
(Name of Firm)
the following timetable for MBE/WBE utilization in the fulfillment of this contract is correct and true to the best of my knowledge.

ALLOTTED TIME FOR THE COMPLETION OF THIS CONTRACT

(Check one only)

15 days	_____	75 days	_____	135 days	_____
30 days	_____	90 days	_____	150 days	_____
45 days	_____	105 days	_____	165 days	_____
60 days	_____	120 days	_____	180 days	_____
Other	_____ (Specify)				

Throughout _____ Beginning 1/3 _____
Middle 1/3 _____ Final 1/3 _____
Beginning 1/3 _____% Middle 1/3 _____% Final 1/3 _____%

PLEASE NOTE: Any changes in this timetable require approval of the Civil Rights & Equal Opportunity Department in advance of the change.

If you have any questions regarding the completion of this form, please contact the Civil Rights & Equal Opportunity Department at: (816) 513-1836.

(Signature)

(Position with Firm)

(Date)



*(This Form **must** be submitted to CREO KC to request substitutions for an MBE/WBE listed in the Contractor Utilization Plan or for modification of the amount of MBE/WBE participation listed in the Contractor Utilization Plan. This Form shall be an amendment to the Contractor Utilization Plan.)*

AMENDMENT/CHANGE ORDER NO: (if applicable)

Project Goals:	_____ % MBE	_____ % WBE
Contractor Utilization Plan:	_____ % MBE	_____ % WBE

3. Bidder/Contractor/Proposer states that a substitution or modification is necessary because: (check applicable reason(s))

- ___The MBE/WBE listed on the Contractor Utilization Plan is non-responsive or cannot perform.
- ___The MBE/WBE listed on the Contractor Utilization Plan has increased its previously quoted price without a corresponding change in the scope of work.
- ___The MBE/WBE listed on the Contractor Utilization Plan has committed a material default or breach of its contract.
- ___Requirements of the scope of work of the contract have changed and make subcontracting not feasible or not feasible at the levels required by the goals established for the contract.
- ___The MBE/WBE listed on the Contractor Utilization Plan is unacceptable to the City contracting department.
- ___Bidder/Contractor/Proposer has not attempted intentionally to evade the requirements of the Act and it is in the best interests of the City to allow a modification or substitution.
4. The following is a narrative summary of the Bidder's/Contractor's/Proposer's good faith efforts exhausted in attempts to substitute the MBE/WBE firm named above which is currently listed on the Contractor Utilization Plan with other qualified, certified MBE/WBE firms for the listed scope of work or any other scope of work in the project:
5. Bidder/Proposer/Contractor will present documentation when requested by the City to evidence its good faith efforts.

Dated:_____

(Bidder/Proposer/Contractor)

By: _____
(Authorized Representative)



CREO KC MONTHLY REPORTING INSTRUCTIONS

M/WBE Monthly Utilization Report Instructions

1. MBE/WBE Reporting applies to Contracts that have approved MBE/WBE goals assigned.
2. The City will utilize a web-based MBE/WBE Reporting System in the administration of this Contract. This web-based application database is a collaboration tool selected and provided by the City, which will allow Contractors and Consultants/Subcontractors and Subconsultants to enter data and report on compliance.

Prevailing Wage Certified Payroll Report Instructions

1. Prevailing Wage Certified Payroll Report applies to Contracts that include Prevailing Wage or Davis Bacon Provisions.
2. This web-based application database is provided by the City for reporting certified payrolls and other related prevailing wage data.
3. Computer Requirements: Minimum Intel Pentium® 4 Processor 2.4 GHz or equivalent processor with 512MB of RAM; recommended Centrino Duo® Processors 1.6 GHz or equivalent with 2GB of RAM, or higher.
 - a. Computer Operation System: Windows XP, Windows Vista, or Windows 7
 - b. Web Browser: Google Chrome
 - c. Connection Speed/Minimum Bandwidth: DSL, ADSL or T1 Line for transferring a minimum of 3 Mbps Downstream and 512 Kbps Upstream
4. City will assist Contractor in providing training of personnel and Subcontractor's personnel.
5. Contractor and Subcontractors shall have the responsibility for visiting the web site and entering data in on timely basis, and as necessary to be in compliance with Prevailing Wage Requirements included in their contracts.

Workforce Monthly Report Instructions

1. Workforce Monthly Reporting only applies to Construction Contracts greater than \$300,000 and greater than 800 projected labor hours.
2. The City will utilize a web-based Reporting System in the administration of this Contract. This web-based application database is a collaboration tool selected and provided by the City, which will allow Contractors and Subcontractors to enter data and report on Workforce compliance.



**AFFIDAVIT OF TRAINING PROGRAM***This form must be submitted with 48 hours of Bid Opening*

Bidder _____

Project Title and Number _____

STATE OF MISSOURI)

) ss:

COUNTY OF _____)

After being duly sworn the person whose name and signature appears below hereby states under penalty of perjury that:

1. I am the duly authorized officer of the business indicated above ("Bidder") and I make this affidavit on behalf of Bidder.
2. Bidder certifies that it presently participates in a training program that facilitates entry into the construction industry and which may include an on-the-job or in-house training program, further described as follows:

(attach additional pages, if necessary)

3. If requested by the City, Bidder agrees to provide City further documentation of, or other information about, this training program within 48 hours of the request.
4. Bidder acknowledges that failure to submit this form to the City within 48 hours of the Bid Opening will automatically render its bid non-responsive.

I am authorized to make this Affidavit on behalf of the Bidder named below as:

_____ of _____
(Title) (Name of Bidder)

Dated: _____ By: _____
(Affiant)

Subscribed and sworn to before me this _____ day of _____, 20____.

My Commission Expires: _____
Notary Public



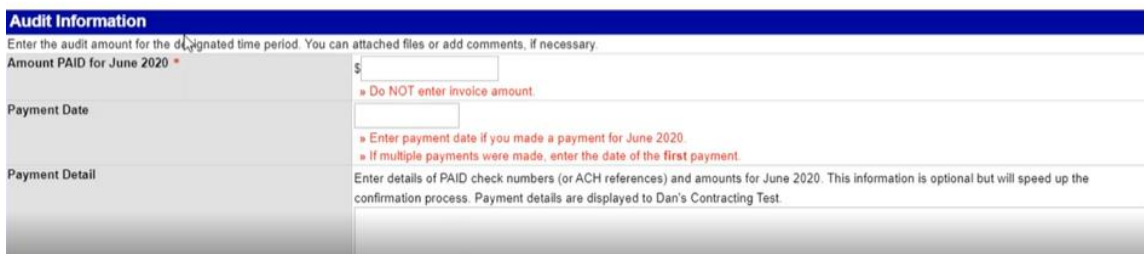
Contract Central

M/WBE Monthly Compliance Audit Online Reporting Instructions

PRIME INSTRUCTIONS:

The Prime's responsibility is to report payments made to subcontractors for the prior month.

1. Log into B2GNow Diversity Management System (B2GNow)
2. On the Dashboard, click Contract Audits.
3. Select the specific audit that needs to be completed. Any and all money that changed hands during the month of the audit must be reported to the specific audit month.
4. To complete audit select Report 1 Subcontractor Payment. Under the actions column, select Submit Response for the specific subcontractor that needs reporting or select the Submit ALL Incomplete Records button to go to all the subcontractors to report amounts. Under the audit information answer the following questions:

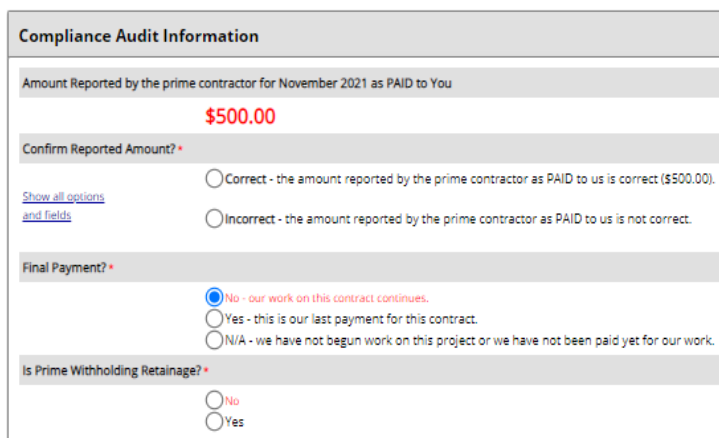


Once information has been entered, select review and save. Complete same steps for all subcontractors. If there were subcontractors that did not receive a payment for the specific audit month, click the Mark Remaining Subcontractors as Zero button to mark remaining subcontractors as 0.

SUBCONTRACTOR INSTRUCTIONS:

The responsibility of the Subcontractor is to confirm payment received for specific audit month.

1. Log in to B2GNow Diversity Management System (B2GNow)
2. On the Dashboard, select Contract Audits.
3. Select the specific audit that needs to be completed.
4. To complete audit, select Confirm Payment Received. There will be two options: correct or incorrect. Select correct if payment was in fact received OR if payment was not received or amount was different select incorrect. Answer all questions and select save to complete.



NOTE: Complete one M/WBE report per project.

An email notice will be sent from our organization monthly to notify Prime & Subcontractor users of incomplete audits.



Project Specific Monthly Report

Human Relations Department - City of Kansas City Missouri

Report Date:		Reporting Period:		Project Description:										
Project Name:		Contractor:		Contract Awarded Date:										
City Project Number:		Contractor Address:		City Contract Number:										
Project Address:				City Vendor ID:										
		Contact Person/Phone:			Contractor Report	<input type="checkbox"/>	Subcontractor Report	<input type="checkbox"/>						
E-mail Address:					Final Cumulative Report: <input type="checkbox"/> Yes <input type="checkbox"/> No									
Report the total monthly hours of work performed by all workers on the City Construction Contract. Enter the total hours on all lines and in all columns. Reported workforce hours should be based on payroll records.														
JOB CATEGORIES	OVERALL TOTAL (Sum of all Columns, A thru F Male & Female)	A Total Hours White Employees		B Total Hours Black Employees		C Total Hours Hispanic Employees		D Total Hours Asian/Pacific Islander		E Total Hours Native American Employee		F Total Hours Other/Unknown Race Employee		G KCMO Resident Hours
		M	F	M	F	M	F	M	F	M	F	M	F	Total #
Foreman/Supervisor														
Asbestos Worker														
Journeyman														
Asbestos Worker														
Apprentice														
Boilermaker Journeyman														
Boilermaker Apprentice														
Bricklayer Journeyman														
Bricklayer Apprentice														
Carpenter Journeyman														
Carpenter Apprentice														
Cement Mason														
Journeyman														
Cement Mason														
Apprentice														
Electrician Journeyman														
Electrician Apprentice														
Elevator Constructor														
Journeyman														
Elevator Constructor														
Apprentice														
Glazier Journeyman														
Glazier Apprentice														
Iron Worker Journeyman														
Iron Worker Apprentice														
Laborer Journeyman														
Laborer Apprentice														
Operating Engineer														
Journeyman														
Operating Engineer														
Apprentice														
Painter Journeyman														
Painter Apprentice														
Pipe Fitter/Plumber														
Journeyman														
Pipe Fitter/Plumber														
Apprentice														
Plasterer Journeyman														
Plasterer Apprentice														
Roofer Journeyman														
Roofer Apprentice														
Sheet Metal Journeyman														
Sheet Metal Apprentice														
Sprinkler Fitter														
Sprinkler Fitter Apprentice														
Truck Driver Journeyman														
Truck Driver Apprentice														
Welder Journeyman														
Welder Apprentice														
Other														
Monthly Total Hours														-
Total % of Monthly Hrs.														
Contractor shall submit report by the 15th of each month.														
Edwina Jones, Interim Director CREO KC Department								Report Submitted By:						
414 E. 12th Street, 4th Floor		Kansas City, MO 64106												
Phone: 816-513-1836		Email: HRDcontractcompliance@kcmo.org						Date:						

Workforce Monthly Report Forms only apply to Construction Contracts greater than \$300,000.00 with greater than 800 projected labor hours.

Workforce Monthly Report Instructions

(Instructions for online reporting)

Completing a Workforce Audit:

To report your workforce hours:

1. Log into B2GNow Diversity Management System (B2GNow)
2. Click on the red underlined number of 'Incomplete audits' under Workforce Audits
3. Click View for the incomplete audit that needs to be completed.
4. Click Fill in Audit
5. Complete the form including the Payroll Number. Select Add to Audit to report hours worked for specific Craft/Trade.

* required entry

Summary Information	
CONTRACTOR	KCMO Test Vendor Sample
PAYROLL START DATE	11/1/2021
PAYROLL END DATE	11/30/2021
PAYROLL NUMBER	<input type="text"/>
SPECIAL STATUS	<input type="checkbox"/> No Work (all fields will be filled with zeros) <input type="checkbox"/> Suspended <input type="checkbox"/> Final

Enter values below as hours worked. There is no need to fill in zeros; all blank fields will be saved as zero.

Craft/Trade List														
Craft/Trade	Caucasian		Black/African American		Hispanic/Latino		Asian		Native American		Other/Unknown Ethnicity		Local Resident	Comments
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Foreman/Supervisor														Not included in audit Add to audit
Asbestos Worker (Journeyman)														Not included in audit Add to audit

6. Scroll down and select review once hours have been reported.
7. Save and Certify to submit OR Save but Certify Later (to save a draft of your audit response). Audit must be certified for the workforce audit to be submitted for review. If there is an audit where no work was performed, and have 0 hours to report, select the Mark as No Work Audit button on step 4 to report 0 hours for all your employees. Select Certify & Release to Organization to complete. Mark Final for Special Status if the audit being completed is the last month of work, this will notify the system to stop generating monthly audits.

NOTE: If subcontractor has completed Workforce Audit, Prime MUST either accept audit and release to the organization or reject audit back to Subcontractor for correction.

An email notice will be sent from our organization monthly to notify Prime & Subcontractor users of incomplete audits.



Company-Wide Workforce Monthly Report

Human Relations Department - City of Kansas City, Missouri

Report Date:		Reporting Period:		Contract Awarded Date:										
Contractor:				City Vendor ID:										
Contact Person/Phone:		Contractor Address:		Contractor Report <input type="checkbox"/>	Subcontractor Report <input type="checkbox"/>									
E-mail Address:		Have you hired any new construction workers this month?		<input type="checkbox"/> Yes <input type="checkbox"/> No	#:									
				Final Cumulative Report: <input type="checkbox"/> Yes <input type="checkbox"/> No										
Report total of all hours of work performed company-wide on all projects in the KCMO Metropolitan Statistical Area (MSA). Enter the total hours on all lines and in all columns. Workforce hours should be based on payroll records.														
JOB CATEGORIES	OVERALL TOTAL (Sum of all Columns, A thru F Male & Female)	A Total Hours White Employees		B Total Hours Black Employees		C Total Hours Hispanic Employees		D Total Hours Asian/Pacific Islander		E Total Hours Native American Employee		F Total Hours Other/Unknown Race Employee		G KCMO Resident Hours
		M	F	M	F	M	F	M	F	M	F	M	F	Total #
Foreman/Supervisor														
Asbestos Worker														
Journeyman														
Asbestos Worker														
Apprentice														
Boilermaker Journeyman														
Boilermaker Apprentice														
Bricklayer Journeyman														
Bricklayer Apprentice														
Carpenter Journeyman														
Carpenter Apprentice														
Cement Mason														
Journeyman														
Cement Mason Apprentice														
Electrician Journeyman														
Electrician Apprentice														
Elevator Constructor														
Journeyman														
Elevator Constructor														
Apprentice														
Glazier Journeyman														
Glazier Apprentice														
Iron Worker Journeyman														
Iron Worker Apprentice														
Laborer Journeyman														
Laborer Apprentice														
Operating Engineer														
Journeyman														
Operating Engineer														
Apprentice														
Painter Journeyman														
Painter Apprentice														
Pipe Fitter/Plumber														
Journeyman														
Pipe Fitter/Plumber														
Apprentice														
Plasterer Journeyman														
Plasterer Apprentice														
Roofer Journeyman														
Roofer Apprentice														
Sheet Metal Journeyman														
Sheet Metal Apprentice														
Sprinkler Fitter														
Sprinkler Fitter Apprentice														
Truck Driver Journeyman														
Truck Driver Apprentice														
Welder Journeyman														
Welder Apprentice														
Other														
Total Monthly Hours														-
Total % of Hours														
Contractor shall submit report by the 15th of each month.														
Edwina Jones, Interim Director CREO KC Department								Report Submitted By:						
414 E. 12th Street, 4th Floor, Kansas City, MO 64106														
Phone: 816-513-1836 Email: HRDcontractcompliance@kcmo.org								Date:						

**City of Kansas City, Missouri
Civil Rights & Equal Opportunity Department
Construction Contractor Employee Identification Report**

Company Name: _____
Company Address: _____
Company City, State, Zip: _____
Name of Person Completing Report: _____
Phone Number: _____
Email: _____

Prime's Name: _____
KCMO Project Name: _____
KCMO Project Number: _____
Today's Date: _____
City Department: _____

Instructions:

- 1) Each applicable Prime Contractors **must complete this form for its company within 48 hours of bid opening**
- 2) The Civil Rights & Equal Opportunity Department strongly recommends usage of the electronic version of this form. This form may be obtained by visiting www.kcmo.gov website. The website is enabled with a "search" function on the Home page on the right corner. Select the magnifying glass and type in the search field "Contract Central". Select the first result, then click on the link to Standard City Contract Forms. Scroll down to Construction Contractor Employee Identification Report and click the link to open this document. Complete the fields in the Employee section; the Official Use Only section will automatically populate. NOTE: This form can be printed and attached to other required Bid documents.
- 3) All subcontractors shall be required to complete this form and submit to the Prime Contractor. For each subcontractor, the Prime must submit this form to City at least at least (10) days prior to the date the subcontractor shall commence work under a city construction contract.
- 4) Complete this form if you are the Prime contractor on a City construction project estimated over **\$300,000 & over 800 man hours**.
- 5) Complete this form with data from your **current construction workforce** (no office personnel).
- 6) Prime contractor is responsible to ensure subcontractor completes this form as required in #3 above.

Official Use Only									
Females	KCMO Resident		Males	KCMO Resident		Foreman/Supervisor	Journeyman	Apprentice	Operating Engineer
African American	0	0	African American	#####	0	0	0	--	0
Asian/Pacific Islander American	0	0	Asian/Pacific Islander American	#####	0	Asbestos Worker	0	0	Painter
Caucasian American	0	0	Caucasian American	#####	0	Boilermaker	0	0	Pipe Fitter/Plumber
Hispanic/Latino American	0	0	Hispanic/Latino American	#####	0	Bricklayer	0	0	Plasterer
Native American	0	0	Native American	#####	0	Carpenter	0	0	Roofer
Other	0	0	Other	#####	0	Cement Mason	0	0	Sheet Metal
	0	0		#####	0	Electrician	0	0	Sprinkler Fitter
						Elevator Constructor	0	0	Truck Driver
						Glazier	0	0	Welder
						Iron Worker	0	0	Other
						Laborer	0	0	
							0	0	

Number of KCMO Residents 0
Number of Journeyman 0
Number of Apprentice 0

Company Name: 0 KCMO Project Name: 0 KCMO Project Number: 0

	Name		Job Title (use drop down menu)	Address	City	State	Zip Code	KCMO Resident	Gender	Ethnicity
	Last	First								
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14										



Company Name: 0

KCMO Project Name: 0

KCMO Project Number: 0

	Name		Job Title <i>(use drop down menu)</i>	Address	City	State	Zip Code	KCMO Resident	Gender	Ethnicity
	Last	First								
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Company Name: 0

KCMO Project Name: 0

KCMO Project Number: 0

	Name		Job Title <i>(use drop down menu)</i>	Address	City	State	Zip Code	KCMO Resident	Gender	Ethnicity
	Last	First								
48										
49										
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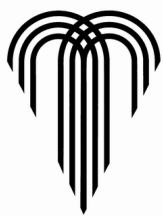
Company Name: 0

KCMO Project Name: 0

KCMO Project Number: 0

	Name		Job Title <i>(use drop down menu)</i>	Address	City	State	Zip Code	KCMO Resident	Gender	Ethnicity
	Last	First								
81										
82										
83										



CITY OF FOUNTAINS
HEART OF THE NATIONKANSAS CITY
MISSOURI

Pre Contract Bidder's Certification

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

STATE OF _____)
) SS
COUNTY OF _____)

Before me, the undersigned authority, personally appeared, who, being by me duly sworn deposed as follows:

I am authorized to make this affidavit on behalf of the named Bidder. I am of sound mind, capable of making this affidavit, and personally acquainted with the facts herein stated:

A. Bidder is current on payment of its Federal and State Income tax withholding and unemployment insurance payments, either in Missouri for companies doing business in Missouri, or in the state in which Bidder has its principal office; and

B. Bidder declares one of the following, regarding all work performed two (2) years immediately preceding the date of the Bid (check one):

☐ Contract by contract listing of all of Bidder's written notices of violations of any Federal or State prevailing wage statute in which prevailing wage penalties were assessed against the Bidder or paid by the Bidder (Complete and attach additional sheets if necessary):

1. _____

2. _____

3. _____

☐ There have been no written notices of violations of any Federal or State prevailing wage statute in which prevailing wage penalties were assessed against the Bidder or paid by the Bidder.

C. Bidder is currently in good standing with the Missouri Secretary of State or Bidder has filed a Registration of Fictitious Name with the Missouri Secretary of State.

(Bidder's Name)

(Date)

Signature of Person Making This Affidavit

In witness whereof, I have hereunto subscribed my name and affixed my official seal this __ day of, 2023.

CITY OF FOUNTAINS
HEART OF THE NATIONKANSAS CITY
MISSOURI

CONTRACT REQUIRED SUBMISSIONS

Project/Contract Number: 81000975/1689

Project/Contract Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU

These instructions are to assist Contractor in providing all necessary documents to enter into a contract with the City.

MISSOURI SECRETARY OF STATE BUSINESS ENTITY REGISTRATION

- ☐ For a corporation, current Certificate of Good Standing from the Missouri Secretary of State ((816) 889-2925 or (816) 889-2926 or a web site print-out, dated no more than ninety (90) days before the date furnished to the City – One Copy.
- ☐ For a business that is not a corporation and not doing business in the exact name of the proprietor, a copy from the Secretary of State, ((816) 889-2925 or (816) 889-2926 of the filed Registration of Fictitious Name dated no more than ninety (90) days before the date furnished to the City – One Copy.

EMPLOYEE ELIGIBILITY VERIFICATION AFFIDAVIT [Required if the contract exceeds \$5,000.00]

- ☐ 00515.01 Employee Eligibility Verification Affidavit – One Executed Affidavit
- ☐ First and last pages of the E-Verify Program Memorandum of Understanding that your company has received from the U.S. Department of Homeland Security verifying enrollment in the program. For assistance, contact E-Verify Operations at 888-464-4218 – One Copy.

SUBCONTRACTORS LISTING [Applicable form provided]

- ☐ Non-Construction Subcontractors List – One Copy
- ☐ 01290.09 Subcontractors & Major Material Suppliers List – One Copy

PAYMENT BONDS (If applicable)

- ☐ Each copy of the Payment bond must be signed and properly dated by the following, as applicable:

Corporation - A corporate officer authorized to sign on behalf of the corporation and the signature must be attested by a witness to the signature; OR

Limited Liability Company - A member of the limited liability company authorized to sign on behalf of the company and a witness to the signature must attest the signature; OR

Partnership - A partner authorized to sign on behalf of the partnership and the signature must be attested by a witness to the signature; OR

Sole Proprietor - By the proprietor and the signature must be attested by a witness to the signature; OR

Joint Venture - The parties to the Joint Venture authorized to sign on behalf of each party to the Joint Venture, or a person authorized by each party to the Joint Venture to sign on behalf of all parties to the Joint Venture; AND

Surety - A person authorized by the Surety to sign on behalf of the Surety. A power of attorney issued by the Surety Company authorizing its representative to sign the Agreement must be attached to the Agreement and each copy.

PERFORMANCE AND MAINTENANCE BOND (If applicable)

- ☐ As applicable, each copy of the Performance and Maintenance bond must be signed and properly dated by:

Corporation - A corporate officer authorized to sign on behalf of the corporation and the signature must be attested by a witness to the signature; OR

Limited Liability Company - A member of the limited liability company authorized to sign on behalf of the company and a witness to the signature must attest the signature; OR

Partnership - A partner authorized to sign on behalf of the partnership and the signature must be attested by a witness to the signature; OR

Sole Proprietor - By the proprietor and the signature must be attested by a witness to the signature; OR

Joint Venture - The parties to the Joint Venture authorized to sign on behalf of each party to the Joint Venture, or a person authorized by each party to the Joint Venture to sign on behalf of all parties to the Joint Venture; AND

Surety - A person authorized by the Surety to sign on behalf of the Surety. A power of attorney issued by the Surety Company authorizing its representative to sign the Agreement must be attached to the Agreement and each copy.

CERTIFICATES OF INSURANCE [Sample form provided] - If you have any questions regarding requirements for insurance certificates, please contact the City's Risk Management Office, 816 513-1299.

- ☐ Provide a certificate of insurance for all insurance that may be required in the contract such as:
- Commercial General Liability
 - Workers' Compensation and Employers' Liability
 - Commercial Automobile Liability
 - Railroad Protective Liability
 - Environmental Liability
 - Asbestos Liability
 - Longshoremen's Insurance
 - Property Insurance
- ☐ List the NAIC Number (National Association of Insurance Commissioners) or A.M. Best Number for each Insurer listed on the Certificate of Insurance.
- ☐ Certificate "Kansas City, Missouri" must named as an Additional Insured.
- ☐ Check the insurance requirements of the Contract. If Contract Documents require that other entities be included as additional insureds, each entity shall be listed on the certificate(s).
- ☐ Description of Operations must include Project/Contract Number and Project/Contract Title/Description as contained in the Contract Documents. The Certificate Holder and address block shall be completed as follows:
- Kansas City, Missouri
[Name of applicable City Department]
[Name of Contract Administrator, Buyer, or Project Manager]
[Department Address]
 Kansas City, Missouri **[Zip Code]**
- ☐ If your insurance agent prepares an ACORD form, the automobile insurance must be "any auto" or better for acceptance by the City.

AFFIRMATIVE ACTION REQUIREMENTS

- ☐ Proposed Affirmative Action Program or a copy of a Certificate of Affirmative Action Compliance – One copy.

PRE-CONTRACT BIDDER'S CERTIFICATION (Prevailing Wage Contracts; Form provided)

- ☐ Submit form 00490 - Bidder's Pre-Contract Certification (provided).

HEALTH AND SAFETY PLAN (If applicable)

- ☐ Bidder's Health and Safety Plan – One copy or one CD Rom.

Affidavit of Compliance With the Federal Consent Decree Regarding the
City of Kansas City, Missouri Overflow Control Plan ("OCP")

Civil Action No. 4:10-cv-0497-GAF

STATE OF MISSOURI)

) ss.

COUNTY OF)

I, _____, having full authority to act on
behalf of _____, do solemnly swear under oath to the
following:

I certify, under penalty of law, that the City has made an electronic copy of this Consent Decree available to this organization at the following web location:
<https://www.kcsmartsewer.us/home/showpublisheddocument/6428/637534718121930000>. I further certify that the Consent Decree, along with appendices, have been reviewed in their entirety and that said review has been performed under my direction or supervision in accordance with a system designed to assure that qualified personnel properly evaluated and fully understand the information contained in this Consent Decree upon execution of any contract relating to such work, including, but not limited to, subcontractors, equipment providers, material suppliers, or sub-consultants.

Signature of affiant

On this ____ day of _____, _____ before me, _____, a Notary Public in and for said state, personally appeared (_____), known to me to be the person who executed the within affidavit, and acknowledge to me that he/she executed the same for the purposes therein stated.

Notary Public

My commission expires: _____

EMPLOYEE ELIGIBILITY VERIFICATION AFFIDAVIT

(Required for any contract with the City of Kansas City, Missouri in excess of \$5,000.00)

STATE OF _____)
) ss
 COUNTY OF _____)

On this _____ day of _____, 20____, before me
 appeared _____, personally known by
 me or otherwise proven to be the person whose name is subscribed on this affidavit and
 who, being duly sworn, stated as follows:

I am of sound mind, capable of making this affidavit, and personally swear or
 affirm that the statements made herein are truthful to the best of my knowledge. I am the
 _____ (title) of _____
 (business entity) and I am duly authorized, directed or empowered to act with full
 authority on behalf of the business entity in making this affidavit.

I hereby swear or affirm that the business entity does not knowingly employ any
 person in connection with the contracted services who does not have the legal right or
 authorization under federal law to work in the United States as defined in 8 U.S.C. §
 1324a(h)(3).

I hereby additionally swear or affirm that the business entity is enrolled in an
 electronic verification of work program operated by the United States Department of
 Homeland Security (E-Verify) or an equivalent federal work authorization program
 operated by the United States Department of Homeland Security to verify information of
 newly hired employees, under the Immigration Reform and Control Act of 1986, and that
 the business entity will participate in said program with respect to any person hired by
 the business entity to perform any work in connection with the contracted services. I
 have attached hereto documentation sufficient to establish the business entity's
 enrollment and participation in the required electronic verification of work program.

I am aware and recognize that unless certain contractual requirements are satisfied
 and affidavits obtained as provided in Section 285.530, RSMo, the business entity may
 face liability for violations committed by its subcontractors, notwithstanding the fact that
 the business entity may itself be compliant.

I acknowledge that I am signing this affidavit as the free act and deed of the business entity and that I am not doing so under duress.

Affiant's signature

Subscribed and sworn to before me this _____ day of _____, 20____.

Notary Public

My Commission expires:



Missouri Department of Revenue
Project Exemption Certificate

This form is to be completed and given to your contractor.

Exempt Entity and Project Information	Name of Exempt Entity Issuing the Certificate		Missouri Tax Exemption Number	
	Address		City	State ZIP Code
	E-mail Address			
	Project Number	Project Begin Date (MM/DD/YYYY) ____/____/____	Estimated Project End Date (MM/DD/YYYY) ____/____/____	
	Description of Project			
	Project Location		Certificate Expiration Date (MM/DD/YYYY) ____/____/____	
Provide a signed copy of this certificate, along with a copy of the exempt entity's Missouri Sales and Use Tax Exemption Letter to each contractor or subcontractor who will be purchasing tangible personal property for use in this project. It is the responsibility of the exempt entity to ensure the validity of the information on the certificate. The exempt entity must issue a new certificate if any of the information changes.				
Signature of Authorized Exempt Entity		Printed Name of Authorized Exempt Entity		Date (MM/DD/YYYY) ____/____/____

Contractor	The Missouri exempt entity named above hereby authorizes the purchase, without sales tax, of tangible personal property to be incorporated or consumed in the construction project identified herein and no other, pursuant to Section 144.062, RSMo . Under penalties of perjury, I declare that the above information and any attached supplement is true, complete, and correct.			
	Name of Purchasing Contractor	Signature of Contractor	Date (MM/DD/YYYY) ____/____/____	
Address		City	State	ZIP Code

Subcontractor	Contractors - Present this to your supplier in order to purchase the necessary materials tax exempt. Complete the Subcontractor portion if extending the certificate to your subcontractor. The contractor must sign the form in the space provided below.			
	Name of Purchasing Subcontractor			
	Address		City	State ZIP Code
	Signature of Contractor	Contractor's Printed Name	Date (MM/DD/YYYY) ____/____/____	

Form 5060 (Revised 08-2015)

Taxation Division
P.O. Box 358
Jefferson City, MO 65105-0358

Phone: (573) 751-2836
Fax: (573) 522-1271
E-mail: salestaxexemptions@dor.mo.gov

Visit <http://dor.mo.gov/business/sales/sales-use-exemptions.php> for additional information.



State of Missouri

EXEMPTION FROM MISSOURI SALES AND USE TAX ON PURCHASES

Issued to:

CITY OF KANSAS CITY
414 E 12TH ST 3RD FLOOR
KANSAS CITY MO 64106

Missouri Tax ID
Number: 12490466

Effective Date:
07/11/2002

Your application for sales/use tax exempt status has been approved pursuant to Section 144.030.1, RSMo. This letter is issued as documentation of your exempt status.

Purchases by your Agency are not subject to sales or use tax if within the conduct of your Agency's exempt functions and activities. When purchasing with this exemption, furnish all sellers or vendors a copy of this letter. This exemption may not be used by individuals making personal purchases.

A contractor may purchase and pay for construction materials exempt from sales tax when fulfilling a contract with your Agency only if your Agency issues a project exemption certificate and the contractor makes purchases in compliance with the provisions of Section 144.062, RSMo.

Sales by your Agency are subject to all applicable state and local sales taxes. If you engage in the business of selling tangible personal property or taxable services at retail, you must obtain a Missouri Retail Sales Tax License and collect and remit sales tax.

This is a continuing exemption subject to legislative changes and review by the Director of Revenue. If your Agency ceases to qualify as an exempt entity, this exemption will cease to be valid. This exemption is not assignable or transferable. It is an exemption from sales and use taxes only and is not an exemption from real or personal property tax.

Any alteration to this exemption letter renders it invalid.

If you have any questions regarding the use of this letter, please contact the Division of Taxation and Collection, P.O. Box 3300, Jefferson City, MO 65105-3300, phone 573-751-2836.

CITY OF FOUNTAINS
HEART OF THE NATIONKANSAS CITY
MISSOURI

PERFORMANCE AND MAINTENANCE BOND

Project Number 81000975Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

KNOW ALL MEN BY THESE PRESENTS: That _____, as PRINCIPAL (CONTRACTOR), and _____, (SURETY), licensed to do business as such in the State of Missouri, hereby bind themselves and their respective heirs, executors, administrators, successors, and assigns unto Kansas City, Missouri, a constitutionally chartered municipal corporation, (OWNER), as obligee, in the penal sum of _____ Dollars (\$ _____) for the payment whereof CONTRACTOR and SURETY bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

CONTRACTOR has entered into a Contract with OWNER for _____ which Contract, including any present or future amendment thereto, is incorporated herein by reference and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if CONTRACTOR shall promptly and faithfully perform said Contract including all duly authorized changes thereto, and including any maintenance requirements contained therein, according to all the terms thereof, including those under which CONTRACTOR agrees to pay legally required wage rates including the prevailing hourly rate of wages in the locality, as determined by the Department of Labor and Industrial Relations or by final judicial determination, for each craft or type of workman required to execute the Contract and, further, shall defend, indemnify, and hold harmless OWNER from all damages, including but not limited to, liquidated damages, loss and expense occasioned by any failure whatsoever of said CONTRACTOR and SURETY to fully comply with and carry out each and every requirement of the Contract, then this obligation shall be void; otherwise, it shall remain in full force and effect.

WAIVER. That SURETY, for value received, hereby expressly agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the Work to be performed thereunder, shall in any way affect the obligations of this Bond; and it does hereby waive notice of any such change, extension of time, or alteration or addition to the terms of the Contract or the Work to be performed thereunder.

IN WITNESS WHEREOF, the above parties have executed this instrument the ____ day of _____, 20__.

CONTRACTOR

Name, address and facsimile number of Contractor

I hereby certify that I have authority to execute this document on behalf of Contractor.

By: _____
Title: _____

(Attach corporate seal if applicable)

SURETY

Name, address and facsimile number of Surety:

I hereby certify that (1) I have authority to execute this document on behalf of Surety; (2) Surety has an A.M. Best rating of A-, V, or better; (3) Surety is named in the current list of "Companies Holding Certificates of Authority as Acceptable Reinsuring Companies: as published in Circular 570 (most current revision) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury; and (4) Surety is duly licensed to issue bonds in the State of Missouri and in the jurisdiction in which the Project is located.

By: _____
Title: _____
Date: _____

(Attach seal and Power of Attorney)

CITY OF FOUNTAINS
HEART OF THE NATIONKANSAS CITY
MISSOURI

PAYMENT BOND

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

KNOW ALL MEN BY THESE PRESENTS: That _____, as PRINCIPAL (CONTRACTOR), and _____, (SURETY), licensed to do business as such in the State of Missouri, hereby bind themselves and their respective heirs, executors, administrators, successors, and assigns unto Kansas City, Missouri, a constitutionally chartered municipal corporation, (OWNER), as obligee, in the penal sum of _____ Dollars (\$_____) for the payment whereof CONTRACTOR and SURETY bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

CONTRACTOR has entered into a contract with OWNER for _____, which Contract, including any present or future amendment thereto, is incorporated herein by reference and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if in connection with the Contract, including all duly authorized modifications thereto, prompt payment shall be made to all laborers, subcontractors, teamsters, truck drivers, owners or other suppliers or for equipment employed on the job, and other claimants, for all labor performed in such work whether done for CONTRACTOR, a subcontractor, SURETY, a completion contractor or otherwise (at the full wage rates required by any law of the United States or of the State of Missouri, where applicable), for services furnished and consumed, for repairs on machinery, for equipment, tools, materials, lubricants, oil, gasoline, water, gas, power, light, heat, oil, telephone service, grain, hay, feed, coal, coke, groceries and foodstuffs, either consumed, rented, used or reasonably required for use in connection with the construction of the work or in the performance of the Contract and all insurance premiums, both for compensation and for all other kinds of insurance on the work, for sales taxes and for royalties in connection with, or incidental to, the completion of the Contract, in all instances whether the claim be directly against CONTRACTOR, against SURETY or its completion contractor, through a subcontractor or otherwise, and, further, if CONTRACTOR shall defend, indemnify and hold harmless OWNER from all such claims, demands or suits by any such person or entity, then this obligation shall be void; otherwise, it shall remain in full force and effect.

Any conditions legally required to be included in a Payment Bond on this Contract, including but not limited to those set out in §107.170 RSMo. are included herein by reference.

SURETY agrees that, in the event that CONTRACTOR fails to make payment of the obligations covered by this Bond, it will do so and, further, that within forty-five (45) days of receiving, at the address given below, a claim hereunder stating the amount claimed and the basis for the claim in reasonable detail, it (a) will send an answer to the claimant, with a copy to OWNER stating the amounts that are undisputed and the basis for challenging any amounts that are disputed, and (b) will pay any amounts that are undisputed. The amount of this Bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder.

While this Bond is in force, it may be sued on at the instance of any party to whom any such payment is due, in the name of OWNER to the use for such party. OWNER shall not be liable for the payment of any costs or expenses of any such suit.

No suit shall be commenced or pursued hereunder other than in a state court of competent jurisdiction in Jackson, Clay or Platte County, Missouri, or in the United States District Court for the Western District of Missouri.

WAIVER. That SURETY, for value received, hereby expressly agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the Work to be performed thereunder, shall in any way affect the obligations of this Bond; and it does hereby waive notice of any such change, extension of time, or alteration or addition to the terms of the Contract or the Work to be performed thereunder.

IN WITNESS WHEREOF, the above parties have executed this instrument the _____ day of _____, 20____.

CONTRACTOR

Name, address and facsimile number of Contractor

I hereby certify that I have authority to execute this document on behalf of Contractor.

By: _____
Title: _____

(Attach corporate seal if applicable)

SURETY

Name, address and facsimile number of Surety:

I hereby certify that (1) I have authority to execute this document on behalf of Surety; (2) Surety has an A.M. Best rating of A- or better; (3) Surety is named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (most current revision) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury; and(4) Surety is duly licensed to issue bonds in the State of Missouri and in the jurisdiction in which the Project is located.

By: _____
Title: _____
Date: _____

(Attach seal and Power of Attorney)

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

PERFORMANCE BOND

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

KNOW ALL MEN BY THESE PRESENTS: That _____, as PRINCIPAL (CONTRACTOR), and _____, (SURETY), licensed to do business as such in the State of Missouri, hereby bind themselves and their respective heirs, executors, administrators, successors, and assigns unto Kansas City, Missouri, a constitutionally chartered municipal corporation, (OWNER), as obligee, in the penal sum of _____ Dollars (\$ _____) for the payment whereof CONTRACTOR and SURETY bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

CONTRACTOR has entered into a Contract with OWNER for _____ which Contract, including any present or future amendment thereto, is incorporated herein by reference and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if CONTRACTOR shall promptly and faithfully perform said Contract including all duly authorized changes thereto, according to all the terms thereof, including those under which CONTRACTOR agrees to pay legally required wage rates including the prevailing hourly rate of wages in the locality, as determined by the Department of Labor and Industrial Relations or by final judicial determination, for each craft or type of workman required to execute the Contract and, further, shall defend, indemnify, and hold harmless OWNER from all damages, including but not limited to liquidated damages, loss and expense occasioned by any failure whatsoever of said CONTRACTOR and SURETY to fully comply with and carry out each and every requirement of the Contract, then this obligation shall be void; otherwise, it shall remain in full force and effect.

WAIVER. That SURETY, for value received, hereby expressly agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the Work to be performed thereunder, shall in any way affect the obligations of this Bond; and it does hereby waive notice of any such change, extension of time, or alteration or addition to the terms of the Contract or the Work to be performed thereunder.

IN WITNESS WHEREOF, the above parties have executed this instrument the ____ day of _____, 20____.

CONTRACTOR

Name, address and facsimile number of Contractor

I hereby certify that I have authority to execute this document on behalf of Contractor.

By: _____
Title: _____

(Attach corporate seal if applicable)

SURETY

Name, address and facsimile number of Surety:

I hereby certify that (1) I have authority to execute this document on behalf of Surety; (2) Surety has an A.M. Best rating of A- or better; (3) Surety is named in the current list of "Companies Holding Certificates of Authority as Acceptable Reinsuring Companies: as published in Circular 570 (most current revision) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury; and (4) Surety is duly licensed to issue bonds in the State of Missouri and in the jurisdiction in which the Project is located.

By:

Title:

Date:

(Attach seal and Power of Attorney)



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
Bid #2

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER AGENT NAME AND ADDRESS	CONTACT NAME:	
	PHONE (A/C, No, Ext):	FAX (A/C, No):
INSURED CONTRACTOR NAME AND ADDRESS	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	
	INSURER A : ABC INSURANCE COMPANY	
	INSURER B :	
	INSURER C :	
	INSURER D :	
INSURER E :		
INSURER F :		

COVERAGES**CERTIFICATE NUMBER:****REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	GENERAL LIABILITY <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PROJECT <input type="checkbox"/> LOC	Y	Y	POLICY NUMBER	1/1/2011	Current	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 50,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000 \$
A	AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO ALL OWNED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS <input type="checkbox"/> SCHEDULED AUTOS NON-OWNED AUTOS	Y	Y	POLICY NUMBER	1/1/2011	Current	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
A	<input checked="" type="checkbox"/> UMBRELLA LIAB EXCESS LIAB <input checked="" type="checkbox"/> OCCUR CLAIMS-MADE DED <input checked="" type="checkbox"/> RETENTION \$ 10,000	Y	Y	POLICY NUMBER	1/1/2011	Current	EACH OCCURRENCE \$ 2,000,000 AGGREGATE \$ 2,000,000 \$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N	N/A	POLICY NUMBER	1/1/2011	Current	<input checked="" type="checkbox"/> WC STATUTORY LIMITS <input type="checkbox"/> OTHER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
A	Leased/Rented/Equip. Owned Equipment <u>Builders Risk/Installation Floater</u>	N/A	Y	POLICY NUMBER	1/1/2011	Current	Limit; Deductible Limit; Deductible Limit; Deductible

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Project No. [Title]. Certholder (City) and [Design Professional] and any other entities named in 00800 SCs are named as primary, noncontributing Additional Insureds including products and completed operations, excluding workers compensation, employers liability and professional liability. Waiver of subrogation applies as allowed by law. [The policies required above shall contain no exclusions for work expressly within the subcontractors scope of work.]

CERTIFICATE HOLDER**CANCELLATION**

City of Kansas City, Missouri [Department] [Address] Kansas City, MO [Zip]	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE
-------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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AUTHORIZATION TO RELEASE A REVENUE CLEARANCE LETTER

Bid #2

Revenue Division
414 East 12th Street, 2nd floor, Room 202 W
Kansas City, MO 64106 Phone (816) 513-1135 Fax (816) 513-1077 email: revenue@kcmo.org

I authorize the City of Kansas City, Missouri, Finance Department, Revenue Division, to release a Revenue Clearance Letter for:

Name of Taxpayer: _____ Tax I.D.# _____
(PRINT)

Address: _____

Check this box and the City will send the Clearance Letter to you or the contractor designated.

☐ I authorize the City to provide a copy of the Taxpayer's Revenue Clearance Letter to the following:

NAME (PRINT)		BUSINESS NAME	TITLE
ADDRESS		CITY, STATE, ZIP CODE	
PHONE NUMBER	FAX NUMBER		E-MAIL ADDRESS

☐ I authorize the City to provide the Taxpayer's Revenue Clearance Letter to all City Departments and to publish on the City's internet/intranet website that the Taxpayer is in compliance with the tax ordinances administered by the City's Commissioner of Revenue.

Please send my 1st Revenue Clearance Letter to: _____
(Print Name of City Department/Contact Person/E-mail/Fax Number)

This authorization shall expire one (1) year from the date of the signature.

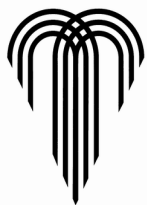
The City, Commissioner of Revenue and the Revenue Division personnel (hereinafter "the City"), are hereby held harmless from any and all liability relating to unauthorized disclosure of confidential tax information resulting from release of information under all applicable confidentiality laws including federal, state, or local including any damages sustained by wrongful transmission of confidential tax information to any other person.

UNDER PENALTIES OF PERJURY, I DECLARE THAT I HAVE EXAMINED THIS AUTHORIZATION, AND TO THE BEST OF MY KNOWLEDGE AND BELIEF, IT IS TRUE, CORRECT AND COMPLETE.

I hereby certify that I am the Taxpayer named herein or that I have the authority to execute this authorization and hold harmless agreement on behalf of the Taxpayer.

NAME (PRINT)		TITLE (IF APPLICABLE)	
SIGNATURE	PHONE NUMBER	DATE	

A FACSIMILE OF THIS DOCUMENT SHALL CONSTITUTE AN ORIGINAL



OVERFLOW CONTROL PROGRAM CONSENT DECREE GENERAL CONDITIONS

TABLE OF CONTENTS

ARTICLE 1 DEFINITIONS AND TERMINOLOGY

- 1.01 Defined Terms
- 1.02 Terminology

ARTICLE 2 PRELIMINARY MATTERS

- 2.01 Delivery of Bonds
- 2.02 Affidavit of Compliance
- 2.03 Evidence of Insurance
- 2.04 Copies of Documents
- 2.05 Commencement of Contract Times; Notice to Proceed
- 2.06 Starting the Work
- 2.07 Before Starting Construction
- 2.08 Acceptable Schedules

ARTICLE 3 CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

- 3.01 Intent
- 3.02 Reference to Standards and Specifications of Technical Societies
- 3.03 Reporting and Resolving Discrepancies
- 3.04 Amending and Supplementing Contract Documents
- 3.05 Reuse of Documents

ARTICLE 4 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

- 4.01 Availability of Lands
- 4.02 Subsurface and Physical Conditions
- 4.03 Differing Subsurface or Physical Conditions
- 4.04 Physical Conditions - Underground Facilities
- 4.05 Reference Points
- 4.06 Asbestos, Lead-Based Paint, PCBs, Petroleum, Hazardous Waste or Radioactive Material

ARTICLE 5 BONDS AND INSURANCE

- 5.01 Performance, Payment and Other Bonds
- 5.02 Licensed Sureties and Insurers
- 5.03 Certificates of Insurance
- 5.04 CONTRACTOR's Liability Insurance
- 5.05 CITY's Liability Insurance
- 5.06 Property Insurance
- 5.07 Waiver of Rights
- 5.08 Receipt and Application of Insurance Proceeds
- 5.09 Partial Utilization - Property Insurance

ARTICLE 6 CONTRACTOR'S RESPONSIBILITIES

- 6.01 Indemnification
- 6.02 Supervision and Superintendence
- 6.03 Services, Working Hours, Labor, Materials and Equipment
- 6.04 Progress Schedule
- 6.05 Recovery Schedules
- 6.06 Substitutes and "Or-Equal" Items
- 6.07 Concerning Subcontractors, Suppliers and Others
- 6.08 Patent Fees and Royalties
- 6.09 Permits
- 6.10 Compliance with Laws or Regulations
- 6.11 Taxes
- 6.12 Use of Site and Other Areas
- 6.13 Record Documents
- 6.14 Safety and Protection
- 6.15 Safety Representative
- 6.16 Hazard Communication Programs
- 6.17 Emergencies
- 6.18 Shop Drawings and Samples
- 6.19 Continuing the Work
- 6.20 CONTRACTOR's General Warranty and Guarantee

ARTICLE 7 OTHER WORK

- 7.01 Related Work at Site
- 7.02 Coordination

ARTICLE 8 CITY's RESPONSIBILITIES

- 8.01 Communications to CONTRACTOR
- 8.02 Replacement of DESIGN PROFESSIONAL
- 8.03 Furnish Data and Prompt Payment
- 8.04 Lands and Easements; Reports and Tests
- 8.05 Insurance
- 8.06 Change Orders
- 8.07 Inspections, Tests and Approvals
- 8.08 Limitations on CITY's Responsibilities
- 8.09 Undisclosed Hazardous Environmental Condition
- 8.10 Evidence of Financial Arrangements
- 8.11 CITY's Representative
- 8.12 Visits to Site

ARTICLE 9 DESIGN PROFESSIONAL's STATUS DURING CONSTRUCTION

- 9.01 General Scope of DESIGN PROFESSIONAL's Duties
- 9.02 Resident Project Representative
- 9.03 Clarifications and Interpretations
- 9.04 Rejecting Defective Work
- 9.05 Shop Drawings, Change Orders and Payments
- 9.06 Determinations for Unit Prices
- 9.07 Decisions on Requirements of Contract Documents and Acceptability of Work
- 9.08 Limitations on DESIGN PROFESSIONAL's Authority and Responsibilities

ARTICLE 10 CHANGES IN THE WORK

- 10.01 Authorized Changes in the Work
- 10.02 Unauthorized Changes in the Work
- 10.03 Signing of Change Orders
- 10.04 Notification to Surety

ARTICLE 11 CHANGE OF CONTRACT PRICE

- 11.01 Change of Contract Price
- 11.02 Cost of the Work
- 11.03 Cash Allowances
- 11.04 Unit Price Work
- 11.05 Dispute Resolution

ARTICLE 12 CONTRACT TIMES

- 12.01 Time of the Essence
- 12.02 Change of Contract Times
- 12.03 Proof Required To Justify An Extension of Time For Excusable and Compensable Delays
- 12.04 Delays Within CONTRACTOR's Control
- 12.05 Delays Beyond the CITY's and CONTRACTOR's Control
- 12.06 Delay Damages
- 12.07 Dispute Resolution

ARTICLE 13 TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

- 13.01 Access to Work
- 13.02 Tests and Inspections
- 13.03 Notice of Defects
- 13.04 Uncovering Work
- 13.05 CITY May Stop the Work
- 13.06 Correction or Removal of Defective Work
- 13.07 Correction Period
- 13.08 Acceptance of Defective Work
- 13.09 CITY May Correct Defective Work

ARTICLE 14 PAYMENTS TO CONTRACTOR AND COMPLETION

- 14.01 Schedule of Values
- 14.02 Application for Progress Payments
- 14.03 Contractor's Warranty of Title
- 14.04 Substantial Completion or Achievement of Full Operation
- 14.05 Partial Utilization
- 14.06 Final Inspection
- 14.07 Final Payment
- 14.08 Final Completion Delayed
- 14.09 Waiver of Claims
- 14.10 Completion of Work by City

ARTICLE 15 SUSPENSION OF WORK AND TERMINATION

- 15.01 CITY May Suspend Work
- 15.02 CITY May Terminate for Default
- 15.03 CITY May Terminate for Convenience

ARTICLE 16 CLAIMS AND DISPUTES

- 16.01 Definition
- 16.02 Written Notice and Burden of Proof
- 16.03 Time Limits on Claims
- 16.04 Continuing Contract Performance
- 16.05 Injury or Damage to Person or Property
- 16.06 Initial Resolution of Claims and Disputes
- 16.07 Final Resolution of Claims and Disputes

ARTICLE 17 MISCELLANEOUS

- 17.01 Giving Notice
- 17.02 Computation of Times
- 17.03 Cumulative Remedies
- 17.04 Survival of Obligations
- 17.05 Controlling Law

ARTICLE 1 DEFINITIONS AND TERMINOLOGY

1.01 Defined Terms

A. Wherever used in these General Conditions or in the other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

1. Achievement of Full Operation shall mean completion of construction and installation of equipment or infrastructure such that the equipment or infrastructure has been placed into full operation and is expected to both function and perform as designed.

2. Addenda - Written or graphic instruments issued prior to the opening of Bids that clarify, correct or change the Bidding Requirements or the Contract Documents.

3. Agreement - The written Contract between CITY and CONTRACTOR governing the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

4. Application for Payment - The form accepted by CITY's Representative which is to be used by CONTRACTOR in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

5. Asbestos - Any material that contains more than one percent (1%) Asbestos and is friable or is releasing Asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

6. Bid - The offer or proposal of the Bidder submitted on the Bid Form/Contract setting forth the prices for the Work to be performed. A Bidder's Bid becomes a Contract with CITY if the CITY executes the Bid Form/Contract submitted by Bidder. If the CITY executes the Bid Form/Contract submitted by Bidder, the term "Bidder" shall mean CONTRACTOR.

7. Bidder - One who submits a Bid directly to CITY, as distinct from a sub-bidder who submits a bid to a Bidder. If the CITY executes the Bid Form/Contract submitted by Bidder, the term "Bidder" shall mean CONTRACTOR in both the Bidding Documents and Contract Documents unless the context clearly indicates otherwise.

8. Bidding Documents - The advertisement or Invitation to Bid, Instructions to Bidders, the Bid Form/Contract, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

9. Bidding Requirements - The advertisement or invitation to bid, Instructions to Bidders, Bid security, and the Bid Form/Contract with any supplements.

10. Bonds - Payment Bond and Performance and Maintenance Bond and other instruments of security.

11. Change Order - A written document issued by CITY that authorizes an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Contract.

12. CITY/OWNER - Kansas City, Missouri, a constitutionally chartered municipal corporation, with which CONTRACTOR has entered into the Contract and for whom the Work is to be provided.

13. CITY's Representative - Person or agency designated to act for the Director as provided in these Contract Documents.

14. Consent Decree shall mean Consent Decree, Civil No. 4:10-cv-0497-GAF.

15. Consultant - Person, firm or corporation having a contract with CITY or DESIGN PROFESSIONAL to furnish services as an independent professional associate or

Consultant with respect to the Project and who's identified as such in the Supplementary Conditions.

- a. The Consultant(s) is identified, and their seals affixed on the Certification Page(s). The certifications describe the respective responsibilities for the Drawings and Specifications prepared by the Consultant(s) and are incorporated into this Contract.

16. Contract - The entire and integrated written agreement between CITY and CONTRACTOR concerning the Work that incorporates all Contract Documents. The Bid Form/Contract submitted by Bidder is the Contract between CITY and CONTRACTOR upon execution by CITY. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

17. Contract Documents - The Contract Documents establish the rights and obligations of the parties and include the Contract, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid Form/Contract (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Intent to Contract), the CREO KC Construction Project Instructions, the Contractor's Utilization Plan/Request for Waiver, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Project Manual and the certification page(s) of the DESIGN PROFESSIONAL and Consultant(s), together with approved project baseline schedule and amendments thereto and all Written Amendments, Change Orders, Work Change Directives, and DESIGN PROFESSIONAL's written interpretations and clarifications issued on or after the Effective Date of the Contract, and approved Shop Drawings, and any certifications required as part of the Consent Decree. Reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this Paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by CITY to CONTRACTOR are not Contract Documents, except project schedules submitted by CONTRACTOR and approved by CITY.

18. Contract Price - The money payable by CITY to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement.

19. Contract Times - The number of days or the dates stated in the Supplementary Conditions: (a) to achieve Substantial Completion and/or Achievement of Full Operation, and (b) to complete the Work so that it is ready for final payment as evidenced by CITY's Representative's written recommendation of final payment.

20. CONTRACTOR - The person, firm, partnership, company, corporation or association licensed or otherwise authorized by law to do business in Missouri, with whom CITY has entered into the Agreement.

21. Day or Days - The terms "day" or "days" as used herein shall mean a calendar day or calendar days. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, federal or state holiday, the period shall run until the close of the next business day

22. DESIGN PROFESSIONAL - Architect, Engineer or other licensed professional who is either employed by or has contracted with CITY to serve in a design capacity and whose Consultants, members, partners, employees or agents have prepared and sealed the Drawings and Specifications.

The DESIGN PROFESSIONAL(s) is identified and their seals affixed on the Certification Page(s). The certifications describe the respective responsibilities for the Drawings and Specifications prepared by the DESIGN PROFESSIONAL and are incorporated into this Contract.

23. DESIGN PROFESSIONAL's Project Representative - The authorized representative of DESIGN PROFESSIONAL who may be assigned to the Site or any part thereof.

24. Director - The term Director shall mean the duly appointed executive officer of a department of City who is empowered by the City Charter or by the City Council to enter into a contract on behalf of City, or to grant a permit for improvements to land owned by City. A Director is authorized to delegate this authority to a City employee so designated in writing.

25. Drawings - The drawings which graphically show the scope, extent and character of the Work to be furnished and performed by CONTRACTOR and which have been prepared by DESIGN PROFESSIONAL and are included in the Contract Documents. Shop Drawings are not Drawings as so defined.

26. Effective Date of the Contract - The date indicated in the Contract on which it becomes effective, but if no such date is indicated it means the date on which the Contract is fully executed by CITY.

27. General Requirements - Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

28. Hazardous Environmental Condition - The presence at the Site of Asbestos, Lead-Based Paint, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

29. Hazardous Waste - The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

30. Laws or Regulations - Any and all applicable laws, rules, regulations, ordinances, codes and orders of any and all governmental bodies, agencies, authorities and courts having jurisdiction.

31. Lead-Based Paint - Any paint, varnish, stain, or other applied coating that has one (1) mg or more of lead per square centimeter. The terms "leaded paint" and "lead-containing paint" are synonymous with Lead-Based Paint.

32. Liens - Liens, charges, security interests or encumbrances upon real property or personal property.

33. Milestone - A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Achievement of Full Operation of all the Work.

34. Notice of Intent to Contract - The written notice by CITY to the apparent successful Bidder stating that upon compliance by that apparent successful Bidder with the conditions in the Bid Documents enumerated, within the time specified, and upon enactment of an appropriate ordinance or resolution, CITY will sign and deliver the Contract.

35. Notice to Proceed - A written notice given by CITY to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR's obligations under the Contract Documents.

36. Overflow Control Plan or OCP shall mean the Long Term Control Plan and Sanitary Sewer System Plan collectively referred to by the City as the Overflow Control Plan approved by the MDNR by letter dated April 14, 2010.

37. Partial Utilization - Use by CITY of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion/Achievement of Full Operation of all the Work.

38. PCBs - Polychlorinated biphenyls.

39. Petroleum - Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Wastes and crude oils.

40. Project - The total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.

41. Project Manual - The documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual may be issued in one or more volumes and is contained in the table(s) of contents.

42. Radioactive Material - Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

43. Samples - Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

44. Shop Drawings - All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

45. Site - Lands or areas indicated in the Contract Documents as being furnished by CITY upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by CITY which are designated for the use of CONTRACTOR.

46. Specifications - Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

47. Subcontractor - Any individual, firm, partnership, company, corporation or association licensed or otherwise authorized by law to do business in Missouri, to whom CONTRACTOR, with written notification to CITY, has entered into an agreement to perform a portion of the work.

48. Substantial Completion - When Work (or a specified part thereof) has progressed to the point where, in the opinion of CITY as evidenced by CITY's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

49. Supplementary Conditions - The part of the Contract Documents which amends and/or supplements these General Conditions.

50. Supplier - A manufacturer, fabricator, supplier, distributor, materialman or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated into the Work by CONTRACTOR or any Subcontractor.

51. Underground Facilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

52. Unpermitted CSO Discharge shall include any release of untreated or partially treated sewage from the City's combined sewer system that is not authorized by any of the City's NPDES permits.

53. Unit Price Work - Work to be paid for on the basis of unit prices.

54. Work - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishing and incorporating material and equipment into the construction, and furnishing documents, all as required by the Contract Documents.

55. Work Change Directive - A written directive to CONTRACTOR, issued on or after the Effective Date of the Contract, signed by CITY and recommended by DESIGN PROFESSIONAL, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed, or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

56. Written Amendment - A written statement modifying the Contract Documents, signed by CITY and CONTRACTOR on or after the Effective Date of the Contract and normally dealing with the non-engineering or non-technical rather than strictly construction-related aspects of the Contract Documents.

1.02 Terminology

A. Intent of Certain Terms or Adjectives

1. Whenever in the Contract Documents the terms “as ordered,” “as directed,” “as required,” “as allowed,” “as approved,” or terms of like effect or import are used, or the adjectives “reasonable,” “suitable,” “acceptable,” “proper” or “satisfactory” or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of DESIGN PROFESSIONAL as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to DESIGN PROFESSIONAL any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.08 or any other provision of the Contract Documents.

B. Defective

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty or deficient, in that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to CITY’s Representative’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by CITY at Achievement of Full Operation in accordance with Paragraph 14.04 or 14.05).

C. Furnish, Install, Perform, Provide

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, “provide” is implied.

D. Unless stated otherwise in the Contract Documents, words and phrases which have a well-known technical or construction industry or trade meanings are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 PRELIMINARY MATTERS

2.01 Delivery of Bonds

A. CONTRACTOR shall deliver to CITY such Bonds as CONTRACTOR may be required to furnish.

2.02 Affidavit of Compliance

A. CONTRACTOR shall deliver to CITY Affidavit of Compliance With the Federal Consent Decree Regarding the City of Kansas City, Missouri Overflow Control Plan (“OCP”) Civil Action No. 4:10-cv-0497-GAF

2.03 Evidence of Insurance

A. CONTRACTOR shall deliver to CITY certificates of insurance or other evidence of insurance that CITY may request, which CONTRACTOR is required to purchase and maintain in accordance with Article 5 or any other applicable provision in the Contract Documents.

2.04 Copies of Documents

A. CITY shall furnish to CONTRACTOR one (1) copy of the Drawings and Specifications, including addenda.

2.05 Commencement of Contract Times; Notice to Proceed

A. The Contract Times will commence to run on the date indicated in the Notice to Proceed.

2.06 Starting the Work

A. CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run, but no Work shall be done at the Site prior to the date on which the Contract Times commence to run, unless otherwise indicated in the Notice to Proceed.

2.07 Before Starting Construction

A. CONTRACTOR's Review of Contract Documents: Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. CONTRACTOR shall promptly report in writing to DESIGN PROFESSIONAL any conflict, error, ambiguity or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from DESIGN PROFESSIONAL before proceeding with any Work affected thereby. CONTRACTOR shall not be liable to CITY or DESIGN PROFESSIONAL for failure to report any conflict, error, ambiguity or discrepancy in the Contract Documents, unless CONTRACTOR knew or reasonably should have known thereof.

B. Preliminary Schedules: Within ten (10) days after the Effective Date of the Contract, or on such later date as CITY's Representative shall provide in writing, CONTRACTOR shall submit to CITY's Representative for review:

1. Preliminary Project Schedule: CONTRACTOR shall submit a proposed project schedule for CITY's acceptance. The proposed project schedule shall include a detailed and comprehensive construction schedule utilizing a critical path method diagram network that (a) shows all major procurement and construction elements and phases of the Project; (b) breaks down each element or phase by trade; (c) shows early and late starts so that all float time will be accurately identified; (d) all other activities necessary for the timely completion of the Project in accordance with the scheduled dates for Achievement of Full Operation; and (e) highlights the project's critical path. CITY's acceptance is expressly limited to CITY's acknowledgement that, based upon CITY's limited review, the dates of Achievement of Full Operation and Milestone dates are acceptable. After final acceptance of the preliminary project schedule by the CITY, it shall be considered the project baseline schedule pursuant to Paragraph 2.07(B).

2. Preliminary schedule of Shop Drawings and Sample submittals which will list each required submittal and the times for submitting, reviewing and processing such submittal; and

3. Preliminary 01290.02 Schedule of Values for all of the Work which will include quantities and prices of items which when added together equals the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

C. Preconstruction Conference: Before any Work at the Site may be started, a conference attended by CONTRACTOR, DESIGN PROFESSIONAL and others, as appropriate, will be scheduled by CITY's Representative to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.06 B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, maintaining required records, Claims process, dispute resolution, OCP requirements, or any other applicable provisions of the Contract Documents.

2.08 Acceptable Schedules

A. Acceptable schedule: If necessary following the Preconstruction Conference, The Contractor shall update and submit to the CITY for review a revised preliminary schedule within seven (7) Calendar Days after the Notice to Proceed.

1. The CITY shall review and make any necessary comments and/or adjustments to the revised preliminary schedule. The Contractor shall incorporate the CITY's comments and resubmit the revised preliminary schedule within seven (7) Calendar Days from receipt of the CITY's comments.

B. Project Baseline Schedule: The accepted revised preliminary schedule shall be considered the project baseline schedule and shall be used by the CONTRACTOR for planning, scheduling, managing, and executing the Work. **The project baseline schedule shall not be changed without the written consent of CITY. Failure of the CONTRACTOR to provide the CITY with an acceptable preliminary schedule shall be cause for the CITY to suspend work and shall be considered an inexcusable delay to the Project.** The project baseline schedule may be further modified by the Supplemental Conditions.

C. CONTRACTOR's schedule of values will be acceptable to CITY's Representative as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 Intent

A. The Contract Documents comprise the entire Contract between CITY and CONTRACTOR concerning the Work.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be furnished and performed whether or not specifically called for at no additional cost to CITY. Clarifications and interpretations of the Contract Documents shall be issued by DESIGN PROFESSIONAL as provided in Paragraph 9.03.

C. Correlation and intent of documents: The Drawings and Specifications are intended to supplement each other. Any Work shown on the Drawings and not mentioned in the Specifications (or vice versa) shall be as binding and shall be completed the same as if mentioned or shown on both. In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

1. Change Orders and Written Amendments
2. Project Baseline Schedule Requirements
3. Approved Shop Drawings
4. Addenda, with those of later date having precedence over those of earlier date
5. The Supplementary Conditions
6. The General Conditions
7. Drawings and Specifications

D. If Drawings are in conflict, larger scale details shall govern over smaller or no-scale Drawings. If Specification sections are in conflict with each other, the conflict shall be resolved by DESIGN PROFESSIONAL in accordance with reasonable interpretation of such documents.

E. The general character of the detailed Work is shown on the Drawings, but minor modifications may be made in the full size or scale details. Where the word "similar" occurs on the Drawings, it shall be used in its general sense and not as meaning identical, and all details shall be worked out in relation to their location and their connection to the other parts of the Work. Where on any Drawings a portion of the Work is drawn out and the remainder is indicated in outline, the parts drawn out shall apply also to all other like portions of the Work. Where ornaments or other details are indicated by starting only, such details shall be continued throughout the courses or parts in which they occur and shall also apply to all other similar parts in the Work, unless otherwise indicated.

3.02 Reference to Standards and Specifications of Technical Societies

A. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code or Laws or Regulations in effect at the time of opening of Bids (or on the date of CONTRACTOR's proposal if there are no Bids), except as may be otherwise specifically stated in the Contract Documents.

1. No provision of any such standard, specification, manual, code or instruction of Supplier shall be effective to change the duties or responsibilities of CITY, CONTRACTOR or DESIGN PROFESSIONAL, or any of their Subcontractors, Consultants, agents, or employees from those set forth in the Contract Documents, nor shall it be effective to assign to CITY or DESIGN PROFESSIONAL or any of their Consultants, agents or employees any duty or

authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 Reporting and Resolving Discrepancies

A. Reporting Discrepancies: If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Laws or Regulations applicable to the performance of the Work or of any standard, specification, manual, code or any instruction of any Supplier referred to in Paragraph 6.07, CONTRACTOR shall report it immediately to DESIGN PROFESSIONAL in writing. CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as authorized by Paragraph 6.17) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04; provided, however, that CONTRACTOR shall not be liable to CITY or DESIGN PROFESSIONAL for failure to report any such conflict, error, ambiguity or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

B. Resolving Discrepancies. The provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity or discrepancy between the provisions of the Contract Documents and:

1. the provisions of any standard, specification, manual, code or instruction (whether or not specifically incorporated by reference in the Contract Documents); or
2. the provisions of any Laws or Regulations applicable to the performance of the Work.

3.04 Amending and Supplementing Contract Documents

A. The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

1. a Written Amendment or
2. a Change Order (pursuant to Article 10), whether pursuant to a Work Change Directive or otherwise.

B. The requirements of the Contract Documents may be supplemented and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

1. DESIGN PROFESSIONAL's approval of a Shop Drawing or Sample (pursuant to Paragraph 6.18), or
2. DESIGN PROFESSIONAL's written interpretation or clarification (pursuant to Paragraph 9.03).

3.05 Reuse of Documents

A. CONTRACTOR and any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under this Contract:

1. shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of DESIGN PROFESSIONAL or Consultant, and
2. shall not reuse any of such Drawings, Specifications, other documents or copies thereof on extensions of the Project or any other project without written consent of CITY, and of DESIGN PROFESSIONAL or Consultant, as applicable, and specific written verification or adaptation by DESIGN PROFESSIONAL or Consultant.

This prohibition will survive final payment, completion, and acceptance of the Work, or

termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.01 Availability of Lands

A. CITY shall furnish the Site. CITY shall identify any encumbrances or restrictions not of general application but specifically related to use of lands so furnished with which CONTRACTOR will have to comply in performing the Work. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by CITY, unless otherwise provided in the Contract Documents. If CONTRACTOR and CITY are unable to agree on entitlement to or the amount or extent of any adjustments in the Contract Price or the Contract Times or both as a result of any delay in CITY's furnishing these lands, rights-of-way or easements, CONTRACTOR may make a Claim as provided in Article 16. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 Subsurface and Physical Conditions

A. Reports and Drawings: Reference is made to the Supplementary Conditions for identification of:

1. Subsurface Conditions: Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by DESIGN PROFESSIONAL in preparing the Contract Documents; and
2. Physical Conditions: Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that have been utilized by DESIGN PROFESSIONAL in preparing the Contract Documents.

B. Limited Reliance by CONTRACTOR on Technical Data Authorized: CONTRACTOR may rely upon the general accuracy of the technical data contained in reports and drawings of subsurface or physical conditions, but such reports and drawings are not Contract Documents. The technical data is identified in the Supplementary Conditions. Except for reliance on such technical data, CONTRACTOR may not rely upon or make any Claim against CITY, DESIGN PROFESSIONAL or any Consultant with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings, or
3. any CONTRACTOR interpretation of or conclusion drawn from any technical data or any such other data, interpretations, opinions or information.

4.03 Differing Subsurface or Physical Conditions

A. Notice of Differing Subsurface or Physical Conditions. If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any technical data on which CONTRACTOR is entitled to rely as provided in Paragraphs 4.02 A and 4.02 B is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.17), notify CITY and DESIGN PROFESSIONAL in writing about such condition(s). CONTRACTOR shall not further disturb such conditions or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. DESIGN PROFESSIONAL's Review: After receipt of notice as required by Paragraph 4.03 A, DESIGN PROFESSIONAL will promptly review the pertinent conditions, determine the necessity for CITY to obtain additional exploration or tests with respect thereto and notify CITY in writing (with a copy to CONTRACTOR) of DESIGN PROFESSIONAL's findings and conclusions.

C. Possible Contract Documents Change: If CITY concludes that a change in the Contract Documents is required as a result of a condition that meets one or more of the categories in Paragraph 4.03 A, a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of such change.

D. Possible Price or Times Adjustments: An equitable adjustment in the Contract Price or in the Contract Times, or both, will be allowed to the extent that the existence of a subsurface or physical condition causes an increase or decrease in CONTRACTOR's cost of, or time required for, performance of the Work; subject, however, to the following:

1. the condition must meet any one or more of the categories described in Paragraphs 4.03 A.1 through 4.03 A.4, inclusive;
2. a change in the Contract Documents pursuant to Paragraph 4.03 C will not be an automatic authorization of, nor a condition precedent to, entitlement to any such adjustments;
3. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.06 and 11.04; and
4. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if;
 - a. CONTRACTOR knew, or by the exercise of ordinary care could have known, of such conditions at the time CONTRACTOR made a final commitment to CITY with respect to Contract Price and Contract Times by the submission of a Bid; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or
 - c. CONTRACTOR failed to give the written notice as required by Paragraph 4.03 A.

E. If CITY and CONTRACTOR are unable to agree on entitlement to, or magnitude of, an equitable adjustment in the Contract Price pursuant to Article 11 and/or Contract Times pursuant to Article 12, a Claim may be made therefore as provided in Article 16. However, CITY, DESIGN PROFESSIONAL and Consultants shall not be liable to CONTRACTOR for any costs, losses or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all other dispute resolution costs) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.04. Physical Conditions - Underground Facilities

A. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to CITY or DESIGN PROFESSIONAL by the owners of such Underground Facilities or by others.

1. CITY and DESIGN PROFESSIONAL shall not be responsible for the accuracy or completeness of any such information or data; and

2. The cost of all of the following will be included in the Contract Price and CONTRACTOR shall have full responsibility for:

- a. reviewing and checking all such information and data,
- b. locating all Underground Facilities shown or indicated in the Contract Documents,
- c. coordination of the Work with the owners of such Underground Facilities during construction, and
- d. the safety and protection of all such Underground Facilities as provided in Paragraph 6.14 and repairing any damage thereto resulting from the Work.

B. Not Shown or Indicated: If an Underground Facility is uncovered or revealed at or contiguous to the Site, and was not shown or indicated in the Contract Documents, or was shown or indicated incorrectly in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.17), identify the owner of such Underground Facility and give written notice to that owner and to CITY and DESIGN PROFESSIONAL.

C. DESIGN PROFESSIONAL's Review: After receipt of notice as required by Paragraph 4.04 B, DESIGN PROFESSIONAL will promptly review the consequences of the existence of the Underground Facility and notify CITY in writing (with a copy to CONTRACTOR) of DESIGN PROFESSIONAL's findings and conclusions.

D. Possible Contract Documents Change: If CITY concludes that a change in the Contract Documents is required as a result of the existence of an Underground Facility that either was not shown, or was shown incorrectly, in the Contract Documents, a Work Change Directive or Change Order will be issued as provided in Article 10 to reflect and document the consequences of such change.

E. Possible Price or Times Adjustments: An equitable adjustment in the Contract Price or in the Contract Times, or both, will be allowed to the extent that the existence of the Underground Facility causes an increase or decrease in CONTRACTOR's cost of, or time required for, performance of the Work; subject, however, to the following:

1. a change in the Contract documents pursuant to Paragraph 4.04 D will not be an automatic authorization of, nor a condition precedent to, entitlement to any such adjustments;

2. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.06 and 11.04; and

3. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if;

- a. CONTRACTOR knew, or by the exercise of ordinary care could have known, of the existence of the Underground Facility at the time CONTRACTOR made a final commitment to CITY with respect to Contract Price and Contract Times by the submission of a Bid; or

- b. the existence of the Underground Facility could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test or study of the

Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or

c. CONTRACTOR failed to give the written notice as required by Paragraph 4.04 B.

F. If CITY and CONTRACTOR are unable to agree on entitlement to, or magnitude of, an equitable adjustment in the Contract Price pursuant to Article 11 and/or Contract Times pursuant Article 12, a Claim may be made therefore as provided in Article 16. However, CITY, DESIGN PROFESSIONAL and Consultants shall not be liable to CONTRACTOR for any costs, losses or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all other dispute resolution costs) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.05 Reference Points

A. CITY shall provide engineering surveys to establish reference points for construction that in DESIGN PROFESSIONAL's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of CITY. CONTRACTOR shall report to DESIGN PROFESSIONAL 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 professionally qualified personnel.

4.06 Asbestos, Lead-Based Paint, PCBs, Petroleum, Hazardous Waste or Radioactive Material

A. Reports and Drawings: Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the DESIGN PROFESSIONAL in the preparation of the Contract Documents.

B. Limited Reliance by CONTRACTOR on Technical Data Authorized: CONTRACTOR may rely upon the general accuracy of the technical data contained in reports and drawings relating to a Hazardous Environmental Condition at the Site, but such reports and drawings are not Contract Documents. Such technical data is identified in the Supplementary Conditions. Except for such reliance on such technical data, CONTRACTOR may not rely upon or make any Claim against CITY, DESIGN PROFESSIONAL or any Consultant with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
3. any CONTRACTOR interpretation of or conclusion drawn from any technical data or any such other data, interpretations, opinions or information.

C. CONTRACTOR shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. CONTRACTOR shall be responsible for all Hazardous Environmental Conditions created with any materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers, or anyone else for whom CONTRACTOR is responsible. CONTRACTOR shall not be entitled to an extension of the Contract Times or an increase in the Contract Price if CONTRACTOR, Subcontractor, Supplier or anyone for whom

CONTRACTOR is responsible created any Hazardous Environmental Condition at the Site or in connection with the Work.

D. If CONTRACTOR encounters a Hazardous Environmental Condition at the Site or if CONTRACTOR or anyone for whom CONTRACTOR is responsible creates a Hazardous Environmental Condition at the Site, CONTRACTOR shall immediately:

1. secure or otherwise isolate such condition;
2. stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6. 15); and
3. notify CITY and DESIGN PROFESSIONAL (and promptly thereafter confirm such notice in writing). CITY shall promptly consult with DESIGN PROFESSIONAL concerning the necessity for CITY to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. CONTRACTOR shall neither resume Work nor be required to resume Work in connection with such condition or in any affected area until after CITY has obtained any required permits related thereto and delivered to CONTRACTOR written notice:

1. specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or
2. specifying any special conditions under which such Work may be resumed safely. If CITY and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price pursuant to Article 11and/or Contract Times to pursuant to Article 12 as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by CONTRACTOR, a Claim may be made therefore as provided in Article 16.

F. If after receipt of written notice as required in Paragraph 4.06 E, CONTRACTOR does not agree to resume Work based on a reasonable belief it is unsafe or does not agree to resume such Work under special conditions specified in the notice, then CITY may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If CITY and CONTRACTOR cannot agree as to entitlement to or magnitude of an equitable adjustment in Contract Price pursuant to Article 11and/or Contract Times pursuant to Article 12 as a result of deleting such portion of the Work, then a Claim may be made therefore as provided in Article 16. CITY may have such deleted portion of the Work performed by CITY's own forces or others in accordance with Article 7.

G. The provisions of Paragraphs 4.02, 4.03, and 4.04 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

H. All materials used, whether new or salvaged, shall be asbestos-free materials. CONTRACTOR shall immediately call to the attention of the CITY's Representative any specified material or product which the CONTRACTOR knows or suspects to contain asbestos, whether new or salvaged.

ARTICLE 5 BONDS AND INSURANCE

5.01 Performance, Payment and Other Bonds

A. CONTRACTOR shall furnish Performance and Maintenance and Payment Bonds, each in an amount at least equal to the Contract Price, as set out in the Contract Documents, as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one (1) year after the date when final payment of the Contract becomes due, except as provided otherwise by Laws or Regulations

or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary Conditions.

B. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations. A certified copy of the agent's authority to act must accompany all Bonds signed by an agent.

C. If the surety on any Bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirement of Paragraph 5.01 B, CONTRACTOR shall within twenty (20) days thereafter substitute another Bond and surety, both of which must be acceptable to CITY.

5.02 Licensed Sureties and Insurers

A. All Bonds and insurance required by the Contract Documents to be purchased and maintained by CITY or CONTRACTOR shall be obtained from surety or insurance companies that are duly licensed in the State of Missouri and in the jurisdiction in which the Project is located, if not in Missouri, to issue Bonds or insurance policies for the limits and coverages so required. All surety and insurance companies shall hold an A.M. Best rating of B+, V, or better.

5.03 Certificates of Insurance

A. CONTRACTOR shall deliver to CITY and DESIGN PROFESSIONAL, prior to the start of any Work at the Project Site, properly completed certificates of insurance or other evidence that the required insurance is in full force and effect, in a form acceptable to CITY. The receipt or acceptance of a certificate of insurance that does not incorporate the required terms and coverage shall not constitute a waiver by the City of the insurance requirements contained in the Contract Documents.

B. All policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained by CONTRACTOR in accordance with Paragraphs 5.04 and 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or changed or renewal refused until at least thirty (30) days prior written notice has been given to CITY and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07 A - The certificates of insurance will contain a provision stating that should any of the policies described in the certificate be cancelled before the expiration date thereof, notice will be delivered in accordance with the policy provisions.

C. If the coverage afforded is cancelled or changed or its renewal is refused, CONTRACTOR shall give at least thirty (30) days prior written notice to CITY and to each other additional insured to whom a certificate of insurance has been issued.

5.04 CONTRACTOR's Liability Insurance

A. CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and furnished, and will provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance and furnishing of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed or furnished by CONTRACTOR, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits and other similar employee benefit acts;
2. claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;
4. claims for damages insured by customary personal injury liability coverage;
5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefore; and
6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance so required by Paragraph 5.04 A, to be purchased and maintained shall:

1. with respect to insurance required by Paragraphs 5.04 A.3 through 5.04 A.5 inclusive, include as additional insureds (subject to any customary exclusion for professional liability) CITY, DESIGN PROFESSIONAL, Consultants and any other individuals or entities identified in the Supplementary Conditions to be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
2. include at least the specific coverages and be written for not less than the limits of liability provided in Paragraph 5.04 C or required by Laws or Regulations, whichever is greater;
3. include completed operations insurance;
4. include contractual liability insurance covering CONTRACTOR's indemnity obligations;
5. contain a provision or endorsement that the coverage afforded will not be canceled, changed or renewal refused until at least thirty (30) days prior written notice has been given to CITY, CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to Paragraph 5.03 will so provide);
6. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be correcting, removing or replacing defective Work in accordance with Paragraphs 13.06 and 13.07;
7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two (2) years after final payment (and CONTRACTOR shall furnish CITY and each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued evidence satisfactory to CITY and any such additional insured of continuation of such insurance);
8. contain a cross-liability or severability of interest clause or endorsement. Insurance covering the specified additional insureds shall be primary insurance, and all other insurance carried by the additional insureds shall be excess insurance;
9. with respect to commercial automobile liability, commercial general liability, and umbrella liability insurance, CONTRACTOR shall require its insurance carrier(s) to waive all rights of subrogation against CITY, and CITY's officers, directors, partners, employees and agents; and
10. contain a provision or endorsement that the costs of providing the insureds a defense and appeal, including attorneys fees, as insureds, shall be supplementary and shall not be included as part of the policy limits but shall remain the insurer's responsibility.

C. Specific policies of insurance required by this Paragraph 5.04 shall include:

1. Workers' Compensation and Employers' Liability Insurance. This insurance shall protect CONTRACTOR against all claims under applicable state workers' compensation laws, including coverage as necessary for the benefits provided under the United States Longshoremen's and Harbor Workers' Act and the Jones Act. CONTRACTOR shall also be protected against claims for injury, disease, or death of employees which, for any reason, may not fall within the provisions of workers' compensation laws. This policy shall include an "all states" or "other states" endorsement. The liability limits shall be not less than:

Workers' Compensation: Statutory

Employers' liability: \$1,000,000 each occurrence

2. Commercial Automobile Liability Insurance. This insurance shall be occurrence type written in comprehensive form and shall protect CONTRACTOR, and CITY, DESIGN PROFESSIONAL and Consultants against all claims for injuries to members of the public and damage to property of others arising from the use of motor vehicles, either on or off the Project Site, whether they are owned, non-owned, or hired.

The liability limits shall be not less than: \$2,000,000

3. Commercial General Liability Insurance. This insurance shall be occurrence type written in comprehensive form acceptable to CITY. This insurance shall protect CONTRACTOR, and CITY, DESIGN PROFESSIONAL and Consultants as additional insureds, against claims arising from injuries, sickness, disease, or death of any person or damage to property arising out of performance of the Work. The policy shall also include coverage for personal injury liability; contractual liability; completed operations and products liability; and for blasting, explosion, and collapse of buildings; and damage to underground property. The liability limits for bodily injury and property damage shall be not less than:

\$2,000,000 combined single limit for each occurrence

\$2,000,000 general aggregate.

4. The insurer's costs of providing the insureds a defense and appeal as additional insureds, including attorney's fees, shall be supplementary and shall not be included as part of the policy limits but shall remain the insurer's separate responsibility.

5.05 CITY's Liability Insurance

A. In addition to the insurance required to be provided by CONTRACTOR under Paragraph 5.04, CITY, at CITY's option, may purchase and maintain at CITY's expense liability insurance that will protect CITY against claims which may arise from operations under the Contract Documents.

5.06 Property Insurance

A. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall purchase and maintain property insurance on the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws or Regulations). This insurance shall:

1. include the interests of CITY, CONTRACTOR, Subcontractors, and any other persons or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, tornado, collapse, debris removal, demolition occasioned by

enforcement of Laws or Regulations, water damage, damage caused by frost and freezing, and acts of God;

3. be maintained in effect until final payment is made unless otherwise agreed to in writing by CITY with thirty (30) days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. CITY shall not be responsible for purchasing and maintaining any property insurance to protect the interests of CONTRACTOR, Subcontractors or others involved in the Work to the extent of any deductible amounts. The risk of loss within the deductible amounts will be borne by CONTRACTOR, Subcontractor or others suffering any such loss and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.07 Waiver of Rights

A. CITY and CONTRACTOR intend that all policies purchased in accordance with Paragraphs 5.04 and 5.06 will protect CITY, CONTRACTOR, DESIGN PROFESSIONAL Consultants, Subcontractors, and all other persons or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds in such policies and will provide primary coverage for all losses and damages caused by the perils covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. CITY and CONTRACTOR waive all rights against each other and their respective officers, directors, partners, employees and agents for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work, but only to the extent of insurance coverage; and, in addition, waive all such rights against DESIGN PROFESSIONAL, Consultants, Subcontractors, and all other persons or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of any and each of them) under such policies for losses and damages so caused and covered by insurance. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by CITY as trustee or otherwise payable under any policy so issued. None of the above waivers shall apply if specifically in conflict with Laws and Regulations.

5.08 Receipt and Application of Insurance Proceeds

A. Any insured loss under the property insurance will be adjusted with CITY and made payable to CITY as fiduciary for the insureds, as their interests may appear, subject to the requirements of any indentures of indebtedness entered into by CITY.

B. CITY as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object to CITY's exercise of this power in writing within fifteen (15) days after the occurrence of loss. If such objection is made, CITY as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, CITY as fiduciary shall adjust and settle the loss with the insurers.

5.09 Partial Utilization - Property Insurance

A. If CITY finds it necessary to occupy or use a portion or portions of the Work prior to Achievement of Full Operation of all the Work, such use or occupancy may be accomplished in accordance with Paragraph 14.05; provided that no such use or occupancy shall commence before the insurers providing the property insurance have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property

insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 CONTRACTOR'S RESPONSIBILITIES

6.01 Indemnification

A. For purposes of this Paragraph 6.01 only, the following terms shall have the meanings listed:

1. Claims means all claims, damages, liability, losses, costs and expenses, including court costs and reasonable attorneys' fees, including attorney's fees incurred by the City in the enforcement of this indemnity obligation.

2. CONTRACTOR'S Agents means CONTRACTOR's officers, employees, sub-consultants, subcontractors, successors, assigns, invitees, and other agents.

3. CITY means CITY, its Program Manager/Construction Advisor and any of their agents, officials, officers, employees and program managers or construction advisors.

B. CONTRACTOR's obligations under this Paragraph with respect to indemnification for acts or omissions, including negligence, of CITY, shall be limited to the coverage and limits of insurance that CONTRACTOR is required to procure and maintain under this Contract. CONTRACTOR affirms that it has had the opportunity to recover the costs of the liability insurance required in this Contract in its contract price.

C. CONTRACTOR shall defend, indemnify and hold harmless CITY from and against all Claims arising out of or resulting from all acts or omissions in connection with this Contract caused in whole or in part by CONTRACTOR or CONTRACTOR's Agents, regardless of whether or not caused in part by any act or omission, including negligence, of OWNER.

D. In any and all Claims against CITY, DESIGN PROFESSIONAL, CONSULTANT, or any of their respective agents, officers, directors or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.01 C shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier or other person or organization under workers' compensation acts, disability benefit acts or other employee benefit acts.

E. The indemnification obligations of CONTRACTOR under Paragraph 6.01 C shall not extend to liability arising out of, resulting from, or caused by the professional negligence, errors or omissions of DESIGN PROFESSIONAL, CONSULTANT, or any of their respective agents, officers, directors or employees.

6.02 Supervision and Superintendence

A. CONTRACTOR shall supervise, inspect and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of others in the design or specification of a specific means, method, technique, sequence or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent of the Work, who shall not be replaced without written request to and

approval by CITY except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to or received from the superintendent shall be binding on CONTRACTOR.

C. If it is determined to be in the best interest of the Work, CONTRACTOR shall replace the project manager, resident superintendent or any other employee of the CONTRACTOR, Subcontractors, Suppliers or other persons or organizations performing or furnishing any of the Work on the project upon written request by the CITY.

6.03 Services, Working Hours, Labor, Materials and Equipment

A. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out and construct or perform the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the Site. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the Site shall be performed during regular working hours. CONTRACTOR shall not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without CITY's written consent given after prior written notice to DESIGN PROFESSIONAL.

B. Unless otherwise specified in Division 1, General Requirements, CONTRACTOR shall furnish and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

C. All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of CITY. If required by DESIGN PROFESSIONAL, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment. All materials and equipment shall be stored, applied, installed, connected, erected, used, cleaned and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

D. It is the policy of the CITY that any manufactured goods or commodities used or supplied in the performance of this Contract and any subcontract hereto shall be manufactured or produced in the United States whenever possible.

6.04 Progress Schedule

A. CONTRACTOR shall adhere to the progress schedule established in accordance with Article 2 as it may be adjusted from time to time as provided below:

1. **CONTRACTOR shall provide, at least once every thirty (30) calendar days, updated information on the project schedule**, including thirty (30) day look ahead schedules, projected variances per event category and per Subcontractor, identification of all variances and calculation of the number of Days difference between the as-built critical path and the project schedule critical path

2. **CONTRACTOR shall, with each application for payment, provide completed monthly updated status report for the previous month on the project schedule and updated information indicating as-built and as-planned conditions.** The updated information on the project schedule shall not modify any Milestone dates in the project schedule that CITY has previously approved. **The updated information required is a condition precedent to payment pursuant to paragraph 14.02 and shall include at a minimum:**

- a. a concise statement of the outlook for meeting project schedule dates and the reasons for any change in outlook from the previous report;
- b. a review of any significant technical problems encountered during the month;
- c. an explanation of any corrective action taken or proposed; and
- d. a summary of any Claims anticipated by CONTRACTOR with respect to the Work, including the anticipated costs and schedule impacts of any such Claims.

6.05 Recovery Schedules

A. If the CONTRACTOR should:

- 1. fail, refuse or neglect to supply a sufficient number of workers or to deliver the materials or equipment with such promptness as to prevent the delay in the progress of the Work;
- 2. fail in any respect to commence and diligently prosecute the Work in accordance with the approved baseline project schedule in order to complete Achievement of Full Operation;
- 3. fail to commence, prosecute, finish, deliver or install the different portions of the Work on time as specified in the approved baseline project schedule; or
- 4. fail in the performance of any of the material covenants of the Contract Documents;

CITY shall have the right to direct the CONTRACTOR to prepare a written recovery plan, for CITY's approval, to accelerate the Work in order to conform to the approved baseline project schedule, including, without limitation, providing additional labor or expediting delivery of materials, performing overtime or re-sequencing the Work without adjustments to the Contract value. Upon CITY's approval of the recovery plan, CONTRACTOR shall accelerate the Work in accordance with the plan.

B. Proposed recovery schedules shall be submitted to the City within three (3) calendar days of demand as a separate project plan for review and approval by CITY prior to incorporation into the approved baseline schedule. The recovery schedule shall be submitted in a format compatible with the baseline schedule format. Each proposed revision shall be submitted as a separate schedule, with the following minimum requirements:

- 1. A critical path method diagram showing revised and affected activities or Milestones.
- 2. An activity report for all revised and affected activities or Milestones.

C. Upon acceptance of the recovery schedule by CITY, data shall be added or revised for all new or revised activities and incorporated into the approved baseline project schedule.

6.06 Substitutes and "Or-Equal" Items

A. Materials or equipment: Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance and quality required. Unless the specification or description contains, or is followed by, words reading that no like, equivalent or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to CITY for review by CITY's Representative under the following circumstances:

- 1. "Or-Equal": If, prior to receipt of Bids, Bidder proposes an item of material or equipment as functionally equal to that named and sufficiently similar so that no change in related Work will be required, CITY's Representative may request DESIGN PROFESSIONAL to consider it as an "or-equal" item. DESIGN PROFESSIONAL will review and recommend the acceptance, or rejection, of the proposed item to the CITY's Representative. For the purposes of this Paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment DESIGN PROFESSIONAL determines that:

(1) it is at least equal in quality, durability, appearance, strength, and design characteristics; and

(2) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole; and

b. Bidder certifies that:

(1) there is no increase in cost to the CITY; and

(2) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

If the CITY's Representative approves the proposed item, it may be accepted by CITY.

2. Substitute Items: If CONTRACTOR proposes an item of material or equipment as a substitute item, then CONTRACTOR shall submit sufficient information as provided below to allow CITY's Representative to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. The procedure for review by the CITY's Representative will include the following as supplemented in the General Requirements and as CITY's Representative may determine is appropriate under the circumstances:

a. Requests for review of proposed substitute items of material or equipment will not be accepted by CITY's Representative from anyone other than CONTRACTOR.

b. If CONTRACTOR wishes to furnish or use a substitute item of material or equipment, CONTRACTOR shall first make written application to CITY's Representative for acceptance thereof.

c. In the application, CONTRACTOR shall certify that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited to the same use as that specified. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will impact CONTRACTOR's achievement of Achievement of Full Operation, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with CITY for work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty.

d. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by CITY's Representative in evaluating the proposed substitute. CITY's Representative may require CONTRACTOR to furnish additional data about the proposed substitute.

If the CITY's Representative approves the proposed item, CITY may accept it.

B. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to DESIGN PROFESSIONAL. CONTRACTOR shall notify CITY and submit sufficient information to allow DESIGN PROFESSIONAL, in DESIGN PROFESSIONAL's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents.

C. Expenses: Bidder shall provide all data in support of any "or equal" at Bidder's expense, and CONTRACTOR shall provide all data in support of any proposed substitute at CONTRACTOR's expense.

D. Evaluation: DESIGN PROFESSIONAL and CITY's Representative will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.06 A, and 6.06 B. CITY will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without CITY's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. CITY may require CONTRACTOR to furnish at CONTRACTOR's expense, a special performance guarantee or other surety with respect to any "or-equal" substitute. DESIGN PROFESSIONAL will record time required by DESIGN PROFESSIONAL and Consultants in evaluating substitutes proposed or submitted by CONTRACTOR pursuant to Paragraphs 6.06 A and 6.06 B and in making changes in the Contract Documents (or in the provisions of any other direct contract with CITY for work on the Project) occasioned thereby. Whether or not CITY accepts a substitute so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse CITY for the reasonable charges of DESIGN PROFESSIONAL and Consultants for evaluating each such proposed substitute.

6.07 Concerning Subcontractors, Suppliers and Others

A. CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to CITY as indicated in Paragraph 6.07 B), whether initially or as a substitute, against whom CITY has a reasonable objection, including but not limited to debarment by City or another governmental entity or decertification of the Subcontractor from the City's Minority and Women's Business Enterprise Program as a result of the Subcontractor's failure to comply with any of the requirements of the provisions of Chapter 3 of the City's Code as determined by the Director of the Human Relations Department. Contractor shall insert this provision in any subcontractor agreement associated with this Contract. CONTRACTOR shall not be required to employ any Subcontractor, Supplier or other person or organization to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection. CONTRACTOR shall submit required information for all Subcontractors on Form 01290.09 - Subcontractor and Major Material Suppliers List, provided in these Contract Documents, prior to Subcontractor beginning Work at the Site.

B. The Supplementary Conditions require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials or equipment) to be submitted to CITY on or before the date specified in the Supplementary Conditions, for acceptance by CITY. If CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, CITY may accept (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Contract Documents) any such Subcontractor, Supplier or other person or organization so identified, or may reject same on the basis of reasonable objection after due investigation, in which case CONTRACTOR shall submit an acceptable replacement for the rejected Subcontractor, Supplier or other person or organization. The Contract Price will be adjusted by the difference in the cost occasioned by such substitution, and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by CITY of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of CITY or DESIGN PROFESSIONAL to reject defective Work.

C. CONTRACTOR shall be fully responsible to CITY for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier or other person or organization any contractual relationship between CITY or DESIGN PROFESSIONAL and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of CITY or DESIGN PROFESSIONAL to pay or to see to the payment of any moneys due

any such Subcontractor, Supplier or other person or organization except as may otherwise be required by Laws or Regulations.

D. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR.

E. CONTRACTOR shall require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with CITY and DESIGN PROFESSIONAL through CONTRACTOR.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for CONTRACTOR by a Subcontractor or Supplier shall be pursuant to an appropriate written agreement between CONTRACTOR and the Subcontractor or Supplier that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of CITY. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against CITY, CONTRACTOR, DESIGN PROFESSIONAL, Consultants and all other additional insureds for all losses and damages caused by, arising out of or resulting from any perils, to the extent covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

H. Except as otherwise provided in this subsection H and in accordance with the provisions of subsection C hereof, the agreement between CONTRACTOR and the Subcontractor or Supplier referred to in subsection G, shall provide that the CONTRACTOR and the Subcontractor or Supplier agree not to request CITY or CITY's Representative to intervene in or facilitate the resolution of claims or contract disputes arising out of or related to the agreement between CONTRACTOR and the Subcontractor or Supplier. Furthermore, the Contracts between CONTRACTOR and Subcontractors or Suppliers shall provide that all unresolved claims and disputes between CONTRACTOR and the Subcontractor or Supplier that remain unresolved after thirty (30) calendar days from the notice of claim, shall be subject to mediation as a condition precedent to the institution of legal proceedings by either party. Any such mediation shall be conducted in accordance with the CITY's Code Section 3-467.

I. CONTRACTOR shall not insert any provision in any subcontract or agreement associated with this Contract that explicitly states or implies that the subcontractor or supplier shall only be paid for work performed if or when the general CONTRACTOR is paid by the CITY. Contractor's compliance with this provision is a material term of this Contract.

J. CONTRACTORS shall not deny any Subcontractor subcontracting opportunities solely because the Subcontractor is not a signatory to collective bargaining agreements with organized labor.

6.08 Patent Fees and Royalties

A. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation into the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work, and if to the actual knowledge of CITY or DESIGN PROFESSIONAL its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by CITY in the Contract Documents. To the fullest extent permitted by Laws or Regulations, CONTRACTOR

shall defend, indemnify and hold harmless CITY, DESIGN PROFESSIONAL, Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or resulting from any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation into the Work of any invention, design, process, product or device not specified in the Contract Documents.

6.09 Permits

A. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. CITY shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Contract. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and CITY shall pay all charges of such utility owners for capital costs related thereto, such as plant investment fees.

B. CONTRACTOR, at its own expense, shall comply with all Federal, State and local laws and regulations, including, but not limited to the Missouri Clean Water Law (Chapter 644 RSMo) together with any accompanying regulation(s) contained in the Missouri Code of State Regulations (CSR Title 10), as well as any implementing permits, together with any CITY Provisions during the life of this Contract including but not limited to:

a. Approvals and permits as required for construction or land disturbance activities.

b. Compliance with the State of Missouri – Department of Natural Resources (“MDNR”) Missouri State Operating Permit (“Land Disturbance Permit”), MO-R100006 for all construction or land disturbance activity.

c. Development and implementation of a Storm Water Pollution Prevention Plan (SWPPP).

(1) Contractor shall not commence land disturbance activity until the initial SWPPP has been finalized.

(2) Preparation and submittal of all applications, documentation and exhibits required to obtain MDNR approvals for uninterrupted Work at the Site.

(3) Amending/Updating SWPPP.

(4) Site Inspections and submittal of Inspection Reports

(5) Proper Operation and Maintenance to achieve compliance with the terms of the Permit.

(6) Maintenance of required records in accordance with MDNR requirements and requirements included in Article 6 of these Contract Documents.

d. In addition to requirements of Article 6, Contractor shall also provide record access to Missouri Department of Natural Resources (MDNR).

e. Failure to control erosion and water pollution is a permit violation. CONTRACTOR shall have 24 hours after receiving notice of the violation to correct the problem. If the CONTRACTOR fails to correct the problem after the time prescribed, the City will hire a remediation expert to fix the problem. In such an event, the CONTRACTOR shall be liable to the City for the remediation costs plus a 10% mark-up of the total contract price. If the CONTRACTOR receives three (3) notices of violation of the erosion control plan and the City’s MS4 permit, the Director may issue a stop work order and delay any payment until

control measures are properly functioning and stream damage has been mitigated. In such an event, any delay to the project schedule will result in liquidated damages assessed against the CONTRACTOR.

6.10 Compliance with Laws and Regulations

A. CONTRACTOR shall comply with all federal, state, and local laws, ordinances and regulations applicable to the work and this Agreement. CONTRACTOR shall give all notices and comply with all Laws or Regulations applicable to furnishing and performing the Work. Except where otherwise expressly required by applicable Laws or Regulations, neither CITY nor DESIGN PROFESSIONAL shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations. The Laws or Regulations included in this Paragraph shall include, but not be limited to, those set forth in the Supplementary Conditions.

B. Failure to Comply. If CONTRACTOR performs any Work in violation of applicable Laws, Regulations, or stipulations of the Consent Decree, CONTRACTOR shall bear all claims, costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) caused by, arising out of or resulting therefrom; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws or Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under Paragraph 3.03.

C. Conflicts of Interest. The provisions of City's Code Sections 2-1015 and 3-301, prohibiting City officers and employees from having a financial or personal interest in any contract with City, and Code Sections 3-307 and 3-309, imposing sanctions for violations, shall apply to this Contract. CONTRACTOR certifies that no officer or employee of City has, or will have, a direct or indirect financial or personal interest in this Contract, and that no officer or employee of City, or member of such officer's or employee's immediate family, either has negotiated, or has or will have an arrangement concerning employment to perform services on behalf of CONTRACTOR on this Contract.

D. Licenses and Permits. CONTRACTOR, at its own expense, shall secure or cause to be secured all licenses and permits from public or private sources necessary for the fulfillment of its obligations under this Contract. All references in this Contract to the "Code" shall mean City's Code of Ordinances, including any amendments thereto or re-codification thereof unless the context clearly indicates otherwise. CONTRACTOR shall obtain copies of all necessary licenses and permits from Subcontractors required for the Work before Subcontractors begin Work at the Site. CONTRACTOR shall retain such evidence in its files and make available to CITY within ten (10) days after CITY's written request.

E. Americans with Disabilities Act. CONTRACTOR agrees to comply, during the course of this Contract, with all provisions of Title II of the 2010 ADA Standards for Accessible Design as amended from time to time.

F. Affirmative Action. If the Contract Price exceeds \$300,000.00 and CONTRACTOR employs fifty (50) or more people, CONTRACTOR shall comply with City's Affirmative Action requirements in accordance with the provisions of Chapter 3 of City's Code, the rules and regulations relating to those sections, and any additions or amendments thereto. CONTRACTOR shall not discriminate against any employee or applicant for employment because of race, color, sex, religion, national origin or ancestry, disability, sexual orientation, gender identity or age in a manner prohibited by Chapter 3 of City's Code.

CONTRACTOR shall:

1. Submit, in print or electronic format, a copy of CONTRACTOR'S current certificate of compliance to the City's Civil Rights and Equal Opportunity Department (CREO) prior to receiving the first payment under the contract, unless a copy has already been submitted to CREO at any point within the previous two calendar years. If, and only if, CONTRACTOR

does not possess a current certification of compliance, CONTRACTOR shall submit, in print or electronic format, a copy of its affirmative action program to CREO prior to receiving the first payment under the contract, unless a copy has already been submitted to CREO at any point within the previous two calendar years..

2. Require any Subcontractor awarded a subcontract exceeding \$300,000.00 to affirm that Subcontractor has an affirmative action program in place and will maintain the affirmative action program in place for the duration of the subcontract.

3. Obtain from any Subcontractor awarded a subcontract exceeding \$300,000.00 a copy of the Subcontractor's current certificate of compliance and tender a copy of the same, in print or electronic format, to CREO within thirty (30) days from the date the subcontract is executed. If, and only if, Subcontractor does not possess a current certificate of compliance, CONTRACTOR shall obtain a copy of the Subcontractor's affirmative action program and tender a copy of the same, in print or electronic format, to CREO within thirty (30) days from the date the subcontract is executed.

City has the right to take action as directed by City's Civil Rights and Equal Opportunity Department to enforce this provision. If CONTRACTOR fails, refuses or neglects to comply with the provisions of Chapter 3 of City's Code, then such failure shall be deemed a total breach of this Contract and this Contract may be terminated, canceled or suspended, in whole or in part, and CONTRACTOR may be declared ineligible for any further contracts funded by City for a period of one (1) year. This is a material term of this Contract.

G. Minority and Women Business Enterprises and Workforce. City is committed to ensuring that minorities and women participate to the maximum extent possible in the performance of City's construction contracts. If minority and women business enterprise (M/WBE) goals have been set for this Contract, CONTRACTOR agrees to comply with all requirements of City's Minority and Women's Business Enterprise Program as enacted in City's Code, Sections 3-421 through 3-469 and as hereinafter amended. CONTRACTOR shall meet or exceed both the MBE and WBE goals set forth in its Contractor Utilization Plan/Request for Waiver. If workforce utilization goals are applicable to this Contract, CONTRACTOR agrees to comply with all requirements of City's Construction Employment Program as enacted in City's Code, Sections 3-501 through 3-527 and as hereinafter amended. CONTRACTOR shall meet or exceed the construction employment goals unless the same shall have been waived in the manner provided by law. CONTRACTOR's compliance with this provision is a material part of this Contract.

H. Records.

1. For purposes of this section:

(a) "City" shall mean the City Auditor, the City's Internal Auditor, the City's Director of Human Relations, the City Manager, the City department administering this Contract and their delegates and agents.

(b) "Record" shall mean any document, book, paper, photograph, map, sound recordings or other material, regardless of physical form or characteristics, made or received in connection with this Contract and all Contract amendments and renewals.

2. Contractor shall maintain and retain all Records for a term of five (5) years that shall begin after the expiration or termination of this Contract and all Contract amendments. City shall have a right to examine or audit all Records and Contractor shall provide access to City of all records upon ten (10) days written notice from the City.

3. The United States, and its representatives, including attorneys, contractors, and consultants, shall have the right of entry into any facility covered by the Consent Decree at all reasonable times, upon presentation of credentials, to: (1) monitor the progress of activities required under the Consent Decree; (2) verify any data or information submitted to the United States and/or MDNR in accordance with the terms of the Consent Decree; (3) obtain samples and, upon request, splits of any samples taken by the City or its representatives, contractors,

or consultants; (4) obtain documentary evidence, including photographs and similar data; and (5) assess the City's compliance with this Consent Decree.

I. Prevailing Wage.

1. CONTRACTOR shall comply and require its Subcontractors to comply with;

a. sections 290.210 to 290.340, RSMO the State of Missouri Prevailing Wage Law (the "Law"); and

b. 8 CSR 30-3.010 to 8 CSR 30-3.060, the Prevailing Wage Law Rules (the "Rules"); and

c. the Annual Wage Order (Wage Order) issued by the State of Missouri's Department of Labor and Industrial Relations; and

d. any applicable Annual Incremental Wage Increase (Wage Increase) to the Annual Wage Order.

2. The Law, Rules, Annual Wage Order and any Wage Increase are incorporated into and made part hereof this Contract and shall be collectively referred to in this Section as the "Prevailing Wage Requirements."

3. CONTRACTOR shall pay and require its Subcontractors to pay to all workers performing work under this Contract not less than the prevailing hourly rate of wages for the class or type of work performed by the worker in accordance with the Law, Rules, Wage Order and any applicable Wage Increase. CONTRACTOR shall take whatever steps are necessary to insure that the prevailing hourly wage rates are paid and that all workers for CONTRACTOR and each of its Subcontractors are paid for the class or type of work performed by the worker in accordance with the Prevailing Wage Requirements.

4. Prior to each of its Subcontractors beginning Work on the Site, CONTRACTOR shall require each Subcontractor to complete CITY's Form 00490 entitled "Pre-contract Certification" that sets forth the Subcontractor's prevailing wage and tax compliance history for the two (2) years prior to the bid. CONTRACTOR shall retain one (1) year and make the Pre-contract Certifications available to CITY within five (5) days after written request.

5. CONTRACTOR shall:

a. Keep and require each of its Subcontractors engaged in the construction of public works in performance of the Contract to keep full and accurate records on City's "Daily Labor Force Report" Form indicating the worker's name, occupational title or classification group & skill and the workers' hours. City shall furnish blank copies of the Daily Labor Force Report Form to Contractor for its use and for distribution to Subcontractors. Contractor shall submit its and its Subcontractors Daily Labor Force Reports to City each day; and

b. Submit, and require each of its Subcontractors engaged in the construction of public works in performance of the Contract to submit electronically, in a format prescribed by the City, Certified Payroll Report Information indicating the worker's name, address, social security number, occupation(s), craft(s) of every worker employed in connection with the public work together with the number of hours worked by each worker and the actual wages paid in connection with the Project and other pertinent information as requested by the City; and

c. Submit, and require each of its Subcontractors engaged in the construction of public works in performance of the Contract to submit, electronically, in format prescribed by the City, a Payroll Certification. The Payroll Certification must be signed by the employee or agent who pays or supervises the payment of the workers employed under the Contract for the Contractor and each Subcontractor.

d. The Daily Labor Force Report, documents used to compile information for the Certified Payroll Report, and Payroll Certification are collectively referred to in this Section as the "Records."

6. CONTRACTOR shall submit its and its Subcontractors Daily Labor Force Reports to CITY each day. CONTRACTOR shall make all of CONTRACTOR's and Subcontractors' Records open to inspection by any authorized representatives of OWNER and the Missouri Department of Labor and Industrial Relations at any reasonable time and as often as they may be necessary and such Records shall not be destroyed or removed from the State of Missouri for a period of one (1) year following the completion of the public work in connection with which the Records are made. CONTRACTOR shall have its and its Subcontractors Certified Payroll Reports and Payroll Certifications available at the CONTRACTOR's office and shall provide the Records to the City electronically at City's sole discretion. In addition, all Records shall be considered a public record and CONTRACTOR shall provide the Records to the CITY in the format required by the CITY within three (3) working days of any request by CITY at the CONTRACTOR's cost. CITY, in its sole discretion, may require CONTRACTOR to send any of the Records directly to the person who requested the Record at CONTRACTOR's expense.

7. CONTRACTOR shall post and keep posted a clearly legible statement of all prevailing hourly wage rates to be paid to all workers employed by CONTRACTOR and each of its Subcontractors in the performance of this Contract in a prominent and easily accessible place at the Site of the Work by all workers.

8. If the Contract Price exceeds \$250,000.00, CONTRACTOR shall and shall require each Subcontractor engaged in any construction of public works to have its name, acceptable abbreviation or recognizable logo and the name of the city and state of the mailing address of the principal office of the company, on each motor vehicle and motorized self-propelled piece of equipment which is used in connection with the Project during the time the CONTRACTOR or Subcontractor is engaged on the project. The sign shall be legible from a distance of twenty (20') feet, but the size of the lettering need not be larger than two (2") inches. In cases where equipment is leased or where affixing a legible sign to the equipment is impractical, the CONTRACTOR may place a temporary stationary sign, with the information required pursuant to this section, at the main entrance of the Project in place of affixing the required information on the equipment so long as such sign is not in violation of any state or federal statute, rule or regulation. Motor vehicles which are required to have similar information affixed thereto pursuant to requirements of a regulatory agency of the state or federal government are exempt from the provisions of this subsection.

9. CONTRACTOR must correct any errors in CONTRACTOR's or any Subcontractors' Records, or CONTRACTOR's or any Subcontractors' violations of the Law, Rules, Annual Wage Order and any Wage Increase within fourteen (14) calendar days after notice from CITY.

10. CONTRACTOR shall and shall require its Subcontractors to cooperate with the CITY and the Department of Labor and Industrial Relations in the enforcement of this Section, the Law, Rules, Annual Wage Order and any Wage Increase. Contractor shall and shall require its Subcontractors to permit CITY and the Department of Labor and Industrial Relations to interview any and all workers during working hours on the Project at CONTRACTOR's sole cost and expense.

11. CONTRACTOR shall file with CITY, upon completion of the Project and prior to final payment therefore, affidavits from CONTRACTOR and each of its Subcontractors, stating that each has fully complied with the provisions and requirements of the Missouri Prevailing Wage Law. CITY shall not make final payment until the affidavits, in proper form and order, from CONTRACTOR and each of its Subcontractors, are filed by CONTRACTOR.

12. CONTRACTOR shall forfeit as a statutory penalty to the CITY one hundred dollars (\$100.00) for each worker employed, for each calendar day, or portion thereof, such worker is paid less than the prevailing hourly rates for any work done under this Contract, by CONTRACTOR or by any of CONTRACTOR's Subcontractors. If CONTRACTOR or any of its Subcontractors have violated any section(s) of 290.210 to 290.340, RSMo, in the course of the execution of the Contract, CITY shall when making payments to the CONTRACTOR becoming due under this Contract, withhold and retain therefrom all sums and amounts due and owing as a result of any violation of sections 290.210 to 290.340, RSMo.

J. Prevailing Wage Damages. CONTRACTOR acknowledges and agrees that, based on the experience of CITY, violations of the Missouri Prevailing Wage Act, whether by CONTRACTOR or its Subcontractors, commonly result in additional costs to CITY. CONTRACTOR agrees that additional costs to CITY for any particular violation are difficult to establish and include but are not limited to: costs of construction delays, additional work for CITY, additional interest expenses, investigations, and the cost of establishing and maintaining a special division working under the City Manager to monitor prevailing wage compliance.

1. In the event of the failure by CONTRACTOR or any of its Subcontractors to pay wages as provided in the Missouri Prevailing Wage Act, CITY shall be entitled to deduct from the Contract Price, and shall retain as liquidated damages, one hundred dollars (\$100.00) per day, per worker who is paid less than the prevailing hourly rate of wages, to approximate the additional costs. The sum shall be deducted, paid or owed whether or not the Contract Times have expired.

2. CITY shall give written notice to CONTRACTOR setting forth the workers who have been underpaid, the amount of the statutory penalty and the amount of the liquidated damages as provided for in this Subparagraph J. CONTRACTOR shall have fourteen (14) calendar days to respond, which time may be extended by CITY upon written request. If CONTRACTOR fails to respond within the specified time, the CITY's original notice shall be deemed final. If CONTRACTOR responds to CITY's notice, CITY will furnish CONTRACTOR a final decision in writing within five (5) days of completing any investigation.

K. Missouri Secretary of State Business Entity Registration. CONTRACTOR shall obtain from all Subcontractors for the Project, a copy of their current certificate of good standing or fictitious name registration from the Missouri Secretary of State before they begin work on the Site. CONTRACTOR shall retain such documents in its files and make available to CITY within ten (10) days after written request.

L. Tropical Hardwoods. The provisions of Code Section 2-1872, restricting the use of tropical hardwoods, shall apply to this Contract.

M. Preference for Missouri Products. Pursuant to Section 71.140 RSMo., preference shall be given to materials, products, supplies and all other articles produced, manufactured, made or grown within the State of Missouri.

N. Guidelines for Open Excavations. CONTRACTOR shall restore required excavations to the level of the adjacent surfaces as soon as practicable. Unsupervised open excavations on public properties are discouraged at all times. If CONTRACTOR, in performance of the Work, makes or causes to be made any excavation in, upon, under, through or adjoining any street, sidewalk, alley, park, boulevard, parkway or any other public properties, and shall leave any part or portion thereof open, CONTRACTOR shall provide effective protection to the public.

CONTRACTOR shall protect and secure all excavations in roadways in compliance with existing federal, state and local codes and standards, including, but not limited to the most current edition of the Manual of Uniform Traffic Control Devices. CONTRACTOR shall protect and secure all unsupervised excavations not within roadways, either by covering or fencing.

a. Covering. A protective cover that can sustain the weight of persons or of objects that are placed upon it may be installed over an unsupervised excavation. The cover shall

be secured to the ground to prevent movement. Protective covers shall have no opening(s) or protuberance(s) of sufficient size to cause a fall and/or injury. Advance warning devices shall be installed as necessary.

b. Fencing. Fencing to prevent entry may be installed surrounding an unsupervised excavation not protectively covered in its entirety. The fencing shall be a minimum of 42" in height. The fencing shall be constructed in such a manner that it is adequately secured and will remain upright at all times under normal Site conditions. All protective coverings and fences over and around excavations shall be inspected at least daily to assure integrity. Protective coverings and/or fences in heavily trafficked areas shall be inspected more often as necessary.

O. Notification of Utilities. CONTRACTOR shall adhere to the provisions of Sections 319.010 et seq., RSMo., which requires that a person or firm making an excavation in any public street, road or alley, right of way dedicated to public use, utility easement of record, or within any private street or private property do so only after giving notice to, and obtaining information from, owners of Underground Facilities. The 24-hour, toll-free accident prevention hotline number in Missouri is 1-800-344-7483 (1-800-Digrite).

P. Employee Eligibility Verification. CONTRACTOR shall adhere to the provisions of Sections 285.525 et seq., RSMo., which requires that for any contract exceeding five thousand dollars (\$5,000.00), CONTRACTOR shall execute and submit an affidavit, in a form prescribed by CITY, affirming that CONTRACTOR does not knowingly employ any person in connection with the contracted services who does not have the legal right or authorization under federal law to work in the United States as defined in 8 U.S.C. § 1324a(h)(3). CONTRACTOR shall attach to the affidavit documentation sufficient to establish CONTRACTOR'S enrollment and participation in an electronic verification of work program operated by the United States Department of Homeland Security (E-Verify) or an equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, under the Immigration Reform and Control Act of 1986. CONTRACTOR may obtain additional information about E-Verify and enroll at <https://e-verify.uscis.gov/enroll/StartPage.aspx?JS=YES>.

Q. For those Contractors enrolled in E-Verify, the first and last pages of the E-Verify Memorandum of Understanding that CONTRACTOR will obtain upon successfully enrolling in the program shall constitute sufficient documentation for purposes of complying with this Section. CONTRACTOR shall submit the affidavit and attachments to CITY prior to execution of the Contract, or at any point during the term of the Contract if requested by City.

R. OSHA 10-Hour Training Requirement. CONTRACTOR and any subcontractor working under this Contract shall require every employee on the Site to complete a ten-hour construction safety program which meets the requirements of Section 292.675, RSMo, except for those employees who shall have previously completed the required program and hold documentation to that effect. CONTRACTOR shall remove or require the removal of any person from the Site who is subject to this requirement and who does not complete or is unable to produce documentation of their successful completion of the required program within the time limitations prescribed by Section 292.675, RSMo. CONTRACTOR shall forfeit the sum of two thousand five hundred dollars (\$2,500.00), in addition to one hundred dollars (\$100.00) per employee each calendar day, or portion thereof, the employee(s) shall continue to be employed without having completed the required program within the time limitations prescribed by Section 292.675, RSMo. CITY shall be entitled to withhold and retain any amounts due and owing hereunder when making payment to CONTRACTOR.

S. Clean Air Act and Clean Water Act. CONTRACTOR shall comply with requirements of the Clean Air Act (42 U.S.C. 7401 et seq.); Clean Water Act (33 U.S.C. 1251 et seq.), Missouri Clean Water Law (Chapter 644 RSMo), Code of Federal regulations (Title 40: Protection of Environment, Title 33: Navigation and Navigable Waters) and the rules of the Missouri Code of State Regulations (CSR Title 10).

T. Contract information Management System. If applicable, CONTRACTOR shall comply with CITY's Contract Information Management System requirements. CONTRACTOR shall use CITY's Internet web based Contract Information Management System/Project Management Communications Tool provided by CITY and protocols included in that software during the term of this Contract. CONTRACTOR shall maintain user applications to CITY's provided system for all personnel, subcontractors or suppliers as applicable and shall require subcontractors/subconsultants to maintain same.

U. Anti-Discrimination Against Israel. If this Contract exceeds \$100,000.00 and CONTRACTOR employs at least ten employees, pursuant to Section 34.600, RSMo., by executing this Contract, CONTRACTOR certifies it is not currently engaged in and shall not, for the duration of this contract, engage in a boycott of goods or services from the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel.

V. Ban the Box in Hiring and Promotion

- a. Pursuant to Section 38-104, City Code Ordinances, CONTRACTOR shall not base a hiring or promotional decision on an applicant's criminal history or sentence related thereto, unless the employer can demonstrate that the employment-related decision was based on all information available including consideration of the frequency, recentness and severity of a criminal record and that the record was reasonably related to the duties and responsibilities of the position.
- b. Notwithstanding subsection (a), CONTRACTOR may inquire about an applicant's criminal history after it has been determined that the individual is otherwise qualified for the position, and only after the applicant has been interviewed for the position. Any such inquiry may be made of all applicants who are within the final selection pool of candidates from which a job will be filled.
- c. This provision shall not apply to positions where employers are required to exclude applicants with certain criminal convictions from employment due to local, state or federal law or regulation.

W. Title VI of the Civil Rights Act of 1964

- a. Title VI of the Civil Rights Act of 1964 requires that no person in the United States shall, on the grounds of race, color, or national or origin (including limited English proficient individuals), be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance. The City of Kansas City, Missouri requires compliance with the requirements of Title VI in all of its programs and activities regardless of the funding source. 00700 Construction General Conditions 03012023 Page - 36 - of 63 Contract Central
- b. CONTRACTOR shall not discriminate on the grounds of race, color, or national or origin (including limited English proficient individuals).

X. Non-discrimination in Employment. CONTRACTOR shall not discriminate against any employee or candidate for employment on the basis of an individual's race, hair texture or hair style associated with an individual's race, color, sex, religion, national origin, or ancestry, disability, sexual orientation, gender identity or age in a manner prohibited by Chapter 38 of the City Code. CONTRACTOR shall not engage in any discrimination as prohibited by Chapter 3 of the City Code.

Y. Quality Services Assurance Act. If this Contract exceeds \$160,000.00, CONTRACTOR certifies that CONTRACTOR will pay all employees who will work on this Contract in the city limits of Kansas City, Missouri at least \$15.00 per hour in compliance with the City's Quality Services

Assurance Act, Section 3-66, Code of Ordinances unless City has granted CONTRACTOR an exemption pursuant to the Quality Services Assurance Act.

6.11 Taxes

A. CONTRACTOR shall pay all sales, consumer, use and other similar taxes required to be paid by CONTRACTOR in accordance with the Laws or Regulations of the place of the Project which are applicable during the performance of the Work.

B. Tax Compliance.

1. As a condition precedent to CITY making its first payment to CONTRACTOR under this Contract, CONTRACTOR shall furnish to CITY sufficient proof from City's Commissioner of Revenue, dated not more than one (1) year prior to the date provided to CITY, verifying that CONTRACTOR is in compliance with the license and tax ordinances administered by City's Revenue Division of the Finance Department.

2. As a condition precedent to Subcontractors performing any Work under this Contract, CONTRACTOR shall obtain from Subcontractor sufficient proof from City's Commissioner of Revenue, dated not more than one (1) year before the date Subcontractor begins Work, verifying that the Subcontractor is in compliance with the license and tax ordinances administered by City's Revenue Division of the Finance Department. CONTRACTOR shall retain such documentation in its files and make available to CITY within ten (10) days after a written request.

3. As a condition precedent to CITY making final payment under this Contract, if this Contract is longer than one (1) year and exceeds the dollar threshold established by ordinance and included in the Supplementary Conditions, CONTRACTOR shall furnish to CITY sufficient proof from City's Commissioner of Revenue, dated not more than one (1) year before the filing of a final Application for Payment, verifying that CONTRACTOR is in compliance with the license and tax ordinances administered by City's Revenue Division of the Finance Department.

4. If this Contract is longer than one (1) year and exceeds the dollar threshold established by ordinance and included in the Supplementary Conditions, CONTRACTOR shall obtain from Subcontractors sufficient proof from City's Commissioner of Revenue, dated not more than one (1) year before the date of CONTRACTOR's final payment to the Subcontractor, that the Subcontractor was or is in compliance with the license and tax ordinances administered by City's Revenue Division of the Finance Department. CONTRACTOR shall retain such documentation in its files and make available to CITY within ten (10) days after written request.

5. If, at the time of final payment to CONTRACTOR, CONTRACTOR is unable to obtain from all its Subcontractors, if any, and furnish to CITY sufficient proof from City's Commissioner of Revenue that all its Subcontractors are in compliance with the license and tax ordinances administered by City's Revenue Division of the Finance Department, CITY may approve final payment to CONTRACTOR if CITY determines that CONTRACTOR has made a good faith effort to furnish evidence or that there are other extenuating circumstances which make it impossible for CONTRACTOR to furnish sufficient proof.

C. Missouri Sales Tax Exemption. Pursuant to Section 144.062, RSMo, CITY is a Missouri exempt entity and tangible personal property to be incorporated or consumed in the construction of this Project may be purchased without sales tax. CITY shall furnish CONTRACTOR a Missouri Project Exemption Certificate for Sales Tax at the time of issuance of the Notice to Proceed.

6.12 Use of Site and Other Areas

A. CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas identified in and permitted by the Contract Documents and other areas permitted by Laws or Regulations. CONTRACTOR

shall not unreasonably encumber the Site and the other areas with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to the Site or the other areas, or to the owner or occupant thereof, or of any adjacent land or areas, resulting from the performance of the Work.

B. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. In case of a failure on the part of the CONTRACTOR to restore such property or to make good such damage or injuries, the CITY may, upon forty-eight (48) hours written notice to the CONTRACTOR, repair, rebuild or otherwise restore such property as the CITY may deem necessary, and the cost thereof will be deducted from any moneys due or which may become due the CONTRACTOR under this Contract.

C. CONTRACTOR shall, to the fullest extent permitted by Laws or Regulations, defend, indemnify and hold harmless CITY, DESIGN PROFESSIONAL, Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or resulting from any claim or action, legal or equitable, brought by any such owner or occupant against CITY, DESIGN PROFESSIONAL or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.

D. During the progress of the Work, CONTRACTOR shall keep the Site and the other areas free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work CONTRACTOR shall remove all waste materials, rubbish and debris from Site and other areas as well as all tools, appliances, construction equipment and machinery and surplus materials. CONTRACTOR shall leave the Site clean and ready for utilization or occupancy by CITY at Achievement of Full Operation of the Work. CONTRACTOR shall restore to all property not designated for alteration by the Contract Documents to its pre-Work condition.

E. CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.13 Record Documents

A. CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, the Contract, Written Amendments, Change Orders, Work Change Directives, and written interpretations and clarifications in good order and annotated to show all changes made during construction. These record documents, together with all approved Samples and a counterpart of all approved Shop Drawings, will be available to CITY and DESIGN PROFESSIONAL for reference. Upon completion of the Work, these record documents, Samples and Shop Drawings will be delivered to DESIGN PROFESSIONAL for CITY.

6.14 Safety and Protection

A. CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall comply with all applicable Laws or Regulations relating to the safety of persons or property to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for safety and protection. CONTRACTOR shall deliver to CITY a copy of CONTRACTOR'S Health and Safety Plan as provided in the Notice of Intent to Contract.

B. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to in Paragraph 6.14 B.2 or 6.14 B.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier or any other person or

organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of CITY, DESIGN PROFESSIONAL, Consultant, or anyone employed by any of them or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR, Subcontractor, Supplier or other person or organization directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and DESIGN PROFESSIONAL has issued a notice to CONTRACTOR in accordance with Paragraph 14.07 that the Work is acceptable (except as otherwise expressly provided in connection with Achievement of Full Operation). CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;
2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation or replacement in the course of the Work.

6.15 Safety Representative

A. In accordance with OSHA standards, CONTRACTOR shall designate a qualified and experienced safety representative whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs. CONTRACTOR's safety representative shall remain at the Site whenever there is Work in progress and shall immediately notify CITY of any emergencies or accidents occurring at the Site

6.16 Hazard Communication Programs

A. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.17 Emergencies

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, CONTRACTOR, without special instruction or authorization from CITY or DESIGN PROFESSIONAL, is obligated to act to prevent threatened damage, injury or loss. CONTRACTOR shall give CITY and DESIGN PROFESSIONAL prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If CITY determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to an emergency, a Work Change Directive or Change Order will be issued.

B. A change in the Contract Documents pursuant to Paragraph 6.15 A will not be an automatic authorization of, nor a condition precedent to, entitlement to adjustment in the Contract Price or Contract Times. If CITY and CONTRACTOR are unable to agree on entitlement to, or magnitude of, an equitable adjustment in the Contract Price or Contract Times, a Claim may be made therefore as provided in Article 16. However, OWNER, DESIGN PROFESSIONAL and Consultants shall not be liable to CONTRACTOR for any costs, losses or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all other dispute resolution costs) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

6.18 Shop Drawings and Samples

A. CONTRACTOR shall submit Shop Drawings to DESIGN PROFESSIONAL for review and approval in accordance with the accepted schedule of Shop Drawings and Sample submittals (see Paragraph 2.07). All submittals shall be identified as DESIGN PROFESSIONAL may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to show DESIGN PROFESSIONAL the services, materials and equipment CONTRACTOR proposes to provide and to enable DESIGN PROFESSIONAL to review the information for the limited purposes required by Paragraph 6.18 D.

B. CONTRACTOR shall also submit Samples to DESIGN PROFESSIONAL for review and approval in accordance with said accepted schedule of Shop Drawings and Sample submittals. Each Sample shall be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended and otherwise as DESIGN PROFESSIONAL may require to enable DESIGN PROFESSIONAL to review the submittal for the limited purposes required by Paragraph 6.18 D. The numbers of each Sample to be submitted will be as specified in the Specifications.

C. Submittal Procedures:

1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

- a. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar information with respect thereto;
- b. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly and installation pertaining to the performance of the Work;
- c. all information relative to means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto; and
- d. CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

3. At the time of each submission, CONTRACTOR shall give DESIGN PROFESSIONAL specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, the notice to be in a written communication separate from the submittal, and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to DESIGN PROFESSIONAL for review and approval of each such variation.

D. DESIGN PROFESSIONAL's Review:

1. DESIGN PROFESSIONAL will review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals accepted by DESIGN PROFESSIONAL as required by Paragraph 2.06. DESIGN PROFESSIONAL's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation into the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. DESIGN PROFESSIONAL's review and approval will not extend to means, methods, techniques, sequences or procedures of construction (except where a particular means, method, technique, sequence or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. DESIGN PROFESSIONAL's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called DESIGN PROFESSIONAL's attention to each such variation at the time of submission as required by Paragraph 6.18 C.3, and DESIGN PROFESSIONAL has given written approval of each such variation by specific written notation thereof incorporated into or accompanying the Shop Drawing or Sample approval; nor will any approval by DESIGN PROFESSIONAL relieve CONTRACTOR from responsibility for complying with the requirements of Paragraph 6.18 C.1.

E. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submissions accepted by DESIGN PROFESSIONAL as required by Paragraph 2.06, any related Work performed prior to DESIGN PROFESSIONAL's review and approval of the pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.

F. CONTRACTOR shall make corrections required by DESIGN PROFESSIONAL and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by DESIGN PROFESSIONAL on previous submittals.

6.19 Continuing the Work

A. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with CITY. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as CITY and CONTRACTOR may otherwise agree in writing.

6.20 CONTRACTOR's General Warranty and Guarantee

B. CONTRACTOR warrants and guarantees to CITY, DESIGN PROFESSIONAL and Consultants that all Work will be in accordance with the Contract Documents and will not be defective. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors, Suppliers or any other individual or entity for whom CONTRACTOR is responsible; or
2. normal wear and tear under normal usage.

C. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents:

1. observations by DESIGN PROFESSIONAL;
2. recommendation of any progress or final payment by DESIGN PROFESSIONAL;
3. the issuance of a certificate of Achievement of Full Operation or any payment related thereto by CITY to CONTRACTOR;
4. use or occupancy of the Work or any part thereof by OWNER;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by DESIGN PROFESSIONAL;
6. any inspection, test or approval by others; or
7. any correction of defective Work by CITY.

D. Nonconforming Work is rejected unless expressly accepted in writing by the CITY's Representative.

ARTICLE 7 OTHER WORK

7.01 Related Work at Site

A. CITY may perform other work related to the Project at the Site by CITY's own forces, or let other direct contracts therefore, or have other work performed by utility owners. If such other work is to be performed and such fact was not noted in the Contract Documents, then:

1. Written notice thereof will be given to CONTRACTOR prior to starting any such other work, and
2. CONTRACTOR may make a Claim therefore as provided in Article 16 if CONTRACTOR believes that such performance involves additional expense to CONTRACTOR or requires additional time and the parties are unable to agree as to the amount or extent thereof.

B. CONTRACTOR shall afford each other contractor who is a party to such a direct contract, and each utility owner (and CITY, if CITY is performing the additional work with CITY's employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of CITY and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between CITY and such utility owners and other contractors.

C. If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to CITY and DESIGN PROFESSIONAL in writing any delays, defects or deficiencies in such other work that render it unavailable or unsuitable for the proper execution or results of CONTRACTOR's Work. CONTRACTOR's failure to report same will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work, except for latent or non-apparent defects and deficiencies in such other work.

7.02 Coordination

A. If CITY contracts with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the person, firm or corporation who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified;
2. the specific matters to be covered by such authority and responsibility will be itemized; and
3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, CITY shall have sole authority and responsibility in respect of such coordination.

ARTICLE 8 CITY's RESPONSIBILITIES

8.01 Communications to CONTRACTOR

A. Except as otherwise provided in these General Conditions, CITY shall issue all communications to CONTRACTOR.

8.02 Replacement of DESIGN PROFESSIONAL

A. In case of termination of the employment of DESIGN PROFESSIONAL, CITY shall appoint a DESIGN PROFESSIONAL whose status under the Contract Documents shall be that of the former DESIGN PROFESSIONAL.

8.03 Furnish Data and Prompt Payment

A. CITY shall promptly furnish the data required of OWNER under the Contract Documents and shall make payments to CONTRACTOR when they are due.

8.04 Lands and Easements; Reports and Tests

A. CITY's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to CITY's duty to identify and make available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions at the Site and drawings of physical conditions in existing structures at or contiguous to the Site that have been utilized by DESIGN PROFESSIONAL in preparing the Contract Documents.

8.05 Insurance

A. CITY's responsibilities, if any, for purchasing and maintaining liability and property insurance are set forth in Article 5 and the Supplementary Conditions.

8.06 Change Orders

A. CITY is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.07 Inspections, Tests and Approvals

A. CITY's responsibility for certain inspections, tests and approvals is set forth in Paragraph 13.02 F.

8.08 Limitations on CITY's Responsibilities

A. The CITY shall not supervise, direct or have control or authority over, nor be responsible for, CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws or Regulations applicable to the furnishing or performance of the Work. CITY will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

8.09 Undisclosed Hazardous Environmental Condition

A. CITY's responsibility for an undisclosed Hazardous Environmental Condition uncovered or revealed at the Site is set forth in Paragraph 4.06.

8.10 Evidence of Financial Arrangements

A. CITY will furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract.

8.11 CITY's Representative

A. CITY will provide a representative during the construction period. The duties, responsibilities and the limitations of authority of the CITY's Representative during construction are set forth in the Contract Documents.

8.12 Visits to Site

A. CITY's Representative will make visits to the Site at intervals appropriate to the various stages of construction as CITY's Representative deems necessary in order to observe the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, CITY's Representative will endeavor to determine, in general, if the Work is proceeding in accordance with the Contract Documents. CITY's Representative will not be required to make exhaustive or continuous on-Site inspections to check the quality or quantity of the Work.

ARTICLE 9 DESIGN PROFESSIONAL's STATUS DURING CONSTRUCTION

9.01 General Scope of DESIGN PROFESSIONAL's Duties

A. DESIGN PROFESSIONAL's efforts will be directed toward providing for CITY a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of visits to the Site and on-Site observations, DESIGN PROFESSIONAL will keep CITY informed of the progress of the Work and will endeavor to guard CITY against defective Work. DESIGN PROFESSIONAL's visits to the Site and on-Site observations are subject to all the limitations on DESIGN PROFESSIONAL's authority and responsibility set forth in Paragraph 9.08.

9.02 Resident Project Representative

A. If CITY and DESIGN PROFESSIONAL agree, DESIGN PROFESSIONAL will furnish a resident Project representative to assist DESIGN PROFESSIONAL in providing more extensive observation of the Work. The responsibilities, authority and limitations thereon of any such resident Project representative and assistants will be as provided in Paragraph 9.08 and in the Supplementary Conditions.

9.03 Clarifications and Interpretations

A. DESIGN PROFESSIONAL will issue with reasonable promptness written clarifications or interpretations (which may be in the form of Drawings) of the requirements of the Drawings and Specifications prepared by the DESIGN PROFESSIONAL as DESIGN PROFESSIONAL may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on CITY and CONTRACTOR. If CITY or CONTRACTOR believes that a written clarification or interpretation justifies an adjustment in the Contract Price pursuant to Article 11 and/ or the Contract Times pursuant to Article 12 and the parties are unable to agree to the amount or extent thereof, if any, a Claim may be made therefore as provided in Article 16.

9.04 Rejecting Defective Work

A. DESIGN PROFESSIONAL will have authority to disapprove or reject Work which DESIGN PROFESSIONAL believes to be defective, that DESIGN PROFESSIONAL believes will not produce a completed Project that conforms to the Contract Documents, or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. DESIGN PROFESSIONAL will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04 B, whether or not the Work is fabricated, installed or completed.

9.05 Shop Drawings, Change Orders and Payments

A. In connection with DESIGN PROFESSIONAL's authority as to Shop Drawings and Samples, see Paragraph 6.18.

B. In connection with DESIGN PROFESSIONAL's authority as to Change Orders, see Article 10.

C. In connection with DESIGN PROFESSIONAL's authority as to Applications for Payment, see Article 14.

9.06 Determinations for Unit Prices

A. DESIGN PROFESSIONAL will initially determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. DESIGN PROFESSIONAL will review with CONTRACTOR the DESIGN PROFESSIONAL's preliminary determinations on such matters before rendering a written opinion thereon (by recommendation of an Application for Payment or otherwise to the CITY). CITY reserves the right to make a final determination of the actual quantities and classifications of Unit Price Work in reviewing an Application for Payment. Within ten (10) days after the date of receipt of any such decision, CONTRACTOR may deliver to CITY and to DESIGN PROFESSIONAL written notice of intention to appeal CITY's decision pursuant to Article 16.

9.07 Decisions on Requirements of Contract Documents and Acceptability of Work

A. DESIGN PROFESSIONAL will be the initial interpreter of the requirements of the Drawings and Specifications prepared by DESIGN PROFESSIONAL and judge of the acceptability of the Work thereunder.

B. When functioning as interpreter and judge under this Paragraph 9.07, DESIGN PROFESSIONAL will not show partiality to OWNER or CONTRACTOR.

C. Claims, disputes and other matters relating to the acceptability of the Work, quantities and classifications of Unit Price Work, or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work will be referred initially to CITY's Representative in writing with a request for a formal decision in accordance with Article 16.

9.08 Limitations on DESIGN PROFESSIONAL's Authority and Responsibilities

A. Neither DESIGN PROFESSIONAL's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by DESIGN PROFESSIONAL in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise or performance of any authority or responsibility by DESIGN PROFESSIONAL shall create, impose or give rise to any duty owed by DESIGN PROFESSIONAL to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them.

B. DESIGN PROFESSIONAL will not supervise, direct, control or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws or Regulations applicable to the furnishing or performance of the Work. DESIGN PROFESSIONAL will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

C. DESIGN PROFESSIONAL will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

D. DESIGN PROFESSIONAL's review of the final Application for Payment and accompanying documentation, and all maintenance and operating instructions, schedules, guarantees, Bonds and certificates of inspection, tests and approvals and other documentation

required to be delivered by Paragraph 14.07 will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests and approvals, that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.08 shall also apply to DESIGN PROFESSIONAL's Consultants, resident Project representative and assistants as identified in the Supplementary Conditions.

ARTICLE 10 CHANGES IN THE WORK

10.01 Authorized Changes in the Work

A. Without invalidating the Contract and without notice to any surety, CITY may, at any time or from time to time, order additions, deletions or revisions in the Work. Such additions, deletions or revisions will be authorized by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved that will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If CITY and CONTRACTOR are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price pursuant to Article 11 or an adjustment of the Contract Times pursuant to Article 12 or both that should be allowed as a result of a Work Change Directive, a Claim may be made therefore as provided in Article 16.

10.02 Unauthorized Changes in the Work

A. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.17 or in the case of uncovering Work as provided in Paragraph 13.04.

10.03 Signing of Change Orders

A. CITY and CONTRACTOR, and DESIGN PROFESSIONAL shall sign appropriate Change Orders covering:

1. changes in the Work which are:
 - a. ordered by CITY pursuant to Paragraph 10.01 A; or
 - b. required because of acceptance of defective Work under Paragraph 13.08 or correcting defective Work under Paragraph 13.09; or
 - c. agreed to by the parties;

2. changes in the Contract Price or Contract Times or both which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times or both which embody the substance of any written decision recommended by DESIGN PROFESSIONAL and approved by CITY pursuant to Paragraph 9.06, provided that, in lieu of signing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws or Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in Paragraph 6.19.

4. All Change Orders shall contain the following statement:

I certify under penalty of law that the 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,

and that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

10.04 Notification to Surety

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times or both) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11 CHANGE OF CONTRACT PRICE

11.01 Change of Contract Price

A. The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by CONTRACTOR shall be at CONTRACTOR's expense without change in the Contract Price.

B. The Contract Price may only be changed by a Change Order. Any request for an adjustment in the Contract Price shall be based on written notice delivered within fourteen (14) calendar days after occurrence of the event giving rise to the request or within fourteen (14) calendar days after first recognition of the conditions giving rise to the request. Prior notice is not required for requests or claims relating to an emergency endangering life or property as described in Paragraph 6.16. Thereafter, the CONTRACTOR shall submit written documentation of its request, including appropriate supporting documentation, within ten (10) calendar days after giving notice, unless the CITY grants an extension based on good cause shown by the CONTRACTOR that such additional time is warranted.

C. The value of any Work covered by a Change Order or of any request for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by Unit Prices contained in the Contract Documents, by application of such Unit Prices to the quantities of the items involved (subject to the provisions of Paragraph 11.04); or

2. where the Work involved is not covered by Unit Prices contained in the Contract Documents, by a mutually agreed lump sum; or

3. where the Work involved is not covered by Unit Prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 11.01 C.2, on the basis of the Cost of the Work (determined as provided in Paragraphs 11.02 A and B) plus a CONTRACTOR's fee for overhead and profit (determined as provided in Paragraph 11.01 D).

D. The CONTRACTOR's fee allowed to CONTRACTOR for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

- a. for costs incurred under Paragraphs 11.02 A.1 and 11.02 A.2, the CONTRACTOR's fee shall be ten percent (10%);

- b. for costs incurred under Paragraph 11.02 A.3, the CONTRACTOR's fee shall be five percent (5%);

c. where one or more tiers of subcontracts are on the basis of the Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01 D.2 and 11.02 A.1 through A.3 is that the Subcontractor who actually performs or furnishes the Work, at whatever tier, will be paid a fee of ten percent (10%) of the costs incurred by such Subcontractor under Paragraphs 11.02 A.1 and 11.02 A.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent (5%) of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.02 A.4, 11.02 A.5 and 11.02 B;

e. the amount of credit to be allowed by CONTRACTOR to CITY for any change which results in a net decrease in cost will be the amount of the actual net decrease in costs plus a deduction in CONTRACTOR's fee by an amount equal to five percent (5%) of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in CONTRACTOR's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.01 D.2.a through 11.01 D.2.e, inclusive.

E. Whenever the Cost of the Work is to be determined pursuant to Paragraphs 11.02 A and B, CONTRACTOR shall establish and maintain records thereof in accordance with generally accepted accounting practices and submit in form acceptable to CITY an itemized cost breakdown together with supporting data.

11.02 Cost of the Work

A. The term "Cost of the Work" means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. When the value of any Work covered by a Change Order or when a request for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to CONTRACTOR will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the request. Except as otherwise agreed to in writing by CITY, costs covered by Change Orders or requests shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any costs itemized in 11.02 B:

1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work, using occupational titles and job classifications agreed upon by CITY and CONTRACTOR. Such employees shall include, without limitation, job Site superintendents, foremen and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing the Work after regular working hours, on Saturdays, Sundays or legal holidays, shall be included in the above to the extent authorized by OWNER.

2. Cost of all materials and equipment furnished and incorporated into the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless CITY deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to CITY. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to CITY, and CONTRACTOR shall make provisions so that they may be obtained.

3. Payments made by CONTRACTOR to Subcontractors for Work performed or furnished by Subcontractors. If required by CITY, CONTRACTOR shall obtain competitive bids from Subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such

bids to CITY who will then determine, with the advice of DESIGN PROFESSIONAL, which bids, if any, will be accepted. If any subcontract provides that the Subcontractor is to be paid on the basis of the Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in Paragraphs 11.01 D and E and 11.02 A and B. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys and accountants) employed for services specifically related to the Work when such services are approved in advance by CITY in writing.

5. Other costs including the following:

a. The proportion of necessary transportation, travel and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the Site and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value of such items used but not consumed which remain the property of CONTRACTOR.

c. Rentals of all construction equipment and machinery and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by CITY with the advice of DESIGN PROFESSIONAL, and the costs of transportation, loading, unloading, installation, assembly, dismantling and removal thereof, all in accordance with the terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

d. Applicable sales, consumer, use or similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws or Regulations.

e. Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses required to perform the Work.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by CONTRACTOR in connection with the performance and furnishing of the Work (except losses and damages within the deductible amounts of property insurance established by CITY in accordance with Article 5), provided they have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of CITY. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's fee. If, however, any such loss or damage requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid for those services a fee proportionate to that stated in Paragraph 11.01 D.2.

g. The cost of utilities, fuel and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressage and similar petty cash items in connection with the Work.

i. Cost of premiums for additional or increased Bonds, or for insurance required because of approved changes in the Work.

B. Costs excluded: The term "Cost of the Work" shall not include any of the following:

1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the Site or in CONTRACTOR's principal or a branch office for general administration of the Work (if not specifically included in the agreed upon occupational titles and job classifications referred to in Paragraph 11.02 A.1 or specifically covered by Paragraph 11.02 A.4), all of which are to be considered administrative costs covered by the CONTRACTOR's fee.

2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the Site.

3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.

4. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials, or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 11.02 A.

11.03 Cash Allowances

A. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be furnished and performed for such sums as may be acceptable to CITY. CONTRACTOR agrees that:

1. the allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. CONTRACTOR's costs for unloading and handling on the Site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

B. Prior to final payment, an appropriate Change Order will be issued by CITY to reflect actual amounts due CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.04 Unit Price Work

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Contract. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made in accordance with Paragraph 9.06.

B. Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

C. CITY or CONTRACTOR may negotiate an adjustment of the price per unit of Unit Price Work stated in the Contract if:

1. the quantity of any item of Unit Price Work performed by CONTRACTOR differs by twenty percent (20%) or more from the estimated quantity of such item indicated in the Contract; and

2. there is no corresponding adjustment with respect to any other item of Work; and
3. CONTRACTOR believes that CONTRACTOR is entitled to an increase in Contract Price as a result of having incurred additional expense or CITY believes that CITY is entitled to a decrease in Contract Price.

11.05 Dispute Resolution

A. If CITY and CONTRACTOR are unable to agree on entitlement to, or magnitude of, an equitable adjustment in the Contract Price in accordance with Article 11 within fourteen (14) calendar days from the receipt of supporting documentation of the request pursuant to 11.01.B., unless the CITY grants an extension based on good cause shown by the CONTRACTOR that such additional time is warranted, then a Claim for such adjustment may be made pursuant to Article 16.

ARTICLE 12 CONTRACT TIMES

12.01 Time of the Essence

A. All times stated in the Contract Documents are of the essence of the Contract.

12.02 Change of Contract Times

A. The Contract Times (or Milestones) may only be changed by a Change Order. Any request for an adjustment in the Contract Times shall be based on written notice delivered within fourteen (14) calendar days after occurrence of the event giving rise to the request or within fourteen (14) calendar days after first recognition of the conditions giving rise to the request. Thereafter, the CONTRACTOR shall submit written documentation of its requests, including appropriate supporting documentation, within ten (10) days after giving notice, unless the CITY grants an extension based on good cause shown by the CONTRACTOR that such additional time is warranted.

12.03 Proof Required To Justify an Extension of Time For Excusable and Compensable Delays

A. In support of any request for an extension of the Contract Times pursuant to this Article, CONTRACTOR must demonstrate to the reasonable satisfaction of the CITY that the critical path of the approved baseline project schedule was delayed. CONTRACTOR shall be entitled to an increase in contract time for the number of days that the critical path was delayed solely as a result of the compensable or excusable event. A compensable or excusable event includes, but is not limited to:

1. unreasonable delay of issuance of Notice to Proceed by CITY;
2. CITY's unreasonable delay of delivery furnished materials, equipment, or work;
3. unreasonable delay responding to shop drawings and submittals;
4. CITY's unreasonable delay in issuing a Change Order;
5. an order by the CITY to stop the Work where the CONTRACTOR was not at fault; and
6. other reasonable grounds as determined by the City in its sole discretion.

B. CONTRACTOR shall compare the critical path of the approved baseline project schedule to the actual critical path of the Work, identifying the specific impact of the compensable or excusable event.

C. CONTRACTOR shall submit to the CITY a written time impact analysis illustrating the influence of each compensable or excusable event on the date of Achievement of Full Operation. The time impact analysis shall demonstrate the time impact based on the date of the delay in time and the event time computations or all affected activities.

D. If the critical path of the Work is delayed by "Force Majeure", the CONTRACTOR shall be entitled only to an extension of the Contract Times for the number of days of delay to the critical path. For purposes of this paragraph, "Force Majeure" shall mean fire, tornado, flood, earthquake, war, act of terrorism, civil disturbance, or labor strikes away from the project site.

E. Extensions of contract time pursuant to the this section will be granted only to the extent that the time adjustments exceed the total float time available when the event causing the delay occurred.

F. As a prerequisite to being considered a valid claim, any submission to the City pursuant to this Paragraph shall contain the following statement:

I certify under penalty of law that the 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, and that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

12.04 Delays Within CONTRACTOR's Control

A. The Contract Times (or Milestones) will not be extended due to delays within the control of CONTRACTOR. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.05 Delays Beyond the CITY's and CONTRACTOR's Control

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both CITY and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay.

12.06 Delay Damages

A. In no event shall CITY be liable to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

1. delays caused by or within the control of CONTRACTOR, or
2. delays beyond the control of CITY or CONTRACTOR including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

B. Nothing in this Paragraph 12.06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay, interference, or disruption directly attributable to actions or inaction of CITY, DESIGN PROFESSIONAL, Consultant or anyone for whom CITY, DESIGN PROFESSIONAL or Consultant is responsible.

12.07 Dispute Resolution

A. If CITY and CONTRACTOR are unable to agree on entitlement to, or magnitude of, an equitable adjustment in the Contract Time in accordance with Article 12 within fourteen (14) calendar days from the receipt of supporting documentation of the request pursuant to 12.02, unless the CITY grants an extension based on good cause shown by the CONTRACTOR that such additional time is warranted, then a Claim for such adjustment may be made pursuant to Article 16.

ARTICLE 13 TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Access to Work

A. CITY, DESIGN PROFESSIONAL, Consultants, other representatives and personnel of CITY, independent testing laboratories and governmental agencies with jurisdictional interests will have access to the Site and Work at reasonable times for their observation, inspecting and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR's Site safety procedures and programs so that they may comply therewith as applicable.

13.02 Tests and Inspections

A. CONTRACTOR shall give DESIGN PROFESSIONAL and CITY's Representative timely notice of readiness of the Work for all required inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. If any Work (or the work of others at the Site) that is to be inspected, tested or approved is covered by CONTRACTOR without written approval required by Paragraphs 13.02 D or 13.02 E, it must, if requested by CITY's Representative, be uncovered for observation.

C. Uncovering Work as provided in Paragraph 13.02 B, shall be at CONTRACTOR's expense unless CONTRACTOR has given DESIGN PROFESSIONAL and CITY's Representative timely notice of CONTRACTOR's intention to cover the same and DESIGN PROFESSIONAL and CITY's Representative have not acted with reasonable promptness in response to such notice.

D. If Laws or Regulations of any public body (including City) having jurisdiction require any Work (or part thereof) specifically to be inspected, tested or approved by an employee or other representative of such public body, CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections, tests or approvals, pay all costs in connection therewith, and furnish DESIGN PROFESSIONAL and CITY's Representative the required certificates of inspection or approval.

E. CONTRACTOR shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for CITY's and DESIGN PROFESSIONAL's acceptance of materials or equipment to be incorporated into the Work, or acceptance of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation into the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to CITY and DESIGN PROFESSIONAL.

F. CITY shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests or approvals covered by Paragraph 13.02 D and E;
2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04 B shall be paid as provided in said Paragraph 13.04 B; and
3. as otherwise specifically provided in the Contract Documents.

13.03 Notice of Defects

A. Prompt notice of all defective Work of which either CITY or DESIGN PROFESSIONAL has actual knowledge will be given to CONTRACTOR. Defective Work may be rejected, corrected or accepted as provided in this Article 13.

13.04 Uncovering Work

A. If any Work (or the work of others at the Site) is covered contrary to the written request of DESIGN PROFESSIONAL or CITY's Representative, it must, if requested by CITY's

Representative, be uncovered for DESIGN PROFESSIONAL's or CITY's Representative's observation and replaced at CONTRACTOR's expense.

B. If CITY considers it necessary or advisable that covered Work be observed by DESIGN PROFESSIONAL or CITY's Representative or be inspected or tested by others, CONTRACTOR, at CITY's request, shall uncover, expose or otherwise make available for observation, inspection or testing as may be required, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, CONTRACTOR shall pay all costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) caused by, arising out of or resulting from such uncovering, exposure, observation, inspection and testing and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and CITY shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, CITY may make a Claim therefore as provided in Article 16. If, however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction. If the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a Claim therefore as provided in Article 16.

13.05 CITY May Stop the Work

A. If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, CITY may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of CITY to stop the Work shall not give rise to any duty on the part of CITY to exercise this right for the benefit of CONTRACTOR, any Subcontractor, Supplier, other individual or entity or any surety or employee or agent of any of them.

13.06 Correction or Removal of Defective Work

A. If required by CITY, CONTRACTOR shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by either DESIGN PROFESSIONAL or CITY's Representative, remove it and replace it with Work that is not defective. CONTRACTOR shall pay all costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.07 Correction Period

A. If within one (1) year after the date of Achievement of Full Operation, or such longer period of time as may be prescribed by Laws or Regulations, by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for CONTRACTOR's use by CITY or permitted by Laws and Regulations as contemplated in Paragraph 6.10 is found to be defective, CONTRACTOR shall promptly, without cost to CITY and in accordance with CITY's written instructions:

1. correct the repair of damages to such land or areas; or
2. correct such defective Work, or if it has been rejected by CITY, remove it from the Site and replace it with Work that is not defective; and
3. satisfactorily correct or remove and replace any damage to other Work or to the work of others or damage to other lands or areas resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in the event of an emergency where delay by CONTRACTOR would cause serious risk of loss or damage, CITY may have the

defective Work corrected or the rejected Work removed and replaced, and all costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

B. In special circumstances where a particular item of equipment is placed in continuous service before Achievement of Full Operation of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

C. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one (1) year, or such longer period of time as may be prescribed within Paragraph 13.07 A, after such correction or removal and replacement has been satisfactorily completed.

D. CONTRACTOR's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or waiver of the provisions of any applicable statute of limitation or repose.

13.08 Acceptance of Defective Work

A. If, instead of requiring correction or removal and replacement of defective Work, CITY prefers to accept it, CITY may do so. CONTRACTOR shall pay all costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to CITY's evaluation of and determination to accept such defective Work and shall pay OWNER for the diminished value of the Work. If any such acceptance occurs prior to DESIGN PROFESSIONAL's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions into the Contract Documents with respect to the Work and, due to the diminished value of the Work, CITY shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, CITY may make a Claim therefore as provided in Article 16. If the acceptance of defective Work occurs after such recommendation, an appropriate amount shall be paid by CONTRACTOR to CITY.

13.09 CITY May Correct Defective Work

A. If CONTRACTOR fails within a reasonable time after written notice from DESIGN PROFESSIONAL or CITY's Representative to correct defective Work or to remove and replace rejected Work as required by CITY in accordance with Paragraph 13.06, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, CITY may, after seven (7) days written notice to CONTRACTOR, correct and remedy any such deficiency.

B. CITY shall proceed expeditiously when exercising the rights and remedies under this Paragraph 13.09. In connection with such corrective and remedial action, CITY may exclude CONTRACTOR from all or part of the Site; take possession of all or part of the Work and suspend CONTRACTOR's services related thereto; take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the Site; and incorporate into the Work all materials and equipment stored at the Site or for which CITY has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow CITY, CITY's Representative, agents and employees, CITY's other contractors, DESIGN PROFESSIONAL and Consultants access to the Site to enable CITY to exercise the rights and remedies under this Paragraph 13.09.

C. All costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by CITY in exercising such rights and remedies will be charged against CONTRACTOR and a Change Order will be issued incorporating the necessary revisions into the Contract Documents with respect to the Work; and CITY shall be

entitled to an appropriate decrease in the Contract Price. If CITY and CONTRACTOR are unable to agree as to the amount thereof, CITY may make a Claim therefore as provided in Article 16. Such Claims for costs, losses and damages will include but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction, removal and replacement of CONTRACTOR's defective or rejected Work.

D. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by CITY of CITY's rights and remedies under Paragraphs 13.06 and 13.09.

ARTICLE 14 PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 Schedule of Values

A. 01290.02 Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into form 01290.01 Application for Payment acceptable to DESIGN PROFESSIONAL and CITY. Progress payments for Unit Price Work will be based on the number of units completed.

14.02 Application for Progress Payments

A. Application for Payment

1. At least twenty (20) days before the date stipulated in the Supplementary Conditions for each progress payment (but not more often than once a month), CONTRACTOR shall submit to DESIGN PROFESSIONAL for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated into the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, paid invoice or other documentation warranting that CITY has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect CITY's interest therein, all of which will be subject to CITY's approval.

2. Beginning with the second Application for Payment, each Application shall include:

a. an affidavit of CONTRACTOR stating that all previous progress payments received for the Work have been applied to discharge CONTRACTOR's legitimate obligations associated with prior Applications for Payment, and

b. a copy of the most recent 00485.01 M/WBE Monthly Utilization Report CONTRACTOR has submitted to the CITY's Human Relations Department.

c. a copy of the most recent 00485.02 Project Workforce Monthly Report and 00485.03 Company-Wide Workforce Monthly Report CONTRACTOR has submitted to the OWNER's Human Relations Department.

d. an update to the approved schedule pursuant to paragraphs 6.04 and 6.05.

e. any submission to the City pursuant to this Paragraph shall contain the following statement:

I certify under penalty of law that the 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, and that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are

significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

3. The amount of retainage with respect to progress payments will be stated in the Supplementary Conditions.

B. Review of Applications

1. DESIGN PROFESSIONAL will, within ten (10) days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to CITY or return the Application to CONTRACTOR indicating in writing DESIGN PROFESSIONAL's reasons for refusing to recommend payment. In the latter case, CONTRACTOR shall make the necessary corrections and resubmit the Application.

a. After presentation of the Application for Payment to CITY, and if CITY's Representative agrees with DESIGN PROFESSIONAL's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02 B.4) become due and will be paid by CITY to CONTRACTOR, subject to the provisions of Laws or Regulations.

b. No payment shall be approved until the CONTRACTOR has submitted with the Application accompanying documentation as required by the Contract Documents, including, but not limited to, the documentation required by paragraphs 6.04 and 6.05.

2. DESIGN PROFESSIONAL's recommendation of any payment requested in an Application for Payment will constitute a representation by DESIGN PROFESSIONAL to CITY, based on DESIGN PROFESSIONAL's observations of the executed Work as an experienced and qualified DESIGN PROFESSIONAL and on DESIGN PROFESSIONAL's review of the Application for Payment and the accompanying data and schedules, that to the best of DESIGN PROFESSIONAL's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Achievement of Full Operation, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.06, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to CONTRACTOR being entitled to such payment appear to have been fulfilled in so far as it is DESIGN PROFESSIONAL's responsibility to observe the Work.

3. DESIGN PROFESSIONAL's recommendation of any payment, including final payment, shall not mean that DESIGN PROFESSIONAL is responsible for CONTRACTOR's means, methods, techniques, sequence or procedures of construction, safety precautions and programs incident thereto, or any failure of CONTRACTOR to comply with Laws or Regulations applicable to the furnishing or performance of Work.

4. DESIGN PROFESSIONAL may refuse to recommend the whole or any part of any payment if, in DESIGN PROFESSIONAL's opinion, it would be incorrect to make the representations to CITY referred to in Paragraph 14.02 B.2. DESIGN PROFESSIONAL may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary in DESIGN PROFESSIONAL's opinion to protect CITY from loss because:

a. the Work is defective, or completed Work has been damaged requiring correction or replacement;

b. the Contract Price has been reduced by Written Amendment or Change Orders;

c. CITY has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. DESIGN PROFESSIONAL has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.

C. Reduction in Payment

1. CITY may refuse to make payment of the full amount recommended by DESIGN PROFESSIONAL because:

a. Claims have been made by third parties against CITY on account of CONTRACTOR's performance or furnishing of the Work; or

b. Claims have been made by CITY against CONTRACTOR in connection with the Work, except where CONTRACTOR has delivered a specific Bond satisfactory to CITY to secure the satisfaction and discharge of such Claims;

c. there are other items entitling CITY to a set-off against the amount recommended; or

d. CITY has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02 B.4.a through c or 15.02 A.1 through 4; but CITY must give CONTRACTOR written notice (with a copy to DESIGN PROFESSIONAL) stating the reasons for such action and promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by CITY and CONTRACTOR, when CONTRACTOR corrects to CITY's satisfaction the reasons for such action; or

e. CITY has made a different determination of the actual quantities and classifications of Unit Price Work.

14.03 CONTRACTOR's Warranty of Title

A. CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated into the Project or not, will pass to CITY no later than the time of payment, free and clear of all Liens.

14.04 Substantial Completion or Achievement of Full Operation

A. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify CITY and DESIGN PROFESSIONAL in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that CITY issue a certificate of Substantial Completion or Achievement of Full Operation. Within a reasonable time thereafter, CITY, together with CONTRACTOR and DESIGN PROFESSIONAL, shall make an inspection of the Work to determine the status of completion. If DESIGN PROFESSIONAL does not consider the Work substantially complete, DESIGN PROFESSIONAL will notify CONTRACTOR and CITY in writing giving the reasons therefore. If DESIGN PROFESSIONAL considers the Work substantially complete, DESIGN PROFESSIONAL will prepare and deliver to CITY a recommended certificate of Substantial Completion or Achievement of Full Operation that shall establish the date of Substantial Completion or Achievement of Full Operation. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. CITY shall have seven (7) days after receipt of the recommended certificate during which to make written objection to DESIGN PROFESSIONAL as to any provisions of the certificate or attached list. At the time of delivery of the recommended certificate of Substantial Completion or Achievement of Full Operation, DESIGN PROFESSIONAL will deliver to CITY and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between CITY and CONTRACTOR with respect to security, operation, safety, protection of the Work, maintenance, heat, utilities, insurance and warranties and guarantees.

B. CITY shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion or Achievement of Full Operation, but CITY shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

14.05 Partial Utilization

A. Use by CITY at CITY's option of any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which CITY, DESIGN PROFESSIONAL and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by CITY for its intended purpose without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following:

1. CITY at any time may request CONTRACTOR in writing to permit CITY to use any such part of the Work which CITY believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to CITY and DESIGN PROFESSIONAL that such part of the Work is substantially complete and request CITY to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify CITY and DESIGN PROFESSIONAL in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request CITY to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, CITY, together with CONTRACTOR and DESIGN PROFESSIONAL, shall make an inspection of that part of the Work to determine its status of completion. If DESIGN PROFESSIONAL does not consider that part of the Work to be substantially complete, DESIGN PROFESSIONAL will notify CITY and CONTRACTOR in writing, giving the reasons therefore. If DESIGN PROFESSIONAL considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

2. No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of Paragraph 5.09 with respect to property insurance.

14.06 Final Inspection

A. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, DESIGN PROFESSIONAL will make a final inspection with CITY and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 Final Payment

A. Application for Payment

1. After CONTRACTOR has completed all corrections required by Paragraph 14.06 to the satisfaction of DESIGN PROFESSIONAL and CITY's Representative and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance required by Paragraph 5.04, certificates of inspection, marked-up record documents (as provided in Paragraph 6.13) and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

- a. all documentation required by the Contract Documents, including but not limited to the evidence of insurance required by Subparagraph 5.04 B.7; and

b. 01290.14 "Contractor Affidavit for Final Payment" from CONTRACTOR and 01290.15 "Subcontractor Affidavit for Final Payment" from all Subcontractors, regardless of tier.

B. Review of Application and Acceptance

1. If, on the basis of DESIGN PROFESSIONAL's and CITY's Representative's observation of the Work during construction and final inspection, and DESIGN PROFESSIONAL's and CITY's Representative's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, DESIGN PROFESSIONAL and CITY's Representative are satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, DESIGN PROFESSIONAL will, within ten (10) days after receipt of the final Application for Payment, indicate in writing DESIGN PROFESSIONAL's and CITY's Representative's recommendation of payment and present the Application to CITY for payment. At the same time DESIGN PROFESSIONAL will also give written notice to CITY and CONTRACTOR that the Work is acceptable subject to the provisions of Paragraph 14.09.

2. Otherwise, DESIGN PROFESSIONAL will return the Application to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application to DESIGN PROFESSIONAL. After the presentation to CITY of the Application and accompanying documentation, in appropriate form and substance, including applicable federal and state prevailing wage provisions, and with DESIGN PROFESSIONAL's recommendation and notice of acceptability, the amount recommended by DESIGN PROFESSIONAL will become due and will be paid by CITY to CONTRACTOR in accordance with Laws and Regulations.

14.08 Final Completion Delayed

A. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed and if DESIGN PROFESSIONAL so recommends and CITY concurs, CITY shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of DESIGN PROFESSIONAL, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by CITY for Work not fully completed or corrected is less than the retainage stipulated in the Supplementary Conditions, and if Bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to DESIGN PROFESSIONAL with the Application for Payment. Payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 Waiver of Claims

A. The making and acceptance of final payment will constitute:

1. a waiver of all claims by CITY against CONTRACTOR, except claims previously made in writing and still unsettled, or claims arising from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by CONTRACTOR against CITY other than those previously made in writing pursuant to Paragraphs 16.02 and 16.03 and still unsettled.

14.10 Completion of Work by CITY

B. If CITY must complete the Work, all costs and charges incurred by CITY, together with the cost of completing the Work under the Contract, will be deducted from any monies due or which may become due CONTRACTOR. If such expense exceeds the sum which would have been

payable under the Contract, then CONTRACTOR and the surety shall be liable and shall pay to CITY the amount of such excess.

ARTICLE 15 SUSPENSION OF WORK AND TERMINATION

15.01 CITY May Suspend Work

A. Notwithstanding any other provision of this Contract, at any time and without cause, and at its sole and absolute discretion, CITY, may suspend the Work or any portion of the Work by written notice to CONTRACTOR, which will initially fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed in the notice unless the date is changed by a subsequent written notice from CITY. CONTRACTOR may be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any suspension if CONTRACTOR makes a Claim therefore in accordance with Article 16.

B. CONTRACTOR will not be allowed an adjustment in the Contract Price or an extension of the Contract Times if CITY suspends the Work because CONTRACTOR's acts or omissions create or cause an emergency that CITY believes affects the safety or protection of persons, the Work, or property at the Site or adjacent thereto. CITY may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been adequately addressed by CONTRACTOR; however, this right of CITY to stop the Work shall not give rise to any duty on the part of CITY to exercise this right for the benefit of CONTRACTOR, any Subcontractor, Supplier, other individual or entity or any surety or employee or agent of any of them.

15.02 CITY May Terminate for Default

A. CONTRACTOR may be deemed in default and CITY may terminate the services of CONTRACTOR upon the occurrence of any one or more of the following events:

1. CONTRACTOR fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under Paragraph 2.06 and 2.07 as adjusted from time to time pursuant to Paragraphs 6.04, 6.05, 12.02 and 12.03);
2. CONTRACTOR abandons the Work or declares its intention to abandon the Work;
3. CONTRACTOR assigns or attempts to assign its rights or obligations under this Contract or any part thereof to any third party without the prior written consent of CITY;
4. CONTRACTOR fails to make prompt payment duly owing to any subcontractor for Work completed in accordance to the Contract Documents or material supplier for materials delivered for incorporation into the Work within thirty (30) calendar days after payment was due;
5. CONTRACTOR fails to achieve the required dates of substantial and achievement of full operation;
6. CONTRACTOR disregards Laws or, Regulations, or Decrees of any public body or court of law having jurisdiction;
7. CONTRACTOR disregards the authority of DESIGN PROFESSIONAL or OWNER; or
8. CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents.

B. CITY may, after giving CONTRACTOR and the surety seven (7) days written notice and to the extent permitted by Laws or Regulations, terminate the services of CONTRACTOR, exclude CONTRACTOR from the Site and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment and machinery at the Site and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate into the Work all materials and equipment stored at the Site or for which

CITY has paid CONTRACTOR but which are stored elsewhere, and finish the Work as CITY may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by CITY arising out of or resulting from completing the Work, such excess may be paid to CONTRACTOR. If such costs, losses and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to CITY within fourteen (14) calendar days of CITY'S demand for payment. When exercising any rights or remedies under this Paragraph CITY shall not be required to competitively bid this work unless required by law.

C. Where CONTRACTOR's services have been so terminated by CITY, the termination will not affect any rights or remedies of CITY against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by CITY will not release CONTRACTOR from liability.

D. If, after a default termination, it is determined that the CONTRACTOR was not in default, the rights and obligations of the parties shall be the same as if the termination had been issued for the convenience of the CITY. The CITY shall then be liable to CONTRACTOR for only those costs enumerated in paragraph 15.03.

15.03 CITY May Terminate for Convenience

A. Notwithstanding any other provision of this Contract, upon seven (7) calendar days written notice to CONTRACTOR, CITY may, at its sole and absolute discretion, without cause and without prejudice to any other right or remedy of CITY, elect to terminate the Contract. In such case, CONTRACTOR shall, with thirty (30) calendar days of receiving notice of termination under this paragraph, submit to CITY its statement of costs and expenses and shall be paid:

1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
3. for all costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and others; and
4. for reasonable expenses directly attributable to termination if approved in advance by CITY.

B. CONTRACTOR shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

C. CONTRACTOR waives any costs not submitted to CITY pursuant to paragraph 15.03.A.

D. CITY shall, within thirty (30) calendar days after receipt of CONTRACTOR's statement, pay CONTRACTOR all amounts it determines are properly determined.

ARTICLE 16 CLAIMS AND DISPUTES

16.01 Definition

A. A Claim is a demand or assertion by the CONTRACTOR seeking, as a matter of right, the adjustment of Contract price and/or times with respect to the terms of the Contract.

16.02 Written Notice and Burden of Proof

A. Claims must be made by written notice pursuant to Paragraph 17.01. The written notice shall clearly indicate that the CONTRACTOR is making a claim. The responsibility to substantiate Claims shall rest with the CONTRACTOR. No Claim may be made under this Contract except as provided in this Article.

B. Certification of Claim: The written notice of Claim shall include the following statement signed by the CONTRACTOR's representative:

I certify under penalty of law that the 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, and that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Strict compliance with this paragraph shall be a condition precedent to the creation, existence or validity of any Claim.

16.03 Time Limits on Claims

A. The CONTRACTOR must give notice to the CITY within fourteen (14) calendar days after occurrence of the event giving rise to the Claim advising the CITY that CONTRACTOR intends to file a claim. After the fourteen (14) day period for making Claims has expired, the Claim shall be considered waived.

B. The CONTRACTOR shall submit the Claim to the CITY's Representative.

16.04 Continuing Contract Performance

A. Pending final resolution of a Claim, unless otherwise agreed in writing, the CONTRACTOR shall proceed diligently with performance of the Work and the CITY shall continue to make payments in accordance with the Contract Documents. The CITY may, but is not obligated to, notify the Surety of the nature and amount of the Claim.

16.05 Injury or Damage to Person or Property

A. If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, of any of the other party's employees or agents, or of others for whose acts that party is legally liable, written notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding thirty (30) days after first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter.

16.06 Initial Resolution of Claims and Disputes

A. After the CONTRACTOR has submitted the Claim to the CITY's Representative, the CITY'S Representative and CONTRACTOR'S Representative shall conduct a settlement conference within fourteen (14) calendar days from the date of receipt of the Claim. If the Claim is not settled within seven (7) calendar days following the date of the settlement conference, the CITY'S Representative and the CONTRACTOR's Representative shall state, in writing, their respective position as to the matters in dispute.

B. The CITY'S and CONTRACTOR'S statement of positions shall state all known factual grounds for each party's position. If the dispute remains unresolved at the end of the seven (7) calendar days from submission of the parties' written position statements, the CONTRACTOR shall have the right to proceed with the pursuit of Claims pursuant to paragraph 16.07.

C. If a Claim has been resolved, the OWNER will prepare or obtain appropriate documentation.

16.07 Final Resolution of Claims and Disputes

A. All administrative procedures set forth in this contract must first be exhausted before suit is filed.

B. If the CITY'S Representative and the CONTRACTOR'S Representative are unable to resolve the dispute pursuant to 16.06, the parties must submit their statements of position to the Director, who shall review the Claim and make a decision within fourteen (14) calendar days.

C. Absent fraud, gross mistake or bad faith, the Director's decision shall be final and binding on CITY and CONTRACTOR within fourteen (14) calendar days after issuance. The CONTRACTOR shall give written notice to the CITY stating its intent to submit its Claim to a court of law pursuant to paragraph 17.05.A. within thirty (30) calendar days after notice of Director's decision.

D. The time frames for the Director's decision and for CONTRACTOR'S written notice of intent may be tolled by participation in voluntary mediation. Mediator selection and the procedures to be employed in voluntary mediation shall be mutually acceptable to the parties. Costs of the mediator shall be shared equally among the parties participating in the mediation. In no event shall any time frame be tolled more than 30 days for mediation. However, mediation may be employed at any time at the discretion and mutual agreement of the parties.

E. If the dispute is not resolved during voluntary mediation, The CONTRACTOR agrees that it will file no suit based on facts or evidentiary materials that were not presented for consideration to the CITY during the mediation process or of which the CONTRACTOR had knowledge and failed to present during the administrative procedures.

ARTICLE 17 MISCELLANEOUS

17.01 Giving Notice

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be given by personal delivery, by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice or by confirmed electronic facsimile transmission. Notice is effective on the date of personal delivery, deposit of registered or certified mail, postage prepaid, or confirmed electronic facsimile transmission.

17.02 Computation of Times

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last calendar day of such period. If the last day of such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 Cumulative Remedies

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon CONTRACTOR and all of the rights and remedies available to CITY and DESIGN PROFESSIONAL hereunder are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee or by other provisions of the Contract Documents, and the provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

17.04 Survival of Obligations

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated

in the Contract Documents will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract.

17.05 Controlling Law

A. This Contract shall be construed and governed in accordance with the laws of the State of Missouri without giving effect to Missouri's choice of law provisions. The CITY and CONTRACTOR: (1) shall submit exclusively to the jurisdiction of the state and federal courts located in Jackson County, Missouri and no other; (2) shall waive any and all objections to jurisdiction and venue; and (3) shall not raise forum non conveniens as an objection to the location of any litigation.

CITY OF FOUNTAINS
HEART OF THE NATIONKANSAS CITY
MISSOURI

OVERFLOW CONTROL PLAN CONSENT DECREE SUPPLEMENTARY CONDITIONS

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

These Supplementary Conditions amend or supplement the General Conditions of the Construction Contract and other provisions of the Contract Documents as indicated below. All provisions that are not so amended or supplemented remain in full force and effect.

SC-2.04 A. Article 2, Paragraph 2.04, Copies of Documents, is amended by deleting Paragraph 2.04 A and replacing it with the following:

- A. CITY shall furnish to CONTRACTOR one executed copy of the Project Manual including all Addenda.

SC-4.02 Article 4, Paragraph 4.02, Subsurface and Physical Conditions; Subparagraphs A and B are supplemented as follows:

In the preparation of the Contract Documents, the following report of explorations and tests of subsurface conditions at or contiguous to the Site of the Work were utilized:

1. Report dated June 26, 2019, prepared by TSI Geotechnical Inc.; entitled *Report of Subsurface Exploration and Geotechnical Engineering Evaluation: Paseo Gateway Roadway Improvements*, which may be reviewed at the KC Planroom or obtained from the City's Project Manager as listed in SC-6.06. The technical data contained in such report is for the CONTRACTOR's information only and is not a part of these Contract Documents.

In the preparation of the Contract Documents, no drawings of physical conditions in or relating to existing surface or subsurface structures which are at or contiguous to the Site of the Work were utilized.

SC-4.06 Article 4, Paragraph 4.06, Asbestos, Lead-Based Paint, PCBs, Petroleum, Hazardous Waste or Radioactive Material, Subparagraphs A and B are supplemented as follows:

In the preparation of the Contract Documents, no reports of explorations and tests of any Hazardous Environmental Condition(s) at the Site of the Work were utilized.

SC-5.01 A. Article 5, Paragraph 5.01, Performance, Payment and Other Bonds, Subparagraph A, second sentence, is revised as follows:

These Bonds shall remain in effect at least until **three (3) years** after the date when Achievement of Full Operation (AFO) is granted by the City, except as provided otherwise by Laws or Regulations or by the Contract Documents.

SC-5.03 A. Article 5, Paragraph 5.03 Certificates of Insurance, Subparagraph A is amended by adding the following Subparagraph 1:

1. CONTRACTOR shall obtain evidence that all Subcontractors have in force the required coverage in the amounts required by these Contract Documents, and evidence that each is current on its unemployment insurance payments before

Subcontractors begin Work at the Site. CONTRACTOR shall retain such evidence in its files and make available to CITY within ten (10) days after written request.

SC-5.04 B.1. Article 5, Paragraph 5.04, CONTRACTOR's Liability Insurance, Subparagraph B.1 is amended as follows:

With respect to insurance required by Paragraphs 5.04 A.3 through 5.04 A.5, the following additional individuals or entities shall be listed as additional insureds:

- Burns & McDonnell Engineering Company, Inc.
- McClure Engineering Company

SC-5.06 A. Article 5, Paragraph 5.06, Property Insurance, Paragraph A, is amended by adding the following after the first sentence:

Property Insurance on the Work at the Site shall be written with a deductible amount not to exceed \$10,000.00.

SC-6.06 A.1 Article 6, Paragraph 6.06 Substitutes and "Or-Equal" Items, Paragraph A is amended by adding the following at the end of Paragraph A.1:

Proposed "or-equal" items must be submitted to CITY at least eleven (11) days prior to Bid date at the following address:

Water Services Department
4800 East 63rd Street
Kansas City, Missouri 64130
Attn: Madison Gibler, P.E., Project Manager

mgibler@burnsmcd.com

Only Bidders may submit proposed "or-equal" items and such items must require no change in related Work. Acceptance by CITY of any proposed "or-equal" items will be made by Addendum only.

SC-6.06 A.2. Article 6, Paragraph 6.06 Substitutes and "Or-Equal" Items, Paragraph A is amended by adding the following at the end of Paragraph A.2:

Proposed substitute items must be submitted to CITY's Representative not later than 30 days prior to the time the item is to be incorporated into the Work. Only CONTRACTOR may submit proposed substitute items, and such items must be submitted to CITY's Representative on the standard City form 01630 - Substitution Request. Acceptance by CITY of any proposed substitute item will be made by Change Order.

SC-6.10. Article 6, Paragraph 6.10, Compliance with Laws and Regulations, is amended by adding the following new Subparagraphs immediately following Subparagraph 6.10 I 2:

- a. CONTRACTOR will be required to comply with wage rates as follows:

County – Jackson

Work Type: State – Heavy

SC-6.10. Article 6, Paragraph 6.10, Compliance with Laws and Regulations, is amended by adding the following new Subparagraph 6.10 S:

1. "Resident Laborers" means laborers who have been residents of the State of Missouri for at least thirty days and who intend to remain Missouri residents, and residents of Nonrestrictive States.

2. "Nonrestrictive States" means states identified by the Missouri Department of Labor and Industrial Relations Division of Labor Standards that have not enacted state laws restricting Missouri laborers from working on public works projects. A list of Nonrestrictive States can be found on the Division web site at <http://www.dolir.mo.gov/ls/index.htm>.

3. A period of Excessive Unemployment is declared when the Missouri Department of Labor and Industrial Relations Division of Labor Standards provides notice of such declaration. When in effect, notice will be provided on the Division web site at <http://www.dolir.mo.gov/ls/index.htm>. It is CONTRACTOR's obligation to determine whether a period of Excessive Unemployment is in effect when this Contract is let.

4. CONTRACTOR agrees to follow the provisions of Section 290.560 - 290.575 RSMo and agrees that if a period of Excessive Unemployment has been declared at any point during the term of this Contract, it will employ and require all Subcontractors of whatever tier to employ only Resident Laborers for the Work to be performed under this CONTRACT. Provided, however, CONTRACTOR may use laborers who are not Resident Laborers when Resident Laborers are not available or are incapable of performing the particular type of work involved if CONTRACTOR so certifies in writing to CITY and CITY issues a written approval. This provision does not apply to regularly employed nonresident executive, supervisory or technical employees.

SC-6.10. Article 6, Paragraph 6.10, Compliance with Laws and Regulations, is amended by adding the following new Subparagraph 6.10 T:

Contract Information Management System. CONTRACTOR shall comply with CITY's Contract Information Management System requirements. CONTRACTOR shall use CITY's Internet web based Contract Information Management System/Project Management Communications Tool provided by CITY and protocols included in that software during the term of this Contract. CONTRACTOR shall maintain user applications to CITY's provided system for all personnel, subcontractors or suppliers as applicable.

SC-6.11. Article 6, Paragraph 6.11, Taxes, is amended by adding the following sentence to Subparagraph 6.11 B:

A. Tax Compliance. The following subparagraphs apply if the Contract is over \$150,000.00.

SC-7.02 A. Article 7, Paragraph 7.02, Coordination, Subparagraph A is supplemented as follows:

1. It is anticipated that work under separate contracts will be performed at the Site, concurrent with the Work to be performed pursuant to these Contract Documents. The following person, firm or corporation ("the Coordinating Contractor") will have authority and responsibility for coordination of the activities among the various contractors performing work at the Site: CONTRACTOR.
2. The Coordinating Contractor shall coordinate the scheduling of work between this Contract and other concurrent contracts so that interference with the use of existing facilities and public works and conflicts with interfacing work will be minimized. Particular attention shall be paid to maintaining suitable traffic patterns and adequate access to the existing facilities.
3. Whenever construction activities conflict with the use of existing facilities and public works, **the City's Project Manager** shall decide which activity shall be given priority. The Coordinating Contractor shall be responsible for coordinating work by its own forces, by other contractors and by all subcontractors with work by the operating staff of the existing facility. The Coordinating Contractor shall exert full control over the actions of all employees and other persons with respect to the use and preservation

of property and existing facilities, except such control as may be specifically reserved to CITY or others. The Coordinating Contractor has the right to exclude from the Site all persons who have no purpose related to the Work or its inspection, and may require all person on the Site (except CITY's employees) to observe the same regulations as the Coordinating Contractor requires of its own employees.

SC-9.02 Article 9, Paragraph 9.02, Resident Project Representative is amended by adding the following new Subparagraphs immediately following Subparagraph 9.02 A:

- B. The Resident Project Representative (RPR) will be DESIGN PROFESSIONAL's representative at the Site, will act as directed by and under the supervision of DESIGN PROFESSIONAL, and will confer with DESIGN PROFESSIONAL regarding RPR's actions.
 - 1. General: RPR's dealings in matters pertaining to the Work in general shall be with DESIGN PROFESSIONAL, the CITY's Smart Sewer Program Manager, and CONTRACTOR. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of CONTRACTOR. RPR shall generally communicate with CITY and CITY'S Smart Sewer Program Manager only with the knowledge of and under the direction of DESIGN PROFESSIONAL.
 - 2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by CONTRACTOR and consult with DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager concerning acceptability.
 - 3. Conferences and Meetings: Attend meetings with CONTRACTOR and CITY's Smart Sewer Program Manager, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings.
 - 4. Liaison:
 - a. Serve as DESIGN PROFESSIONAL's liaison with CONTRACTOR. Working principally through CONTRACTOR's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist DESIGN PROFESSIONAL in serving as CITY's liaison with CONTRACTOR when CONTRACTOR's operations affect CITY's on-Site operations.
 - c. Assist in obtaining from CITY additional details or information, when required for proper execution of the Work.
 - 5. Interpretation of Contract Documents: Report to DESIGN PROFESSIONAL when clarifications and interpretations of the Contract Documents are needed and transmit to CONTRACTOR clarifications and interpretations as issued by DESIGN PROFESSIONAL.
 - 6. Shop Drawings and Samples:
 - a. Record date of receipt of Samples and CONTRACTOR-approved Shop Drawings when hard copies are furnished at the Site.
 - b. Receive Samples which are furnished at the Site by CONTRACTOR, and notify DESIGN PROFESSIONAL of availability of Samples for examination.
 - c. Advise DESIGN PROFESSIONAL and CONTRACTOR of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which

RPR believes that the submittal has not been approved by DESIGN PROFESSIONAL.

7. Modifications: Consider and evaluate CONTRACTOR's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager. Transmit to CONTRACTOR in writing decisions as issued by DESIGN PROFESSIONAL.
8. Review of Work and Rejection of Defective Work:
 - a. Conduct on-Site observations of CONTRACTOR's work in progress to assist DESIGN PROFESSIONAL and CITY's Smart Sewer Program Manager in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager whenever RPR believes that any part of CONTRACTOR's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval. If RPR believes a Notice of Non-conformance should be issued, the RPR will advise the DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager in this matter and provide field information as required for the DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager to complete and issue a Notice of Non-Conformance to the CONTRACTOR.
9. Inspections, Tests, and System Start-ups:
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate CITY's personnel, and that CONTRACTOR maintains adequate records thereof.
 - b. Observe, record, and report to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager appropriate details relative to the test procedures and systems start-ups.
10. Records:
 - a. Prepare a daily report or keep a diary or log book, recording CONTRACTOR's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager.
 - b. Maintain records for use in preparing Project documentation.
11. Reports:

- a. Furnish to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager periodic reports as required of progress of the Work and of CONTRACTOR's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
 - b. Recommend to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager proposed Change Orders, Work Change Directives, and Field Orders. Assist DESIGN PROFESSIONAL as necessary in drafting such documents and obtain backup material from CONTRACTOR.
 - c. Immediately notify DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.
- 12. Payment Requests: Review applications for payment with CONTRACTOR for compliance with the established procedure for their submission and forward with recommendations to DESIGN PROFESSIONAL, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
- 13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by CONTRACTOR are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to DESIGN PROFESSIONAL for review and forwarding to CITY prior to payment for that part of the Work.
- 14. Completion:
 - a. Participate in DESIGN PROFESSIONAL's and CITY'S Smart Sewer Program Manager visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
 - b. Participate in DESIGN PROFESSIONAL's and CITY'S Smart Sewer Program Manager final visit to the Site to determine completion of the Work, in the company of CITY and CONTRACTOR, and prepare a final punch list of items to be completed and deficiencies to be remedied.
 - c. Observe whether all items on the final list have been completed or corrected and make recommendations to DESIGN PROFESSIONAL concerning acceptance and issuance of the notice of acceptability of the work.
- C. The RPR shall not:
 - 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 - 2. Exceed limitations of DESIGN PROFESSIONAL's authority as set forth in the Contract Documents.
 - 3. Undertake any of the responsibilities of CONTRACTOR, Subcontractors, or Suppliers.
 - 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of CONTRACTOR's work.

5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, anprograms in connection with the activities or operations of CITY or CONTRACTOR.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by DESIGN PROFESSIONAL.
7. Accept Shop Drawing or Sample submittals from anyone other than CONTRACTOR.
8. Authorize CITY to occupy the Project in whole or in part.

SC-9.04 Article 9, Paragraph 9.04, Rejecting Defective Work is amended by adding the following new Subparagraph immediately following Subparagraph 9.04 A:

- B. When the work performed by CONTRACTOR deviates from the project's contractual requirements, the Contractor is to be notified by the DESIGN PROFESSIONAL using the Non-Conformance Notice/Defective Work Form. The DESIGN PROFESSIONAL shall complete Part 1 – Identification of the Non-Conformance Notice and/or Defective Work to provide written notice to the CONTRACTOR that the work does not meet the referenced contractual requirements. Upon receipt, CONTRACTOR shall suspend work directly related to the non-conforming work in accordance with Specification 00700 General Conditions, Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work.

SC-9.08 E. Article 9, Paragraph 9.08, Limitations on DESIGN PROFESSIONAL's Authority and Responsibilities, Subparagraph E is supplemented as follows:

DESIGN PROFESSIONAL's Consultant(s), resident Project representative and assistant(s) to the Resident Project Representative are the following:

Consultant(s): McClure Engineering Company.

Resident Project representative: TBD.

Assistant(s) to the resident Project representative: TBD.

SC-11.04 C. Article 11, Paragraph 11.04, Unit Price Work, is amended by deleting Paragraph 11.04 C and replacing it with the following:

CITY may add or delete any quantity of work to the project, by Work Change Directive, at the established unit price. The established unit prices shall not be adjusted regardless of actual quantities.

SC-12.01 Article 12, Paragraph 12.01, Time of the Essence is amended by adding the following new Subparagraphs immediately following Subparagraph 12.01 A:

B. Starting and Completion

1. The Work to be performed under this Contract shall begin on the date specified in the written Notice to Proceed issued by the Director of Water Services, and the Work shall be substantially complete, in accordance with Paragraph 14.04, within 420 Calendar Days thereafter. Once the Work starts, CONTRACTOR shall continuously pursue completion of the Work.
2. The Work shall be completed and ready for final payment in accordance with Paragraph 14.07 within 60 Calendar Days after the date of Substantial Completion of the Work.

C. Liquidated Damages

1. If the Work is not substantially completed, in accordance with Paragraph 14.04, within the period stated in Paragraph 12.01 B.1, CONTRACTOR shall pay to CITY the amount of two thousand dollars (\$ 2,000.00) as liquidated damages and not as a penalty for each Calendar Day until the Work is substantially complete. The amount of liquidated damages shall be deducted from any payments due or to become due CONTRACTOR.
2. If the Work is not completed and ready for final payment in accordance with Paragraph 14.07, within the period stated in Paragraph 12.01 B.2, CONTRACTOR shall pay to CITY the amount of five hundred dollars (\$ 500.00) as liquidated damages and not as a penalty for each Calendar Day until the Work is completed and ready for final payment. The amount of liquidated damages shall be deducted from any payments due or to become due CONTRACTOR.

SC-13.03 Article 13, Paragraph 13.03, Notice of Defects is amended by adding the following new Subparagraph immediately following Subparagraph 13.03 A:

- B. Once the Non-Conformance Notice Part 1 – Identification has been given to the CONTRACTOR, per Article 9, Paragraph 9.04, Subparagraph B, the CONTRACTOR shall propose their corrective action plan with a detailed description of corrective work and proposed completion schedule in writing to the DESIGN PROFESSIONAL within the time identified in Part 1 of the Non-Conformance Notice. The DESIGN PROFESSIONAL and CITY shall approve CONTRACTOR's corrective action plan prior to commencement of remedial work. The Contractor shall resubmit its corrective action plan to address review comments received from CITY and DESIGN PROFESSIONAL. The DESIGN PROFESSIONAL shall document the approved corrective action plan in Part 2 – Disposition and Corrective Action of the Notice of Non-Conformance and/or Defective Work. The DESIGN PROFESSIONAL shall then distribute the Non-Conformance Notice / Defective Work Form to the CITY and CONTRACTOR. CONTRACTOR shall complete the corrective work in accordance with Article 13.06.

SC-13.06 Article 13, Paragraph 13.06, Correction of Removal of Defective Work is amended by adding the following new Subparagraph immediately following Subparagraph 13.06 A:

- B. Once the corrective action has been taken, the DESIGN PROFESSIONAL shall verify that the agreed upon resolution has been carried out in accordance with the procedures and verification process agreed upon in Part 2 – Disposition and Corrective Action of the Non-Conformance Notice and/or Defective Work. The DESIGN PROFESSIONAL shall document how satisfactory completion of corrective action was verified in Part 3 – Verification of Corrective Action. The DESIGN PROFESSIONAL shall then distribute the Non-Conformance Notice / Defective Work Form to the CITY and CONTRACTOR.

SC-13.07 Article 13, Paragraph 13.07, Correction Period, Subparagraph A is amended as follows:

The correction period set forth in Paragraph 13.07 A shall be three (3) years instead of one (1) year for all components except Green Stormwater Infrastructure Aggregate Media Plants and Non-Native Seeding and Sodding. The CITY or its designee will maintain the Green Stormwater Infrastructure after all work is completed and recommended for Final Payment. The CITY's (or its designee's) maintenance does not negate the CONTRACTOR's obligation to warrant these portions of the work for the duration of the Correction Period.

SC-14.04. Article 14, Paragraph 14.04, Substantial Completion or Achievement of Full Operation, Subparagraph A is supplemented as follows:

A. To meet the definition of Achievement of Full Operation, the following items of the Work must be operational and ready for CITY's continuous use as intended:

- Installation of control and protection around the extended wet detention site per Section 02938 and per the Site Activity Plan defined in Section 02937
- Installation of all storm structures (including outlet control structure modifications), storm piping, end sections, trash racks, and permanent erosion control measures (including riprap and/or cobble)
- Grading of extended wet detention basin area including ledgetone and retaining walls
- Installation of concrete maintenance paths and pedestrian stairs
- Installation of site amenities including dock and pedestrian bridge
- Installation of lighting
- Installation of Continuous Monitoring and Adaptive Controls (CMAC) with conduit and trace wire for future City SCADA connection
- Installation of fencing and gates
- Installation of all landscaping including trees, shrubs, grasses, perennials, submergent/aquatic vegetation, mulch, and limestone boulders

To meet the definition of Achievement of Full Operation, the following items of the Work must be operational and ready for CITY's continuous use as intended:

- Achievement of Full Operation punch list items
- Demobilization
- Record Drawings
- Contractor and Subcontractor Affidavit for Final Payment
- Warranties

SC-14.05 Article 14, Paragraph 14.05, Partial Utilization is amended by adding the following new Subparagraph A.3. immediately following Subparagraph 14.05 A.2:

3. CITY at any time may make a written request to CONTRACTOR to permit CITY to take over operation of any part of the Work although it is not substantially complete. A copy of the request will be sent to DESIGN PROFESSIONAL, and within a reasonable time thereafter CITY, CONTRACTOR and DESIGN PROFESSIONAL shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If CONTRACTOR does not make written objection to CITY and DESIGN PROFESSIONAL that such part of the Work is not ready for separate operation by CITY, DESIGN PROFESSIONAL will finalize the list of items to be completed or corrected and will deliver such lists to CITY and CONTRACTOR. DESIGN PROFESSIONAL will also make a written recommendation as to the division of responsibilities pending final payment between CITY and CONTRACTOR with respect to security, operation, safety, maintenance, utilities, insurance, warranties and guarantees for that part of the Work, which recommendation will become binding upon CITY and CONTRACTOR at the time when CITY takes over such operation (unless they shall have otherwise agreed in writing and so informed DESIGN PROFESSIONAL). During such operation and prior to Substantial Completion of such part of the Work, CITY shall allow CONTRACTOR reasonable access to complete or correct items on said list and to complete other related Work.

Project No.:	NCN No.:
Name of Responsible Contractor/Organization:	Date:
Contractor Contact Name:	Page:
Contractor Contact Phone and Email:	

STEP 1 – IDENTIFICATION		
Nonconformance Identified Via: <input type="checkbox"/> Internal Quality Audit <input type="checkbox"/> Shop Inspection / Testing <input type="checkbox"/> Jobsite Inspection / Testing Jobsite Inspection Report No.: <input type="checkbox"/> Other:		
Detailed References (Specifications, Drawings, Details, Standards, etc):		
Description of Requirement:		
Description of Defective or Nonconforming Item(s) or Requirement:		
Nonconforming Identified By (Name):	Signature:	Date (MM/DD/YYYY):
Contractor shall respond to this Notice on or before this date (MM/DD/YYYY):		
Delivered to Contractor (Name of Recipient):	Signature:	Date (MM/DD/YYYY):

Attachments for Nonconforming work? <input type="checkbox"/> YES <input type="checkbox"/> NO
If YES, list attachments:

STEP 2 – DISPOSITION AND CORRECTIVE ACTION		
Date of Contractor’s response to this notice (MM/DD/YYYY):		
Description of Proposed Corrective Action:		
Disposition: <input type="checkbox"/> Accept As-Is <input type="checkbox"/> Accept Pending Further Corrective Action <input type="checkbox"/> Reject		
Accepted By (Design Professional):	Signature:	Date:
Accepted By (SSP Project Manager):	Signature:	Date:
Accepted By (Construction Manager):	Signature:	Date:

Corrective Action Attachments? <input type="checkbox"/> YES <input type="checkbox"/> NO
If YES, list attachments:

STEP 3 – VERIFICATION OF CORRECTIVE ACTION		
Description of how corrective action was verified:		
Corrective Action Verified By (RPR):	Signature:	Date:
Accepted/Closed By (SSP Project Manager):	Signature:	Date:

SECTION 00830

PREVAILING WAGE

1. Annual Wage Order No. 30
2. **0830.03 Division of Labor Standards Rules & Regulations** are incorporated into and made part of this Contract and are available at
<http://s1.sos.mo.gov/cmsimages/adrules/csr/current/8csr/8c30-3.pdf>.

Missouri

Division of Labor Standards

WAGE AND HOUR SECTION



MICHAEL L. PARSON, Governor

Annual Wage Order No. 30

Section 048
JACKSON 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

Building Construction Rates for
JACKSON County

REPLACEMENT PAGE

Section 048

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	\$68.67
Bollermaker	\$38.37*
Bricklayer	\$60.27
Carpenter	\$61.82
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	\$55.22
Plasterer	
Communications Technician	\$60.34
Electrician (Inside Wireman)	\$69.22
Electrician Outside Lineman	\$59.91
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	\$102.69
Glazier	\$58.17
Ironworker	\$68.53
Laborer	\$49.56
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	\$54.80
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	\$61.54
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	\$50.40
Plumber	\$76.04
Pipe Fitter	
Roofer	\$59.33
Sheet Metal Worker	\$72.78
Sprinkler Fitter	\$75.09
Truck Driver	\$52.39
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
JACKSON County

Section 048

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	\$61.98
Millwright	
Pile Driver	
Electrician (Outside Lineman)	\$87.19
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	\$50.25
General Laborer	
Skilled Laborer	
Operating Engineer	\$58.85
Group I	
Group II	
Group III	
Group IV	
Truck Driver	\$50.18
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.

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.

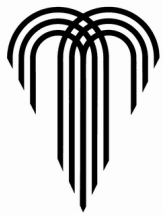
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A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

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.



ADDENDUM NUMBER 1

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

ISSUE DATE: 5/17/24

Bidders are hereby notified that the Bidding and Contract Documents for the above project, for which Bids are to be received on May 21, 2024, are amended as follows:

The Bid date for this Project stated in Document 00130 - Invitation to Bid shall be changed to: 2:00 PM, on June 4, 2024.

Information to Bidders:

Addendum number 2 will be forthcoming to clarify bidder's questions.

NOTE: Bidders must acknowledge receipt of this Addendum by listing the number and date, where provided, on the Bid Form - Document 00410.



ADDENDUM NUMBER 2

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

ISSUE DATE: 5/24/2024

Bidders are hereby notified that the Bidding and Contract Documents for the above project, for which Bids are to be received on June 4, 2024, are amended as follows:

Information to Bidders The following is provided to Bidders for information only:

1. Pre-Bid Meeting attendance from the Pre-Bid Conference held on 05/02/2024 is attached to this Addendum No. 2.
2. Pre-Bid Conference Presentation from the Pre-Bid Conference held on 05/02/2024 is attached to this Addendum No. 2.
3. Addendum No. 3 will be forthcoming to clarify additional bidder's questions. This Addendum No.3 is anticipated to include revisions to Sections 00412, 00413, 01270, and other Contract Documents.

Q1.	Are landscaper qualifications similar to the landscaper qualifications for the Mill Creek Park Project?
A1.	Refer to Sections 00410 Bid Form, 00410 Experience Reference Form, 00410.02 Experience and Reference Summary, and 00410.03 List of Equipment and Staffing. This project does not include Section 00410.04 GSI Statement of Qualifications. Additionally, refer to Sections 02951 paragraph 1.06A for Installer and Field Supervisor qualifications and 02953 paragraph 1.06A for Installer qualifications.
Q2.	What is the 3-year correction period applicable to?
A2.	Section 00800 has been revised with this Addendum to address this question.
Q3.	Where is the bentonite clay being stored?
A3.	Section 01015 has been revised with this Addendum to address this question.
Q4.	Are the exiting contours shown on the drawing representative of what's present at the job site?
A4.	Refer to the Survey Note and Note #3 on Drawing C-004. Refer to the callout on Section Detail #6 of Drawing C-012.
Q5.	Who will be the Resident Project Representative and will they be on-site full time?
A5.	The Resident Project Representative (RPR) will be a member of the design team (McClure or a subconsultant). The RPR is not anticipated to be on-site full-time; their time on site will depend on the work being performed.

Q6.	Where will the KC Parks contractor (Amino Brothers be excavating to) and will they be bringing the bottom of the ponds up to finished grade?
A6.	Refer to Section Detail #6 of Drawing C-012.
Q7.	Are the limestone wall blocks required to be from a certain supplier or will “or equals” be permissible based on color and other properties?
A7.	Refer to notes on Drawing L-107 which has been revised with this Addendum to answer this question.
Q8.	Does the contractor need to include the CMAC provider’s (OptiRTC’s) materials & integration in the pricing or just materials? Will the integration be included in the other contract that Opti has with KC Water?
A8.	Refer to Section 01270 paragraph 2.09 and Item 9 of Section 00412 Adjustment Unit Prices. Refer to Drawings I&C-001 and I&C-002 for Contractor procurement requirements. Refer to Section 01015, paragraph 1.17 which has been revised with this Addendum to answer this question.
Q9.	Can you provide a preferred contact at OptiRTC?
A9.	Aaron Goodykoontz agoodykoontz@optirtc.com 844-678-4782 ext. 712
Q10.	Will big block walls have specified concrete mixes? And the specification calls out .67 sf face area but plans call out big block (much larger). Can clarification be provided on the size wanted?
A10.	Refer to the notes on Drawing L-107 for limestone slab dimensions. Drawing L-107 has been revised with this Addendum.
Q11.	Are the limestone wall blocks natural stone or a manufactured block?
A11.	Refer to notes on Drawing L-107, which has been revised per this Addendum.
Q12.	Storm pipe on this project is shown on plans as 12” PVC but wanted to make sure we could bid 12” HDPE per KCMO specs?
A12.	Refer to Section 02630; storm pipe may be per paragraphs 2.01 B through E.
Q13.	Will the water service line tap be part of this project?
A13.	Refer to the callout on Drawing C-008 regarding the Contractor’s scope for the water service line.

Specifications

1. Delete and replace the following section(s):
 - a. Delete Section 00410, Construction Bid Form and replace with the following Section 00410, Construction Bid Form, attached herein.
 - b. Delete Section 00800, Supplementary Conditions and replace with the following Section 00800, Supplementary Conditions, attached herein.
2. Make the following modifications to Section 01015 – SPECIFIC PROJECT REQUIREMENTS:
 - a. Delete Paragraph 1.08A.1. and replace with the following:

1.08A.1. Bentonite Clay Liner. The bentonite material is stored near the project site (at the southwest corner of the intersection of The Paseo and Independence Ave.) in a Conex container approximately 10-ft wide by 40-ft long. Approximately 1,400 50-lb bags of bentonite material are stored on pallets in the Conex container. The bentonite material will be available to Contractor at this location at the time of construction notice-to-proceed. Contractor will be responsible for storage of bentonite material following construction notice-to-proceed.
 - b. Add to the end of paragraph 1.17 the following:

The Contractor shall procure CMAC equipment through CMAC Provider and procure the installation materials and hardware. The contractor is responsible for providing all labor associated with the installation and commissioning of the CMAC system. The software subscription and professional services are provided by the CMAC Provider through a separate contract with KC Water. Professional services include configuration and implementation services and remote engineering and Contractor support; the CMAC Provider will provide remote guidance and support for the Contractor through these professional services.

Drawings

1. Delete and replace the following section(s):
 - a. Delete Drawing L-107, Layout Plan Enlargement and replace with the following Drawing L-107, Layout Plan Enlargement, Revisions 1, attached herein.

NOTE: Bidders must acknowledge receipt of this Addendum by listing the number and date, where provided, on the Bid Form - Document 00410.

Green Infrastructure Project 1-2: Paseo Gateway/KCU
Non-Mandatory Pre-Bid Conference

Date: 05/02/2024

Format: Virtual, Microsoft Teams

Project Number: 81000975

Construction Contract Number 1689

Start Time: 09:00 AM

End Time: 10:00 AM

ATTENDANCE LIST		
Name	Organization	Email
Madison Gibler	Burns & McDonnell	mgibler@burnsmcd.com
Brad Ikenberry	Infrastrucutre Solutions	bikenberry@i-solutionsllc.com
Coby Crawl	McClure	ccrawl@mcclurevision.com
Bob Hitt	MegaKC	bob@megakc.com
Sarjit Sajjad	Parrish & Sons Construction	ssajjad@parrishandsonsconstruction.com
Andrew Richardson	MegaKC	arichardson@megakc.com
Alex Schlader	McClure	aschlader@mcclurevision.com
Kconllc	Kcon	bids@kconllc.us
Jamie Driskell	Burns & McDonnell	jdriskell@burnsmcd.com
Kyle Tonjes	Burns & McDonnell	kltonjes@burnsmcd.com
DAN (Unverified)	Unknown	Unknown
Daniel Felder	Axiom Construction Group	dfelder@axiomcgkc.com
Jerry Baker	Gunter Construction Company	JerryB@gunterkc.com

GREEN INFRASTRUCTURE PROJECT 1-2: PASEO GATEWAY/KCU (BID #2)

NON-MANDATORY PRE-BID MEETING

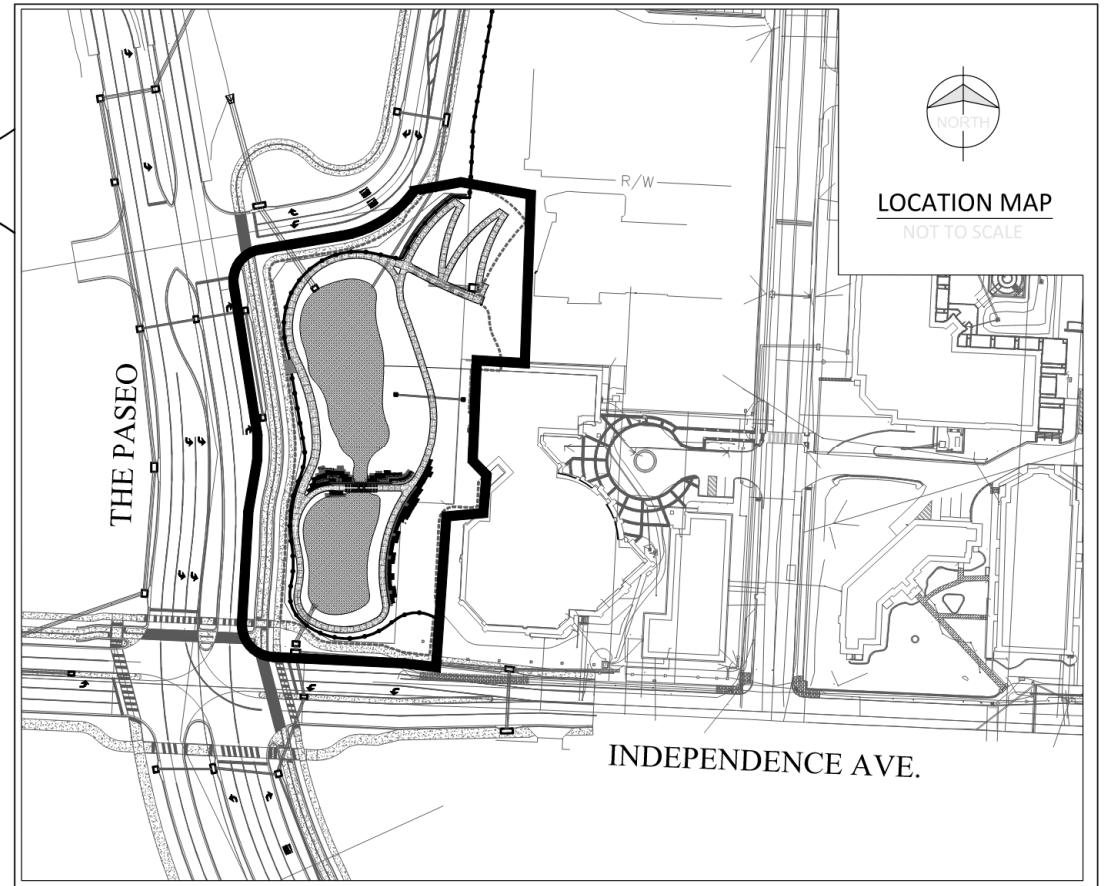
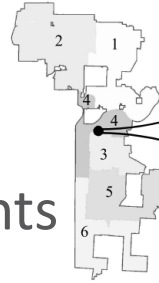
Project # 81000975; Contract # 1689

May 2, 2024



Agenda

- Introductions
- General Requirements
 - Bid Date/Time
 - MBE/WBE Goals
 - Instructions to Bidders
 - Bid Structure
 - Contract Schedule
- Project Description
- Coordination Requirements
- Technical Requirements
- Questions



INTRODUCTIONS

- Project Manager

- Madison Gibler
- Phone: (816) 448-7506
- Email: mgibler@burnsmcd.com



- Smart Sewer Program
Project Delivery Manager

- Steve Stuempfig



- Contract Administrator

- Jamie Driskell
- Phone: (816) 652-2927
- Email: jdriskell@burnsmcd.com



- Design Professional: McClure

- Coby Crowl
- Alex Schlader



GENERAL REQUIREMENTS

- Bid Date and Time:
May 21, 2024 at 2:00PM
 - Drop Bids off at 4800 East 63rd Street, KCMO 64130 (NE doors)
 - Attend Bid Opening in-person
4800 East 63rd Street, KCMO 64130 (NE doors)
- MBE 13% WBE 13%
- 00210 Instruction to Bidders
 - 00410.01 Experience Reference Summary
 - Affidavit of Compliance with the Federal Consent Decree
- Bid Structure
 - 00412 Unit Price with \$200,000 Allowance
 - Three (3) Bid Alternates
 - 00410 Bid Form will be revised with Addendum No. 1
- Project Schedule
 - Anticipated NTP: September 2024
 - 420 days to Achievement of Full Operation

PROJECT DESCRIPTION

- This Project is associated with the Federal Consent Decree regarding the City of Kansas City, Missouri Overflow Control Plan.
- Green Infrastructure Project
 - Two (2) extended wet detention basins with real-time controls
- Work efforts generally include:
 - Fine Grading
 - Pond Liner Installation
 - Native Vegetation Landscaping
 - Instrumentation & Controls



- Electrical Power Supply
- Retaining Walls
- Storm Sewer Relocation
- Concrete Placement

BID #1 (2023)



BID #2 (2024)





TECHNICAL REQUIREMENTS



CONTRACTOR MAINTENANCE & WARRANTY

00800 Supplementary Conditions

- Refer to SC-13.07
- The correction period set forth in Paragraph 13.07 A shall be three (3) years instead of one (1) year for all components except Green Stormwater Infrastructure Aggregate Media Plants and Non-Native Seeding and Sodding.
- The CITY or its designee will maintain the Green Stormwater Infrastructure after all work is completed and recommended for Final Payment.
- The CITY's (or its designee's) maintenance does not negate the CONTRACTOR's obligation to warrant these portions of the work for the duration of the Correction Period.

01015 Project Specific Requirements

- Modified Maintenance and Warranty Obligations of Green Stormwater Infrastructure Sections:
 - Section 02937 – Site Activity Plan
 - Section 02938 – Control and Protection
 - Section 02946 – Media
 - Section 02947 – Growing Media and Soil Amendments
 - Section 02949 – Tree Protection, Removal, and Replacement
 - Section 02951 – Plants
 - Section 02953 – Non-Native Seeding and Sodding
 - Section 02955 – Outlets
 - Section 02957 – Establishment
- **Maintenance** “until all work is completed and recommended for Final Payment”
- **Warrant** for “one (1) year after Achievement of Full Operation”

GREEN STORMWATER INFRASTRUCTURE INFILTRATION TESTING

- No post-construction infiltration testing
- Section 01015 – Specific Project Requirements modifies Section 02957 – Establishment Period to remove post-construction infiltration testing requirements



CRITICAL TIMING

Material Lead Times

- Pedestrian Bridge
- Valves
- Control Panel

Planting Windows

- Fall 2024
- Spring 2025
- Fall 2025

CONTINUOUS MONITORING AND ADAPTIVE CONTROLS (CMAC) PROVIDER

- CMAC Provider shall be OptiRTC
- KC Water has negotiated a contract with Opti RTC that includes Site Commissioning and Software Configuration/Implementation Services for this Project



Image Source: <https://optirtc.com/company>

UPCOMING ADDENDUM

- Items included:
 - Pre-Bid Conference Slides
 - Pre-Bid Conference Q&A Summary
 - 00410 Bid Form (Bid Alternates)

QUESTIONS



CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

BID FORM/CONTRACT

Project/Contract Number: 81000975 / 1689

Addendum #2

Project Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU

1. Bidder, having examined the Bidding Documents, related documents and the Site of the Work, and being familiar with all the conditions affecting the construction of the proposed Work, including Laws and Regulations and the availability of materials and supplies, agrees, if this Bid is selected by CITY, this Bid Form/Contract will become the Contract between Bidder and CITY for Bidder to furnish all labor and materials, equipment and services necessary for the proper completion of the Work in accordance with the Contract Documents, including general construction work at the price(s) stated below, which stated sums include fees and all other charges applicable to materials, appliances, labor and all things subject to and upon which other charges may be levied.
2. Bidder agrees the Contract Documents will comprise the entire agreement between CITY and Bidder. The Contract Documents are identified in the General Conditions and are incorporated into and made part hereof this Bid Form/Contract by reference.
3. Bidder agrees that if this Bid Form/Contract is executed by CITY, Bidder's offer is accepted and this Bid Form/Contract that incorporates all other Contract Documents shall constitute the Contract between the parties. Bidder authorizes the CITY to fill in the Contract Price on this Bid Form/Contract in accordance with Bidder's Bid. Bidder agrees that this Bid Form/Contract may be executed in one or more counterparts, each of which will be deemed an original copy of this Bid Form/Contract and all of which, when taken together, will be deemed to constitute one and the same Bid Form/Contract. This Bid Form/Contract shall be effective upon the execution of counterparts by both parties, notwithstanding that both parties may not sign the same counterpart. The parties' signatures transmitted by facsimile or by other electronic means shall be proof of the execution of this Bid Form/Contract and shall be acceptable in a court of law. A copy of this Bid Form/Contract shall constitute an original and shall be acceptable in a court of law.
4. **The Bid Prices shall be the totals as Calculated in TABLE A – BASE BID, and TABLE B – BID ALTERNATES, Form 00412. In determining lowest, responsive, and responsible Bid, the lowest will be the combination of BASE BID and BID ALTERNATES selected by the City during the bid evaluation. The City may determine the lowest, responsive, and responsible bid solely on the BASE BID or the BASE BID plus BID ALTERNATES 1, 2, AND/OR 3 in any combination. The City may make this determination at any time after Bid Closing and prior to Contract award. The City will act in the best interest of the City in determining whether to include any, all, or none of the Bid Alternates 1, 2, and/or 3 and the combination and priority of any Bid Alternates selected.**
5. **The Bid Price(s) shall be shown in numeric figures only and shall be paid at the Adjustment Unit Prices shown in Tables A and B.**

TOTAL SUM TABLE A - BASE BID IN NUMERIC FIGURES

\$ _____

TOTAL SUM BID TABLE B – BID ALTERNATE 1 IN NUMERIC FIGURES

\$ _____

TOTAL SUM BID TABLE B – BID ALTERNATE 2 IN NUMERIC FIGURES

\$ _____

TOTAL SUM BID TABLE B – BID ALTERNATE 3 IN NUMERIC FIGURES

\$ _____

6. The undersigned Bidder has given CITY’S Project Manager written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by the Project Manager or by the DESIGN PROFESSIONAL is acceptable to Bidder.
7. The undersigned Bidder agrees that this Bid shall remain subject to selection by CITY, and may not be withdrawn for one hundred twenty (120) days after the day Bids are opened.
8. The undersigned Bidder certifies that this Bid contains no modifications, deviations, riders or qualifications.
9. **Form 00412 Adjustment Unit Prices contains prices included in the Base Bid, Bid Alternate 1, and Bid Alternate 2, are incorporated into this bid. Form 00412 must be completed and returned with this bid. Bidder agrees that all profit, overhead, markups, labor, equipment, materials, ancillary work, permits, coordination, submittals, bonds, insurance and other costs required to provide the work listed in the Adjustment Unit Prices is included in the Adjustment Unit Price for each item of work listed. The City may add or delete any quantity of work to the project, by Work Change Directive or Change Order, at the prices indicated in TABLE A and TABLE B. The adjustment to the Contract Price will be based upon the awarded bid, plus or minus the work added or deleted based upon the Adjustment Unit Prices.**
10. Form(s) 00412 Adjustment Unit Prices and 00413 Allowances contain prices included in the Base Bid, and are incorporated into this Bid. Form(s) must be completed and returned with this Bid.
11. The undersigned Bidder acknowledges receipt of the following addenda listed by number and date appearing on each addendum:

Addendum Number	Dated	Addendum Number	Dated
(_____)	(_____)	(_____)	(_____)
(_____)	(_____)	(_____)	(_____)
(_____)	(_____)	(_____)	(_____)
(_____)	(_____)	(_____)	(_____)
(_____)	(_____)	(_____)	(_____)

12. By submitting its bid, Bidder is agreeing to meet or exceed the minimum employment goals of 10% minority and 2% women during the term of its contract with the City, or request a waiver of the goals. If a waiver is requested, Bidder must establish good faith efforts towards meeting the goals as set forth in the HRD Instructions for Construction Contracts and the City’s Construction Employment Program Ordinance (commonly known as the “Workforce Ordinance”) (City Code Section 3-515). Within forty-eight (48) hours after bid opening, the construction contractor shall submit HRD Employee Identification Report Form-Rev. 102715 which shall include: the name, home address, job title, sex and race/ethnicity of each person the contractor anticipates will be performing construction labor hours creditable towards the minimum workforce goals applicable to the construction contractor individually.

13. Should Bidder fail to meet or exceed the minimum employment goals or otherwise establish that Bidder is entitled to a waiver under circumstances in which Bidder has previously failed to meet or exceed the goals on one or more occasions with the twenty-four month period immediately preceding the completion of the Work under this Bid Form/Contract, Bidder may be suspended from participating, either as a contractor or subcontractor, on any future contract with the City for a period ranging from thirty days to six months as further specified in the Contract Documents. This program is distinguished from the M/WBE Program in that it is not based on company ownership but rather is based on workforce hours instead of a budgetary allocation of work.

By submitting its bid, Bidder warrants that if its bid should exceed \$300,000.00 and Bidder employs fifty (50) or more people, Bidder has an affirmative action program in place and will maintain the affirmative action program in place for the duration of its contract with the City. Bidder further warrants that it will comply with the affirmative action requirements contained in the General Conditions as incorporated by reference into this Bid Form/Contract.

14. Section 15 through Section 18 constitutes the Affidavit of Intended Utilization required to be submitted by Bidders.

15. By submitting its bid, Bidder is agreeing to the following: (1) Bidder has made by bid opening a good faith effort to meet the MBE/WBE/DBE goals established for the project; or Bidder will continue to make during the 48 hours after bid opening a good faith effort to meet the MBE/WBE/DBE goals established for the project; and (2) Bidder will timely submit its **00450 HRD 08 Contractor Utilization Plan/Request for Waiver, 00450.01 Letter of Intent to Subcontract** for each MBE/WBE listed on the 00450 HRD 08 Construction Contractor Utilization Plan/Request for Waiver, and **00460 HRD Timetable for MBE WBE Utilization (HRD Form 10)**; and (3) Bidder will submit documentation of its good faith efforts to meet the MBE/WBE/DBE goals when requested by the City. Failure to meet these requirements in good faith will result in Bidder forfeiting its bid bond.

PROJECT GOALS: 13% MBE 13% WBE 0% DBE

BIDDER PARTICIPATION: _____% MBE _____% WBE _____% DBE

16. To the best of Bidder's knowledge, the following are names of certified MBEs and/or WBEs with whom Bidder, or Bidder's subcontractors, presently intend to contract with if awarded the Contract on the above project: **(All firms must currently be certified by Kansas City, Missouri Human Relations Department)**

A. Name of M/WBE Firm _____
Address _____
Telephone No. _____
I.R.S. No. _____
Area/Scope of work _____
Subcontract amount _____

B. Name of M/WBE Firm _____
Address _____
Telephone No. _____
I.R.S. No. _____
Area/Scope of work _____
Subcontract amount _____

C. Name of M/WBE Firm _____
Address _____
Telephone No. _____
I.R.S. No. _____

Area/Scope of work _____
Subcontract amount _____

D. Name of M/WBE Firm _____
Address _____
Telephone No. _____
I.R.S. No. _____
Area/Scope of work _____
Subcontract amount _____

E. Name of M/WBE Firm _____
Address _____
Telephone No. _____
I.R.S. No. _____
Area/Scope of work _____
Subcontract amount _____

F. Name of M/WBE Firm _____
Address _____
Telephone No. _____
I.R.S. No. _____
Area/Scope of work _____
Subcontract amount _____

(List additional MBE/WBEs, if any, on additional pages and attach to this form)

17. By submitting its bid, Bidder is agreeing it will identify and timely submit within 48 Hours after Bid opening those MBE/WBE subcontractors with dollar amounts and scopes of work, which apply to or exceed the MBE/WBE goals for the Project on the **00450 HRD 08 Contractor Utilization Plan/Request for Waiver**.

18. Bidder agrees that failure to meet or exceed the MBE/WBE Goals for the above project will require the Director of Human Relations to recommend disapproval of the bid unless the Director of Human Relations finds the Bidder established good faith efforts towards meeting the goals as set forth in the HRD Forms and Instructions for Construction Projects and the City's MBE/WBE Ordinance.

For subcontractor's, indicate either the subcontractor to be provided, indicate "self-performed," or indicate "not-applicable" if there is not work (for example – Pipe Bursting is optional).

<u>Work to be Performed</u>	<u>Specification Section</u>	<u>Subcontractor to be Provided</u>
a. Grading/Soil		_____
b. Concrete Flatwork		_____
c. Concrete Retaining Walls		_____
d. Storm Structures and Piping	02630	_____
e. Landscaping	02951, 02953	_____
f. Irrigation	328423	_____
g. CMAC	406900	_____

Bidder: _____

Bid #2
Revision 1 - May 22, 2024

h. Lighting

260519 - 262816

Business Entity Type:

- ☐ Missouri Corporation
☐ Foreign Corporation
☐ Fictitious Name Registration
☐ Sole Proprietor
☐ Limited Liability Company
☐ Partnership
☐ Joint Venture
☐ Other: (Specify) _____

BIDDER

Legal name & address of Bidder, person
firm, partnership, corporation, or
association submitting Bid:

Phone No: _____

Cell No: _____

Facsimile No: _____

Bidder's E-Mail: _____

Federal ID. No. _____

I hereby certify that I have authority to execute this document on
behalf of Bidder, person, firm, partnership, corporation or association
submitting Bid.

By: _____
(Signature)

(Print Name)

Title: _____

Date: _____

(Attach corporate seal if applicable)

NOTARY

Subscribed and sworn to before me this _____ day of _____, 20__.

My Commission Expires: _____

ACCEPTANCE OF BID

CITY, by executing this Bid Form/Contract, hereby accepts Bidder's Bid and this Bid Form/Contract that incorporates all other Contract Documents shall constitute the Contract between the Parties.

CITY shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents a maximum amount of _____ Dollars, (\$ _____). The Contract Price includes:

00412 Unit Prices, included in the Bid, a copy of which is attached

00413 Allowances, included in the Bid, a copy of which is attached

By executing this Bid Form/Contract, CITY accepts Bidder's offer for the Contract Price stated above and this Bid Form/Contract that incorporates all other Contract Documents shall constitute the Contract between the parties

City of Kansas City, Missouri (OWNER or City)

Approved as to form:

Assistant City Attorney

I hereby certify that there is a balance, otherwise unencumbered, to the credit of the appropriation to which the foregoing expenditure is to be charged, and a cash balance, otherwise unencumbered, in the treasury, to the credit of the fund from which payment is to be made, each sufficient to meet the obligation hereby incurred.

Director of Finance

(Date)

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

OVERFLOW CONTROL PLAN CONSENT DECREE SUPPLEMENTARY CONDITIONS

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

These Supplementary Conditions amend or supplement the General Conditions of the Construction Contract and other provisions of the Contract Documents as indicated below. All provisions that are not so amended or supplemented remain in full force and effect.

SC-2.04 A. Article 2, Paragraph 2.04, Copies of Documents, is amended by deleting Paragraph 2.04 A and replacing it with the following:

- A. CITY shall furnish to CONTRACTOR one executed copy of the Project Manual including all Addenda.

SC-4.02 Article 4, Paragraph 4.02, Subsurface and Physical Conditions; Subparagraphs A and B are supplemented as follows:

In the preparation of the Contract Documents, the following report of explorations and tests of subsurface conditions at or contiguous to the Site of the Work were utilized:

1. Report dated June 26, 2019, prepared by TSI Geotechnical Inc.; entitled *Report of Subsurface Exploration and Geotechnical Engineering Evaluation: Paseo Gateway Roadway Improvements*, which may be reviewed at the KC Planroom or obtained from the City's Project Manager as listed in SC-6.06. The technical data contained in such report is for the CONTRACTOR's information only and is not a part of these Contract Documents.

In the preparation of the Contract Documents, no drawings of physical conditions in or relating to existing surface or subsurface structures which are at or contiguous to the Site of the Work were utilized.

SC-4.06 Article 4, Paragraph 4.06, Asbestos, Lead-Based Paint, PCBs, Petroleum, Hazardous Waste or Radioactive Material, Subparagraphs A and B are supplemented as follows:

In the preparation of the Contract Documents, no reports of explorations and tests of any Hazardous Environmental Condition(s) at the Site of the Work were utilized.

SC-5.01 A. Article 5, Paragraph 5.01, Performance, Payment and Other Bonds, Subparagraph A, second sentence, is revised as follows:

These Bonds shall remain in effect at least until **three (3) years** after the date when Achievement of Full Operation (AFO) is granted by the City, except as provided otherwise by Laws or Regulations or by the Contract Documents.

SC-5.03 A. Article 5, Paragraph 5.03 Certificates of Insurance, Subparagraph A is amended by adding the following Subparagraph 1:

1. CONTRACTOR shall obtain evidence that all Subcontractors have in force the required coverage in the amounts required by these Contract Documents, and evidence that each is current on its unemployment insurance payments before

Subcontractors begin Work at the Site. CONTRACTOR shall retain such evidence in its files and make available to CITY within ten (10) days after written request.

SC-5.04 B.1. Article 5, Paragraph 5.04, CONTRACTOR's Liability Insurance, Subparagraph B.1 is amended as follows:

With respect to insurance required by Paragraphs 5.04 A.3 through 5.04 A.5, the following additional individuals or entities shall be listed as additional insureds:

- Burns & McDonnell Engineering Company, Inc.
- McClure Engineering Company

SC-5.06 A. Article 5, Paragraph 5.06, Property Insurance, Paragraph A, is amended by adding the following after the first sentence:

Property Insurance on the Work at the Site shall be written with a deductible amount not to exceed \$10,000.00.

SC-6.06 A.1 Article 6, Paragraph 6.06 Substitutes and "Or-Equal" Items, Paragraph A is amended by adding the following at the end of Paragraph A.1:

Proposed "or-equal" items must be submitted to CITY at least eleven (11) days prior to Bid date at the following address:

Water Services Department
4800 East 63rd Street
Kansas City, Missouri 64130
Attn: Madison Gibler, P.E., Project Manager

mgibler@burnsmcd.com

Only Bidders may submit proposed "or-equal" items and such items must require no change in related Work. Acceptance by CITY of any proposed "or-equal" items will be made by Addendum only.

SC-6.06 A.2. Article 6, Paragraph 6.06 Substitutes and "Or-Equal" Items, Paragraph A is amended by adding the following at the end of Paragraph A.2:

Proposed substitute items must be submitted to CITY's Representative not later than 30 days prior to the time the item is to be incorporated into the Work. Only CONTRACTOR may submit proposed substitute items, and such items must be submitted to CITY's Representative on the standard City form 01630 - Substitution Request. Acceptance by CITY of any proposed substitute item will be made by Change Order.

SC-6.10. Article 6, Paragraph 6.10, Compliance with Laws and Regulations, is amended by adding the following new Subparagraphs immediately following Subparagraph 6.10 I 2:

- a. CONTRACTOR will be required to comply with wage rates as follows:

County – Jackson

Work Type: State – Heavy

SC-6.10. Article 6, Paragraph 6.10, Compliance with Laws and Regulations, is amended by adding the following new Subparagraph 6.10 S:

1. "Resident Laborers" means laborers who have been residents of the State of Missouri for at least thirty days and who intend to remain Missouri residents, and residents of Nonrestrictive States.

2. "Nonrestrictive States" means states identified by the Missouri Department of Labor and Industrial Relations Division of Labor Standards that have not enacted state laws restricting Missouri laborers from working on public works projects. A list of Nonrestrictive States can be found on the Division web site at <http://www.dolir.mo.gov/ls/index.htm>.

3. A period of Excessive Unemployment is declared when the Missouri Department of Labor and Industrial Relations Division of Labor Standards provides notice of such declaration. When in effect, notice will be provided on the Division web site at <http://www.dolir.mo.gov/ls/index.htm>. It is CONTRACTOR's obligation to determine whether a period of Excessive Unemployment is in effect when this Contract is let.

4. CONTRACTOR agrees to follow the provisions of Section 290.560 - 290.575 RSMo and agrees that if a period of Excessive Unemployment has been declared at any point during the term of this Contract, it will employ and require all Subcontractors of whatever tier to employ only Resident Laborers for the Work to be performed under this CONTRACT. Provided, however, CONTRACTOR may use laborers who are not Resident Laborers when Resident Laborers are not available or are incapable of performing the particular type of work involved if CONTRACTOR so certifies in writing to CITY and CITY issues a written approval. This provision does not apply to regularly employed nonresident executive, supervisory or technical employees.

SC-6.10. Article 6, Paragraph 6.10, Compliance with Laws and Regulations, is amended by adding the following new Subparagraph 6.10 T:

Contract Information Management System. CONTRACTOR shall comply with CITY's Contract Information Management System requirements. CONTRACTOR shall use CITY's Internet web based Contract Information Management System/Project Management Communications Tool provided by CITY and protocols included in that software during the term of this Contract. CONTRACTOR shall maintain user applications to CITY's provided system for all personnel, subcontractors or suppliers as applicable.

SC-6.11. Article 6, Paragraph 6.11, Taxes, is amended by adding the following sentence to Subparagraph 6.11 B:

A. Tax Compliance. The following subparagraphs apply if the Contract is over \$150,000.00.

SC-7.02 A. Article 7, Paragraph 7.02, Coordination, Subparagraph A is supplemented as follows:

1. It is anticipated that work under separate contracts will be performed at the Site, concurrent with the Work to be performed pursuant to these Contract Documents. The following person, firm or corporation ("the Coordinating Contractor") will have authority and responsibility for coordination of the activities among the various contractors performing work at the Site: CONTRACTOR.
2. The Coordinating Contractor shall coordinate the scheduling of work between this Contract and other concurrent contracts so that interference with the use of existing facilities and public works and conflicts with interfacing work will be minimized. Particular attention shall be paid to maintaining suitable traffic patterns and adequate access to the existing facilities.
3. Whenever construction activities conflict with the use of existing facilities and public works, **the City's Project Manager** shall decide which activity shall be given priority. The Coordinating Contractor shall be responsible for coordinating work by its own forces, by other contractors and by all subcontractors with work by the operating staff of the existing facility. The Coordinating Contractor shall exert full control over the actions of all employees and other persons with respect to the use and preservation

of property and existing facilities, except such control as may be specifically reserved to CITY or others. The Coordinating Contractor has the right to exclude from the Site all persons who have no purpose related to the Work or its inspection, and may require all person on the Site (except CITY's employees) to observe the same regulations as the Coordinating Contractor requires of its own employees.

SC-9.02 Article 9, Paragraph 9.02, Resident Project Representative is amended by adding the following new Subparagraphs immediately following Subparagraph 9.02 A:

- B. The Resident Project Representative (RPR) will be DESIGN PROFESSIONAL's representative at the Site, will act as directed by and under the supervision of DESIGN PROFESSIONAL, and will confer with DESIGN PROFESSIONAL regarding RPR's actions.
1. General: RPR's dealings in matters pertaining to the Work in general shall be with DESIGN PROFESSIONAL, the CITY's Smart Sewer Program Manager, and CONTRACTOR. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of CONTRACTOR. RPR shall generally communicate with CITY and CITY'S Smart Sewer Program Manager only with the knowledge of and under the direction of DESIGN PROFESSIONAL.
 2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by CONTRACTOR and consult with DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager concerning acceptability.
 3. Conferences and Meetings: Attend meetings with CONTRACTOR and CITY's Smart Sewer Program Manager, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings.
 4. Liaison:
 - a. Serve as DESIGN PROFESSIONAL's liaison with CONTRACTOR. Working principally through CONTRACTOR's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist DESIGN PROFESSIONAL in serving as CITY's liaison with CONTRACTOR when CONTRACTOR's operations affect CITY's on-Site operations.
 - c. Assist in obtaining from CITY additional details or information, when required for proper execution of the Work.
 5. Interpretation of Contract Documents: Report to DESIGN PROFESSIONAL when clarifications and interpretations of the Contract Documents are needed and transmit to CONTRACTOR clarifications and interpretations as issued by DESIGN PROFESSIONAL.
 6. Shop Drawings and Samples:
 - a. Record date of receipt of Samples and CONTRACTOR-approved Shop Drawings when hard copies are furnished at the Site.
 - b. Receive Samples which are furnished at the Site by CONTRACTOR, and notify DESIGN PROFESSIONAL of availability of Samples for examination.
 - c. Advise DESIGN PROFESSIONAL and CONTRACTOR of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which

RPR believes that the submittal has not been approved by DESIGN PROFESSIONAL.

7. Modifications: Consider and evaluate CONTRACTOR's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager. Transmit to CONTRACTOR in writing decisions as issued by DESIGN PROFESSIONAL.
8. Review of Work and Rejection of Defective Work:
 - a. Conduct on-Site observations of CONTRACTOR's work in progress to assist DESIGN PROFESSIONAL and CITY's Smart Sewer Program Manager in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager whenever RPR believes that any part of CONTRACTOR's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval. If RPR believes a Notice of Non-conformance should be issued, the RPR will advise the DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager in this matter and provide field information as required for the DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager to complete and issue a Notice of Non-Conformance to the CONTRACTOR.
9. Inspections, Tests, and System Start-ups:
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate CITY's personnel, and that CONTRACTOR maintains adequate records thereof.
 - b. Observe, record, and report to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager appropriate details relative to the test procedures and systems start-ups.
10. Records:
 - a. Prepare a daily report or keep a diary or log book, recording CONTRACTOR's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager.
 - b. Maintain records for use in preparing Project documentation.
11. Reports:

- a. Furnish to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager periodic reports as required of progress of the Work and of CONTRACTOR's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
 - b. Recommend to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager proposed Change Orders, Work Change Directives, and Field Orders. Assist DESIGN PROFESSIONAL as necessary in drafting such documents and obtain backup material from CONTRACTOR.
 - c. Immediately notify DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.
12. Payment Requests: Review applications for payment with CONTRACTOR for compliance with the established procedure for their submission and forward with recommendations to DESIGN PROFESSIONAL, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by CONTRACTOR are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to DESIGN PROFESSIONAL for review and forwarding to CITY prior to payment for that part of the Work.
14. Completion:
- a. Participate in DESIGN PROFESSIONAL's and CITY'S Smart Sewer Program Manager visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
 - b. Participate in DESIGN PROFESSIONAL's and CITY'S Smart Sewer Program Manager final visit to the Site to determine completion of the Work, in the company of CITY and CONTRACTOR, and prepare a final punch list of items to be completed and deficiencies to be remedied.
 - c. Observe whether all items on the final list have been completed or corrected and make recommendations to DESIGN PROFESSIONAL concerning acceptance and issuance of the notice of acceptability of the work.
- C. The RPR shall not:
1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 2. Exceed limitations of DESIGN PROFESSIONAL's authority as set forth in the Contract Documents.
 3. Undertake any of the responsibilities of CONTRACTOR, Subcontractors, or Suppliers.
 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of CONTRACTOR's work.

5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, anprograms in connection with the activities or operations of CITY or CONTRACTOR.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by DESIGN PROFESSIONAL.
7. Accept Shop Drawing or Sample submittals from anyone other than CONTRACTOR.
8. Authorize CITY to occupy the Project in whole or in part.

SC-9.04 Article 9, Paragraph 9.04, Rejecting Defective Work is amended by adding the following new Subparagraph immediately following Subparagraph 9.04 A:

- B. When the work performed by CONTRACTOR deviates from the project's contractual requirements, the Contractor is to be notified by the DESIGN PROFESSIONAL using the Non-Conformance Notice/Defective Work Form. The DESIGN PROFESSIONAL shall complete Part 1 – Identification of the Non-Conformance Notice and/or Defective Work to provide written notice to the CONTRACTOR that the work does not meet the referenced contractual requirements. Upon receipt, CONTRACTOR shall suspend work directly related to the non-conforming work in accordance with Specification 00700 General Conditions, Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work.

SC-9.08 E. Article 9, Paragraph 9.08, Limitations on DESIGN PROFESSIONAL's Authority and Responsibilities, Subparagraph E is supplemented as follows:

DESIGN PROFESSIONAL's Consultant(s), resident Project representative and assistant(s) to the Resident Project Representative are the following:

Consultant(s): McClure Engineering Company.

Resident Project representative: TBD.

Assistant(s) to the resident Project representative: TBD.

SC-11.04 C. Article 11, Paragraph 11.04, Unit Price Work, is amended by deleting Paragraph 11.04 C and replacing it with the following:

CITY may add or delete any quantity of work to the project, by Work Change Directive, at the established unit price. The established unit prices shall not be adjusted regardless of actual quantities.

SC-12.01 Article 12, Paragraph 12.01, Time of the Essence is amended by adding the following new Subparagraphs immediately following Subparagraph 12.01 A:

B. Starting and Completion

1. The Work to be performed under this Contract shall begin on the date specified in the written Notice to Proceed issued by the Director of Water Services, and the Work shall be substantially complete, in accordance with Paragraph 14.04, within 420 Calendar Days thereafter. Once the Work starts, CONTRACTOR shall continuously pursue completion of the Work.
2. The Work shall be completed and ready for final payment in accordance with Paragraph 14.07 within 60 Calendar Days after the date of Substantial Completion of the Work.

C. Liquidated Damages

1. If the Work is not substantially completed, in accordance with Paragraph 14.04, within the period stated in Paragraph 12.01 B.1, CONTRACTOR shall pay to CITY the amount of two thousand dollars (\$ 2,000.00) as liquidated damages and not as a penalty for each Calendar Day until the Work is substantially complete. The amount of liquidated damages shall be deducted from any payments due or to become due CONTRACTOR.
2. If the Work is not completed and ready for final payment in accordance with Paragraph 14.07, within the period stated in Paragraph 12.01 B.2, CONTRACTOR shall pay to CITY the amount of five hundred dollars (\$ 500.00) as liquidated damages and not as a penalty for each Calendar Day until the Work is completed and ready for final payment. The amount of liquidated damages shall be deducted from any payments due or to become due CONTRACTOR.

SC-13.03 Article 13, Paragraph 13.03, Notice of Defects is amended by adding the following new Subparagraph immediately following Subparagraph 13.03 A:

- B. Once the Non-Conformance Notice Part 1 – Identification has been given to the CONTRACTOR, per Article 9, Paragraph 9.04, Subparagraph B, the CONTRACTOR shall propose their corrective action plan with a detailed description of corrective work and proposed completion schedule in writing to the DESIGN PROFESSIONAL within the time identified in Part 1 of the Non-Conformance Notice. The DESIGN PROFESSIONAL and CITY shall approve CONTRACTOR's corrective action plan prior to commencement of remedial work. The Contractor shall resubmit its corrective action plan to address review comments received from CITY and DESIGN PROFESSIONAL. The DESIGN PROFESSIONAL shall document the approved corrective action plan in Part 2 – Disposition and Corrective Action of the Notice of Non-Conformance and/or Defective Work. The DESIGN PROFESSIONAL shall then distribute the Non-Conformance Notice / Defective Work Form to the CITY and CONTRACTOR. CONTRACTOR shall complete the corrective work in accordance with Article 13.06.

SC-13.06 Article 13, Paragraph 13.06, Correction of Removal of Defective Work is amended by adding the following new Subparagraph immediately following Subparagraph 13.06 A:

- B. Once the corrective action has been taken, the DESIGN PROFESSIONAL shall verify that the agreed upon resolution has been carried out in accordance with the procedures and verification process agreed upon in Part 2 – Disposition and Corrective Action of the Non-Conformance Notice and/or Defective Work. The DESIGN PROFESSIONAL shall document how satisfactory completion of corrective action was verified in Part 3 – Verification of Corrective Action. The DESIGN PROFESSIONAL shall then distribute the Non-Conformance Notice / Defective Work Form to the CITY and CONTRACTOR.

SC-13.07 Article 13, Paragraph 13.07, Correction Period, Subparagraph A is amended as follows:

The correction period set forth in Paragraph 13.07 A shall be three (3) years instead of one (1) year for all components except Green Stormwater Infrastructure Plants and Non-Native Seeding and Sodding. The CITY or its designee will maintain the Green Stormwater Infrastructure after all work is completed and recommended for Final Payment. The CITY's (or its designee's) maintenance does not negate the CONTRACTOR's obligation to warrant these portions of the work for the duration of the Correction Period.

SC-14.04. Article 14, Paragraph 14.04, Substantial Completion or Achievement of Full Operation, Subparagraph A is supplemented as follows:

A. To meet the definition of Achievement of Full Operation, the following items of the Work must be operational and ready for CITY's continuous use as intended:

- Installation of control and protection around the extended wet detention site per Section 02938 and per the Site Activity Plan defined in Section 02937
- Installation of all storm structures (including outlet control structure modifications), storm piping, end sections, trash racks, and permanent erosion control measures (including riprap and/or cobble)
- Grading of extended wet detention basin area including ledgetone and retaining walls
- Installation of concrete maintenance paths and pedestrian stairs
- Installation of site amenities including dock and pedestrian bridge
- Installation of lighting
- Installation of Continuous Monitoring and Adaptive Controls (CMAC) with conduit and trace wire for future City SCADA connection
- Installation of fencing and gates
- Installation of all landscaping including trees, shrubs, grasses, perennials, submergent/aquatic vegetation, mulch, and limestone boulders

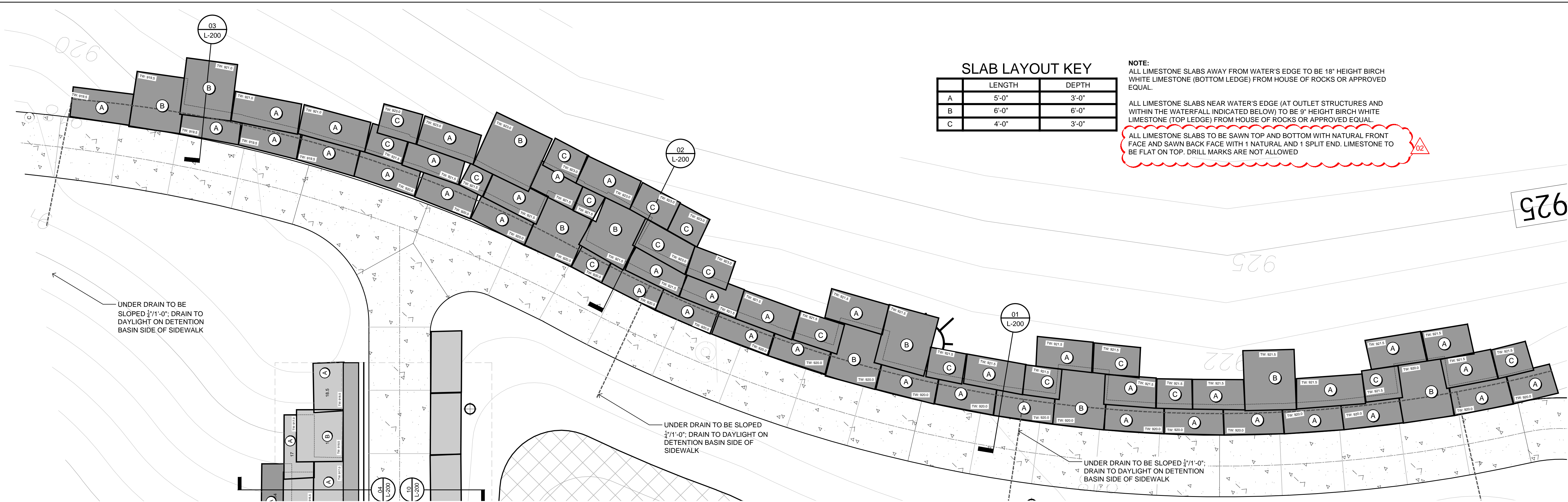
To meet the definition of Achievement of Full Operation, the following items of the Work must be operational and ready for CITY's continuous use as intended:

- Achievement of Full Operation punch list items
- Demobilization
- Record Drawings
- Contractor and Subcontractor Affidavit for Final Payment
- Warranties

SC-14.05 Article 14, Paragraph 14.05, Partial Utilization is amended by adding the following new Subparagraph A.3. immediately following Subparagraph 14.05 A.2:

3. CITY at any time may make a written request to CONTRACTOR to permit CITY to take over operation of any part of the Work although it is not substantially complete. A copy of the request will be sent to DESIGN PROFESSIONAL, and within a reasonable time thereafter CITY, CONTRACTOR and DESIGN PROFESSIONAL shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If CONTRACTOR does not make written objection to CITY and DESIGN PROFESSIONAL that such part of the Work is not ready for separate operation by CITY, DESIGN PROFESSIONAL will finalize the list of items to be completed or corrected and will deliver such lists to CITY and CONTRACTOR. DESIGN PROFESSIONAL will also make a written recommendation as to the division of responsibilities pending final payment between CITY and CONTRACTOR with respect to security, operation, safety, maintenance, utilities, insurance, warranties and guarantees for that part of the Work, which recommendation will become binding upon CITY and CONTRACTOR at the time when CITY takes over such operation (unless they shall have otherwise agreed in writing and so informed DESIGN PROFESSIONAL). During such operation and prior to Substantial Completion of such part of the Work, CITY shall allow CONTRACTOR reasonable access to complete or correct items on said list and to complete other related Work.

S:\1-PROJECTS\2018\18158_PASEO GATEWAY CSO FEATURE\18158_WORKING\AUTOCAD\SHEETS\SITE DETAILS.DWG
SKW:STB
1: 0.0245
ANDREW HOLZUM
20 May 2024



SLAB LAYOUT KEY		
	LENGTH	DEPTH
A	5'-0"	3'-0"
B	6'-0"	6'-0"
C	4'-0"	3'-0"

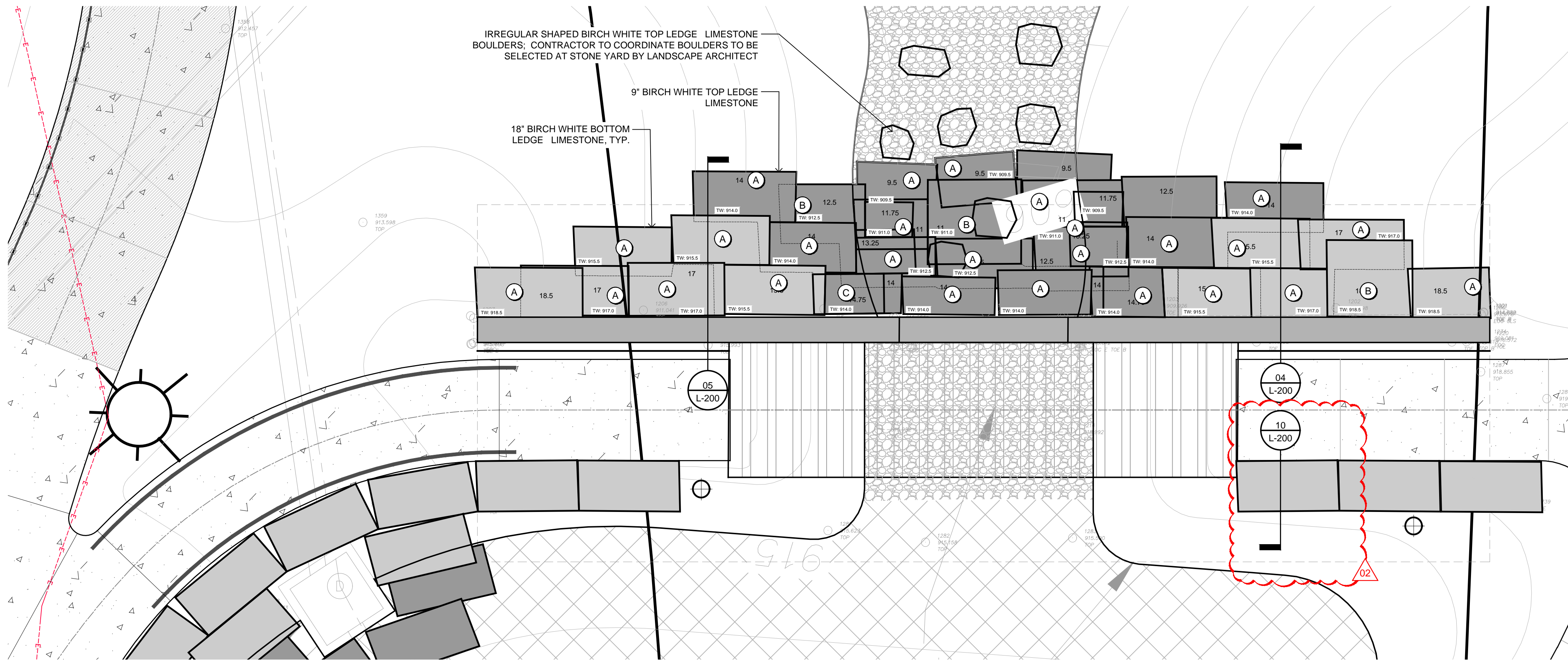
NOTE:
ALL LIMESTONE SLABS AWAY FROM WATER'S EDGE TO BE 18" HEIGHT BIRCH WHITE LIMESTONE (BOTTOM LEDGE) FROM HOUSE OF ROCKS OR APPROVED EQUAL.

ALL LIMESTONE SLABS NEAR WATER'S EDGE (AT OUTLET STRUCTURES AND WITHIN THE WATERFALL INDICATED BELOW) TO BE 9" HEIGHT BIRCH WHITE LIMESTONE (TOP LEDGE) FROM HOUSE OF ROCKS OR APPROVED EQUAL.

ALL LIMESTONE SLABS TO BE SAWN TOP AND BOTTOM WITH NATURAL FRONT FACE AND SAWN BACK FACE WITH 1 NATURAL AND 1 SPLIT END. LIMESTONE TO BE FLAT ON TOP. DRILL MARKS ARE NOT ALLOWED

1 L-107 PLAN: SOUTH ROCK RETAINING WALL

1"=60'-0"



THE PROFESSIONAL WHOSE SIGNATURE AND PERSONAL SEAL APPEARS HEREON ASSUMES RESPONSIBILITY ONLY FOR WHAT APPEARS ON THIS PAGE, AND DISCLAIMS (PURSUANT TO SECTION 327.411 RSMO) ANY RESPONSIBILITY FOR ALL OTHER PLANS, SPECIFICATIONS, ESTIMATES, REPORTS, OR OTHER DOCUMENTS OR INSTRUMENTS NOT SEALED BY THE UNDERSIGNED PROFESSIONAL RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE PROJECT TO WHICH THIS PAGE REFERS.

PROFESSIONAL ENGINEER SEAL

KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT



ISSUE FOR BID
FOR WSD USE:

GREEN INFRASTRUCTURE 1-2:
PASEO GATEWAY/KCU
THE PASEO AND INDEPENDENCE
AVENUE

KANSAS CITY,
JACKSON COUNTY, MISSOURI

LAYOUT PLAN
ENLARGEMENT

DRAWN BY AH	CHECKED BY ME	DATE SUBMITTED 04/12/24	RANGE 33W	TWP 50N	SEC 33
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CONTRACTOR DATE COMPLETED

CONTRACT NO. DPS 1850 CCR 1850	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06
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PROJECT NO. SHEET NUMBER

81000975 L-107 SHEET 41 OF 52

2 L-107 POND ROCK WALL - EAST

1'-50'



ADDENDUM NUMBER 3

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

ISSUE DATE: 5/30/2024

Bidders are hereby notified that the Bidding and Contract Documents for the above project, for which Bids are to be received on June 4, 2024, are amended as follows:

Specifications

1. Delete and replace the following section(s):
 - a. Delete Section 00412, Unit Prices and replace with the following Section 00412, Unit Prices, Revision 1, attached herein.
 - b. Delete Section 00413, Allowance Form and replace with the following Section 00413, Allowance Form, Revision 1, attached herein.
 - c. Delete Section 01270, Adjustment Unit Price and Measurement Procedures and replace with the following Section 01270, Adjustment Unit Price and Measurement Procedures, Revision 1, attached herein.
2. Add the following section(s):
 - a. Add Section 02220, Impermeable Clay Liner, attached herein.
3. Make the following modifications to Section 01015 – Specific Project Requirements:
 - a. Add Paragraph 3.02.K as follows:
 - K. Section 02200 - Earthwork.
 - b. Add Paragraph 3.02.K.1 as follows:
 1. Add paragraph 2.05.C. “C. Pond liner material shall have a LL < 50 and a PI > 10 with 95 percent of the material passing the No. 4 sieve and no less than 50 percent of the material passing through the No. 200 sieve. Material shall be free of debris and organics.”
 - c. Add Paragraph 3.02.K.2 as follows:
 1. Remove the last sentence from paragraph 2.03.A. “Rock encountered shall be handled at no extra cost to City.”
 - d. Add Paragraph 3.02.K.3 as follows:
 1. Add paragraphs 2.03.B., B.1., B.2., and B.3. as follows:

“B. Rock excavation is defined as the removal of all rock ledges 6 inches or more in thickness, and detached rock or boulders having a volume of more than 1 ½ cubic yards and shale occurring in its natural state, hard and un-weathered.

 1. A rock ledge is defined as a continuous body of rock which may include thin interbedded seams of shale or other soft materials less than 12 inches thick. The vertical limit of each ledge shall be defined by interbedded seams of soft materials 12 inches or more in thickness. The beds of soft interbedded material 12 inches or more in thickness shall not be included in the measurement for “Rock Excavation” but shall be included in the measurement for “Grading (Fine Grading)”.

2. The following items shall not be considered as rock excavation: soft or disintegrated rock or flowable backfill (CLSM) which can be removed with a pick or digging machine; loose, shaken or previously blasted rock; broken stones and rock which may fall into the trench from outside the limits of excavation.
3. When solid rock (including non-diggable flowable backfill (CLSM)) is discovered, the Contractor shall notify the Owner.”

Drawings

1. Delete and replace the following drawings(s):
 - a. Delete Drawing C-005, Upper Pond Grading Plan and replace with the following Drawing C-005, Upper Pond Grading Plan, Revision 1, attached herein.
 - b. Delete Drawing C-007, Lower Pond Grading Plan and replace with the following Drawing C-007, Lower Pond Grading Plan, Revision 1, attached herein.
 - c. Delete Drawing C-008, Utility Plan and replace with the following Drawing C-008, Utility Plan, Revision 1, attached herein.
 - d. Delete Drawing C-011, Civil Details and replace with the following Drawing C-011, Civil Details, Revision 1, attached herein.
 - e. Delete Drawing C-012, Civil Details and replace with the following Drawing C-012, Civil Details, Revision 1, attached herein.
 - f. Delete Drawing E-001, Electrical Symbols Notes and Details and replace with the following Drawing E-001, Electrical Symbols Notes and Details, Revision 1, attached herein.
 - g. Delete Drawing E-201, Overall Electrical Plan and replace with the following Drawing E-201, Overall Electrical Plan, Revision 1, attached herein.
 - h. Delete Drawing E-202, Enlarged Electrical Plans and replace with the following Drawing E-202, Enlarged Electrical Plans, Revision 1, attached herein.
 - i. Delete Drawing E-301, One Line Diagram and Panelboard Schedules and replace with the following Drawing E-301, One Line Diagram and Panelboard Schedules, Revision 1, attached herein.
 - j. Delete Drawing E-401, Electrical Details 1 and replace with the following Drawing E-401, Electrical Details 1, Revision 1, attached herein.
 - k. Delete Drawing E-402, Electrical Details 2 and replace with the following Drawing E-402, Electrical Details 2, Revision 1, attached herein.
 - l. Delete Drawing IC-001, P&ID and replace with the following Drawing IC-001, P&ID, Revision 1, attached herein.
 - m. Delete Drawing IC-002, Actuator Wiring Diagram and replace with the following Drawing IC-002, Actuator Wiring Diagram, Revision 1, attached herein.
 - n. Delete Drawing IC-003, Instrument Installation Details and replace with the following Drawing IC-003, Instrument Installation Details, Revision 1, attached herein.
 - o. Delete Drawing L-102, Site Plan Enlargement and replace with the following Drawing L-102, Site Plan Enlargement, Revision 1, attached herein.
 - p. Delete Drawing L-103, Site Plan Enlargement and replace with the following Drawing L-103, Site Plan Enlargement, Revision 1, attached herein.
 - q. Delete Drawing L-108, Layout Plan Enlargement and replace with the following Drawing L-108, Layout Plan Enlargement, Revision 1, attached herein.
 - r. Delete Drawing L-201, Site Details and replace with the following Drawing L-201, Site Details, Revision 1, attached herein.

- s. Delete Drawing L-203, Site Details Wood Dock - Alternate 1 and replace with the following Drawing L-203, Site Details Wood Dock - Alternate 1, Revision 1, attached herein.

NOTE: Bidders must acknowledge receipt of this Addendum by listing the number and date, where provided, on the Bid Form - Document 00410.

Section 00412

Bidder: _____



Adjustment Unit Prices

Project Number: 81000975 / Contract Number: 1650

Project Title: Green Infrastructure Project 1-2: Paseo Gateway/KCU

TABLE A - BASE BID

NOTE: IN THE EVENT OF DISCREPANCY, UNIT PRICE SHALL GOVERN. THE LUMP SUM CONTRACT PRICE WILL BE SUBJECT TO ADJUSTMENT ACCORDING TO FINAL MEASURED, USED, OR DELIVERED QUANTITIES BASED ON THE ADJUSTMENT UNIT PRICES LISTED BELOW. THE CITY MAY ADD OR DELETE ANY QUANTITY OF WORK TO THE PROJECT AS SPECIFIED IN SUPPLEMENTARY CONDITION SC-11.04 C. THE ADJUSTMENT OF THE CONTRACT PRICE WILL BE BASED UPON THE LUMP SUM BID PLUS OR MINUS THE WORK ADDED OR DELETED BASED UPON THE ADJUSTMENT UNIT PRICES.

Item	Unit	Qty.	Item Description	Unit Price	Extension
1	LS	1	Erosion & Sediment Control		\$ -
2	LF	150	Removal of Storm Sewer System		\$ -
3	SF	250	Removal of Sidewalk		\$ -
4	CY	3300	Grading (Fine Grading)		\$ -
5	EA	2	Trash Racks		\$ -
6	EA	3	Adjust Storm Sewer Structure Top		\$ -
7	LF	150	12" PVC Storm Sewer Pipe		\$ -
8	EA	4	24" Nyloplast Drain Basin w/ Standard Grate		\$ -
9	LS	1	CMAC Valves and Controls		\$ -
10	LS	1	Electrical Power to Valves and Controls		\$ -
11	LS	1	Fiber Optic Connection		\$ -
12	EA	2	Waterfall/Recirculation Pumps		\$ -
13	EA	2	Waterfall/Recirculation Strainer Baskets		\$ -
14	EA	1	Waterfall/Recirculation 6'x6' Precast Concrete Pump Vault		\$ -
15	LF	26	Waterfall/Recirculation 6" PVC Intake Pipe		\$ -
16	LF	800	Waterfall/Recirculation 3" Flexible PVC Discharge Pipe		\$ -
17	EA	2	Bridge Abutments		\$ -
18	CY	84	Concrete Retaining Wall		\$ -
19	CY	73	Turndown Sidewalk Curb		\$ -
20	CY	30	Rip Rap		\$ -
21	SY	2,600	Impermeable Clay Liner		\$ -
22	SF	3,183	Paseo Gateway Bike Path		\$ -
23	SF	2,142	Paseo Gateway Sidewalk		\$ -
24	SF	6,307	Concrete Maintenance Path		\$ -
25	SF	301	Concrete Sidewalk		\$ -
26	EA	4	Stairs with Handrails		\$ -
27	LS	1	ADA Ramp with Guard Rails		\$ -
28	LS	1	Pedestrian Bridge (excludes footings)		\$ -
29	EA	2	Bridge Extended Guard Rail + Footing (15' Section)		\$ -
30	SF	230	Grasspave		\$ -
31	LF	678	Decorative Fence		\$ -
32	EA	1	Decorative Gate (Double Leaf)		\$ -
33	EA	1	Weir Wall Stainless Steel Weir		\$ -
34	TON	441	Limestone Retaining Wall Slabs		\$ -
35	TON	1	Pea Gravel Infill at Limestone Wall Edge Along Walk		\$ -
36	EA	20	Overstory Trees		\$ -
37	EA	63	Understory Trees		\$ -
38	EA	12,918	Perennials and Grasses - QT Size		\$ -
39	EA	1,740	Submerged Perennials and Grasses - Plug Size		\$ -
40	CY	282	Mulch		\$ -
41	SY	2,222	Turf		\$ -
42	SF	33,922	Irrigation		\$ -
43	CY	1,568	Planting Soil		\$ -
44	TON	20	Cobble Stone (4"-10" Gray Cobble)		\$ -
45	SSF	350	Weir Wall Veneer		\$ -
46	LF	52	Weir Wall Cap		\$ -
47	LF	361	Landscape Edging		\$ -
48	EA	8	Concrete Lightpole Bases		\$ -

49	EA	8	LS2 Pedestrian Pole - HESS		\$	-
50	LF	1,500	Trenching and Backfilling		\$	-
51	LF	4,500	#10 THHN/ Copper Conductors		\$	-
52	LF	1,500	1" PVC Schedule 40 Conduit		\$	-
ALLOWANCE						
53	LS	1	General Allowance		\$	200,000.00
54	CY	300	Rock Excavation Allowance	\$ 92	\$	27,600.00
Adjustment Unit Price Extension Subtotal Table A - Base Bid (Add Line Items 1-54)					\$	-
THE LUMP SUM ITEMS BELOW SHALL NOT BE ADJUSTED REGARDLESS OF THE FINAL QUANTITY OF THE ADJUSTMENT UNIT PRICE ITEMS LISTED ABOVE. THE CONTRACTOR REMAINS RESPONSIBLE FOR MAINTAINING THE BONDS AND INSURANCE AS NECESSARY TO COVER THE FINAL CONTRACT VALUE AS ADJUSTED USING THE ADJUSTMENT UNIT PRICE ITEMS ABOVE. BID PRICE FOR LUMP SUM ITEMS 55 AND 56 SHALL NOT EXCEED THE LIMITS INDICATED IN THE ITEM DESCRIPTION.						
Item	Unit	Qty.	Item Description	Extension		
55	LS	1	Mobilization (Shall not exceed 3.5% of Table A - Base Bid Adjustment Unit Price Extension Subtotal)			
56	LS	1	Bonds and Insurance (Shall not exceed 1.5% of Table A - Base Bid Adjustment Unit Price Extension Subtotal)			
57	LS	1	Final Completion, Demobilization, Record Drawings, Close-Out (Shall not be less than \$20,000)			
Lump Sum Unit Price Subtotal Table A - Base Bid (Add Line Items 55-57)					\$	-
TOTAL TABLE A - BASE BID (Adjustment Unit Price Extension Subtotal plus Lump Sum Unit Price Subtotal)					\$	-

TABLE B - BID ALTERNATES						
Item	Unit	Qty.	Item Description	Unit Price	Extension	
BID ALTERNATE 1						
58	EA	1	Southern Staircase + Handrails		\$	-
TOTAL - BID ALTERNATE 1						\$ -
BID ALTERNATE 2						
59	TON	49	Limestone Outcroppings at Upper Pond Waters Edge		\$	-
TOTAL - BID ALTERNATE 2						\$ -
BID ALTERNATE 3						
60	CY	31	Dock Foundation Piers		\$	-
61	LS	1	Lower Pond Dock (excludes piers)		\$	-
62	CY	2	Turndown Sidewalk Curb		\$	-
63	TON	5	Limestone Retaining Wall Slabs		\$	-
TOTAL - BID ALTERNATE 3						\$ -

Project Number: 81000975

[illegible]

SECTION 01270 – ADJUSTMENT UNIT PRICE AND MEASUREMENT PROCEDURES

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This section describes the method by which construction of this project shall be measured and paid in accordance with Form 00412 Adjustment Unit Prices. Should there be any conflicts between payment described in individual specification sections and this section, payment shall be made in accordance with this section. Any work shown on the Construction Contract Documents or described in the Specifications that is not specifically covered by the bid items shall be considered subsidiary and costs included in other items of Work.
- B. The Base Bid and Bid Alternate 1 shall be as calculated on Form 00412 Adjustment Unit Prices. The Base Bid and Bid Alternate 1 or any combination thereof may be selected for construction at the Owner's discretion.
- C. The Bid includes all profit, overhead, markups, labor, equipment, materials, incidental or ancillary work, permits, coordination, traffic control, submittals, mobilization, bonds, insurance, acceptance testing, cleanup, demobilization, closeout and other costs required to provide a complete functioning project that satisfies the project specifications, unless specifically noted or excluded by subsequent in these specifications.
- D. Form 00412 includes a listing of Adjustment Unit Price items and Adjustment Unit Price costs. The final Contract Price shall be adjusted according to the final measured, used, or installed quantities based on the Line Items unit prices. Measurement shall be as approved by the Owner.
- E. Include as part of each Line Item Adjustment Unit Price in PART 2 – ADJUSTMENT UNIT PRICES ITEMS all costs associated with miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.
- F. As part of each Adjustment Unit Price Line Items in PART 2 – ADJUSTMENT UNIT PRICES ITEMS, the unit price on 00412 Adjustment Unit Prices Bid Form includes all costs associated with permits, traffic control, bypass pumping, preliminary cleaning including heavy cleaning as necessary and CCTV, demolition, excavation, bedding, backfill, ancillary devices, locating manholes including those below grade, verifying manhole depths, restoration, fence removal and replacement, landscaping, removing and replacing retaining walls 4-feet and less in height unless otherwise called out with a greater height, tree removal and replacement, street restoration, curb replacement, sidewalk replacement, driveway restoration, ADA ramp construction, sign removal and replacement, utility pole bracing or relocating, irrigation system replacement, abandoned utility removal, and abandoned railroad rail removal required to complete installation.

- G. Contractor shall protect in place all utilities and adjacent infrastructure (including but not limited to subgrade, backfill, streets, driveways, sidewalks, ADA ramps, etc.) by whatever means necessary and at the Contractor's cost. No additional payment will be made for repair of public or private utilities or adjacent infrastructure that are damaged or collapse during construction activities, regardless of the means and methods for protecting in place. If a utility is in direct conflict with the Work and requires relocation, Contractor shall give the utility company reasonable advanced notice and provide such plans as the company may reasonably require to perform the relocation.
- H. Contractor shall be responsible to complete field investigations to determine if service laterals within the area of Work are active and to only install new service connections and/or reinstate active laterals. If inactive laterals are installed or reinstated, Contractor shall install a Cured-in-Place Pipe Sectional Point Repair at no additional cost to the Owner.
- I. References in this specification to Line Items and Unit Prices (costs) are to Form 00412 Adjustment Unit Prices and to the Sewer Main and Lateral Rehabilitation Schedule and Manhole Rehabilitation Schedule on the Contract Drawings. Reference herein to the "Rehabilitation Schedule" refers to these two schedules.
- J. The Owner may add or delete any quantity of Work to the project by Work Change Directive at the prices listed on Form 00412 Adjustment Unit Prices, per 00800 Supplementary Conditions SC-11.04 C.

PART 2 – ADJUSTMENT UNIT PRICE ITEMS

2.01 EROSION & SEDIMENT CONTROL (LINE ITEM 1)

- A. This section refers to the erosion and sediment control measures depicted on the Erosion Control Plan, including silt fence, construction entrance, concrete wash out and storm sewer inlet protection.
- B. This item includes erosion and sediment control required initially, during construction, and during the landscape establishment period.
- C. Erosion & Sediment Control: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for "Erosion & Sediment Control" as listed in the Bid Form – Unit Prices.

2.02 REMOVAL OF STORM SEWER SYSTEM (LINE ITEM 2)

- A. This section refers to storm sewer pipe and storm sewer structures located along the west and north sides of the Student Center on the Kansas City University campus. These items are being demolished so that the line can be lowered in the same alignment.
- B. Removal of Storm Sewer System: Measured to the nearest 1 linear foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Removal of Storm Sewer System” as listed on the Bid Form – Unit Prices.

2.03 REMOVAL OF SIDEWALK (LINE ITEM 3)

- A. This section refers to sidewalk that needs to be removed for the construction of the concrete retaining wall along the north side of the site. The sidewalk will need to be replaced after construction of the retaining wall.
- B. Removal of Sidewalk: Measured to the nearest 1 square foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Removal of Sidewalk” as listed on the Bid Form – Unit Prices.

2.04 GRADING (FINE GRADING) (LINE ITEM 4)

- A. This section refers to cut and fill on the site required to finish the pond, for installing the proposed features, and for constructing the proposed grades indicated in the Grading Drawings. Estimated cut is 1140 CY and the estimated fill is 2160 CY for total combined 3300 CY.
- B. Grading (Fine Grading): Measured to the nearest cubic yard of cut and fill, complete in place and acceptable, shall be paid for at the contract unit price bid for “Grading (Fine Grading)” as listed in the Bid Form – Unit Prices.

2.05 TRASH RACKS (LINE ITEM 5)

- A. This section refers to trash racks added to the existing flared end sections on the Upper and Lower Ponds outlet pipes. The trash racks are intended to prevent large debris from clogging the outlet pipes and from entering the control structures.
- B. Trash Racks: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Trash Racks” as listed on the Bid Form – Unit Prices.

2.06 ADJUST STORM SEWER STRUCTURE TOP (LINE ITEM 6)

- A. This section refers to two existing storm sewer junction boxes located in the northeast area of the site and the existing outlet structure for the Upper Pond.
- B. The existing top section shall be removed and replaced with a new precast section.
- C. Adjust Storm Sewer Structure Top: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Adjust Storm Sewer Structure Top” as listed on the Bid Form – Unit Prices.

- 2.07 12" PVC STORM SEWER PIPE (LINE ITEM 7)
- A. This section refers to storm sewer pipe to be placed to the west and north of the Student Center on the Kansas City University campus for the storm sewer line that will be lowered in the same alignment.
 - B. 12" PVC Storm Sewer Pipe: Measured to the nearest 1 linear foot, complete in place and acceptable, shall be paid for at the contract unit price bid for "12" PVC Storm Sewer Pipe" as listed in the Bid Form – Unit Prices.
- 2.08 24" NYLOPLAST DRAIN BASIN W/ STANDARD GRATE (LINE ITEM 8)
- A. This section refers to the Nyloplast storm sewer basins for the storm sewer system being lowered along the west and north side of the Student Center on the Kansas City University campus.
 - B. 24" Nyloplast Drain Basin w/ Standard Grate: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for "24" Nyloplast Drain Basin w/ Standard Grate" as listed on the Bid Form – Unit Prices.
- 2.09 CMAC VALVES AND CONTROLS (LINE ITEM 9)
- A. This section refers to the butterfly valves, actuators, and controls to be added to the existing pond outlet control structures for the Upper and Lower ponds. This equipment will provide automated control to lower the pond water level in advance of a storm so that the pond can be utilized for stormwater retention.
 - B. CMAC Valves and Controls: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for "CMAC Valves and Controls" as listed in the Bid Form – Unit Prices.
- 2.10 ELECTRICAL POWER TO VALVES AND CONTROLS (LINE ITEM 10)
- A. This section refers to the electrical equipment, panel, cable, conduits, etc. included on the Electrical drawings needed for power distribution from the existing transformer located east of the site next to Independence Ave., through the control panel, to the CMAC gates, actuators, and controls; and the Waterfall/Recirculation Pumps.
 - B. Electrical Power to Gate and Controls: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for "Electrical Power to Gate and Controls" as listed in the Bid Form – Unit Prices.

- 2.11 FIBER OPTIC CONNECTION (LINE ITEM 11)
- A. This section refers to the fiber equipment, panel, cable, conduits, etc. included on the Electrical drawings needed to provide communications from an existing fiber box located at the SE corner of The Paseo and Cliff Dr. to the service panel and from the service panel to the equipment located in the Upper and Lower Pond control structures.
 - B. Fiber Optic Connection: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for “Fiber Optic Connection” as listed in the Bid Form – Unit Prices.
- 2.12 WATERFALL/RECIRCULATION PUMPS (LINE ITEM 12)
- A. This section refers to the pumps that will recirculate water from the Lower Pond to the Upper Pond to create a waterfall over the weir located between the two ponds. This recirculation/waterfall will provide aeration and will help keep the pond from becoming stagnant. The pumps are in a vault at the north end of the Lower Pond.
 - B. For measurement and payment information, refer to Specification 330513 Waterfall/Recirculation Pumps, Strainer Baskets, Piping and Vault; Section 3.7; Item A.
- 2.13 WATERFALL/RECIRCULATION STRAINER BASKETS (LINE ITEM 13)
- A. This section refers to the strainer baskets, located in the pump vault, used to protect the pumps from being fouled by debris. The strainer baskets are in a vault at the north end of the Lower Pond.
 - B. For measurement and payment information, refer to Specification 330513 Waterfall/Recirculation Pumps, Strainer Baskets, Piping and Vault; Section 3.7; Item B.
- 2.14 WATERFALL/RECIRCULATION 6’x6’ PRECAST CONCRETE PUMP VAULT (LINE ITEM 14)
- A. This section refers to the precast concrete vault located at the north end of the Lower Pond which houses the waterfall/recirculation pumps and strainer baskets.
 - B. For measurement and payment information, refer to Specification 330513 Waterfall/Recirculation Pumps, Strainer Baskets, Piping and Vault; Section 3.7; Item C.
- 2.15 WATERFALL/RECIRCULATION 6” PVC INTAKE PIPE (LINE ITEM 15)
- A. This section refers to the two 6” intake pipes that provide a gravity feed into the strainer baskets and waterfall/recirculation pumps in the precast concrete vault located at the north end of the Lower Pond.
 - B. For measurement and payment information, refer to Specification 330513 Waterfall/Recirculation Pumps, Strainer Baskets, Piping and Vault; Section 3.7; Item D.

2.16 WATERFALL/RECIRCULATION 3" FLEXIBLE PVC DISCHARGE PIPE (LINE ITEM 16)

- A. This section refers to the two 3" discharge pipes that convey lower pond water from the waterfall/recirculation pumps in the precast concrete vault located at the north end of the Lower Pond to the south end of the Upper Pond.
- B. For measurement and payment information, refer to Specification 330513 Waterfall/Recirculation Pumps, Strainer Baskets, Piping and Vault; Section 3.7; Item E.

2.17 BRIDGE ABUTMENTS (LINE ITEM 17)

- A. This section refers to concrete bridge abutments, identical but mirrored at both ends of the pedestrian bridge located along the north end of the Upper Pond.
- B. The unit price shall include all concrete, rebar, expansion joint material, anchor bolts, bearing plate and aggregate necessary to prepare the subgrade and construct the bridge abutment and the approach slab. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. Bridge Abutments: Measured per each bridge abutment, complete in place and acceptable, shall be paid for at the contract unit price bid for "Bridge Abutments" as listed on the Bid Form – Unit Prices.

2.18 CONCRETE RETAINING WALL (LINE ITEM 18)

- A. This section refers to the concrete retaining wall that extends along the majority of the west side of the west sidewalks and also some shorter portions located along the east side of the west sidewalk to the west of the Lower Pond.
- B. The unit price shall include all concrete, rebar, dowels and waterstop necessary to prepare the subgrade and construct the wall including the footing. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. Concrete Retaining Wall: Measured to the nearest 0.1 cubic yards, complete in place and acceptable, shall be paid for at the contract unit price bid for "Concrete Retaining Wall" as listed on the Bid Form – Unit Prices.

2.19 TURNDOWN SIDEWALK CURB (LINE ITEM 19)

- A. This section refers to the turndown sidewalk curbs that extends along the sidewalks in areas where the distance between the top of sidewalk and the adjacent grade is two feet or less.
- B. The unit price shall include all concrete, rebar, and dowels necessary to prepare the subgrade and construct the turndown sidewalk curb and the full width of sidewalk adjacent to the turndown. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.

- C. Turndown Sidewalk Curb: Measured to the nearest 0.1 cubic yards, complete in place and acceptable, shall be paid for at the contract unit price bid for “Turndown Sidewalk Curb” as listed in the Bid Form – Unit Prices.

2.20 RIP RAP (LINE ITEM 20)

- A. This section refers to additional rip rap added to some of the storm sewer outlets in the pond and to the outlet of the weir between the Upper and Lower Ponds. This section also refers to the removal, storing, and replacement of existing rip rap at the storm sewer outlets and inlets in the pond.
- B. Rip Rap: Measured to the nearest 0.1 cubic yards, complete in place and acceptable, shall be paid for at the contract unit price bid for “Rip Rap” as listed on the Bid Form – Unit Prices.

2.21 IMPERMEABLE CLAY LINER (MATERIAL PROVIDED BY CITY) (LINE ITEM 21)

- A. This section refers to a bentonite clay liner to be installed in the Upper and Lower Ponds over the entire surface of the bottom, up to the Normal Water Level.
- B. The Owner is providing the bentonite material; therefore, only the cost for installation of the liner shall be included in the Unit Price. Installation cost includes permeability and density tests for anticipated imported soil, final grading in the ponds to the liner elevation, fill to bring the grade above the liner back to finished elevation, hauling and placing imported material, hauling and placing the bentonite, mixing, and compaction of material layers as specified herein.
- C. Contractor shall bid project assuming 70,000-pounds of bentonite (minimum of 3-pounds per square foot mix ratio, 2,600 SY) on site is sufficient for clay liner. Any changes to be coordinated with engineer.
- D. Impermeable Clay Liner: Measured to the nearest 0.1 square yards, complete in place and acceptable, shall be paid for at the contract unit price bid for “Impermeable Clay Liner” as listed in the Bid Form – Unit Prices.

2.22 PASEO GATEWAY BIKE PATH (LINE ITEM 22)

- A. This section refers to the concrete bike path on the west side of the site. This section also refers to the gravel base and compacted subgrade under the bike path as detailed in the plan sheet documents. This section includes reinforced concrete with welded wire fabric as detailed in KCMO Parks Standard Detail “SC”.
- B. Paseo Gateway Bike Path: Measured to the nearest 0.1 square feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Paseo Gateway Bike Path” as listed on the Bid Form – Unit Prices.

2.23 PASEO GATEWAY SIDEWALK (LINE ITEM 23)

- A. This section refers to the concrete bike path on the west side of the site. This section also refers to the gravel base and compacted subgrade under the sidewalk as detailed in the plan sheet documents. This section includes reinforced concrete with welded wire fabric as detailed in KCMO Parks Standard Detail “SC”.
- B. Paseo Gateway Sidewalk: Measured to the nearest 0.1 square feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Paseo Gateway Sidewalk” as listed on the Bid Form – Unit Prices.

2.24 CONCRETE MAINTENANCE PATH (LINE ITEM 24)

- A. This section refers to the concrete walks throughout the project site.
- B. Concrete Maintenance Path: Measured to the nearest 0.1 square feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Concrete Maintenance Path” as listed on the Bid Form – Unit Prices.

2.25 CONCRETE SIDEWALK (LINE ITEM 25)

- A. This section refers to the concrete sidewalk throughout the project site.
- B. Concrete Sidewalk: Measured to the nearest 0.1 square feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Concrete Sidewalk” as listed on the Bid Form – Unit Prices.

2.26 STAIRS WITH HANDRAILS (LINE ITEM 26)

- A. This section refers to the concrete stairs with handrails northeast of the Lower Pond.
- B. The unit price shall include all concrete, rebar, dowels and handrail necessary to prepare the subgrade and construct the staircase including the footing. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. Stairs with Handrails: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Stairs with Handrails” as listed in the Bid Form – Unit Prices.

2.27 ADA RAMP WITH GUARD RAILS (LINE ITEM 27)

- A. This section refers to the concrete ADA ramp with guard rails on the west side of the pedestrian bridge.
- B. The unit price shall include all concrete, rebar, dowels and handrail necessary to construct the ADA Ramp. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. ADA Ramp with Guard Rails: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for “ADA Ramp with Guard Rails” as listed in the Bid Form – Unit Prices.

2.28 PEDESTRIAN BRIDGE (EXCLUDES FOOTINGS) (LINE ITEM 28)

- A. This section refers to the pedestrian bridge on the upper side of the existing weir wall. Footings are part of the Bridge Abutments, a separate line item.
- B. The unit price shall include all materials necessary to construct the pedestrian bridge. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work necessary to complete the item.
- C. Pedestrian Bridge: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for “Pedestrian Bridge (excludes footings)” as listed in the Bid Form – Unit Prices.

2.29 BRIDGE EXTENDED GUARD RAIL + FOOTING (LINE ITEM 29)

- A. This section refers to the bridge guard rails on both sides of the pedestrian bridge along the existing weir wall. Footings are included as part of this line item.
- B. Bridge Extended Guard Rail + Footing: Measured is for each guard rail side, complete in place and acceptable, shall be paid for at the contract unit price bid for “Bridge Extended Guard Rail + Footing” as listed in the Bid Form – Unit Prices.

2.30 GRASSPAVE (LINE ITEM 30)

- A. This section refers to the grasspave area near the southeast corner of the site.
- B. Grasspave: Measured to the nearest 0.1 square feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Grasspave” as listed in the Bid Form – Unit Prices.

2.31 DECORATIVE FENCE (LINE ITEM 31)

- A. This section refers to decorative fence around the perimeter of the project site that connects to the KCU Sign on the south and existing campus fence on the north. This includes footings and all elements to match the KCU Standard.
- B. Decorative Fence: Measured to the nearest 0.1 linear feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Decorative Fence” as listed in the Bid Form – Unit Prices.

2.32 DECORATIVE GATE (DOUBLE LEAF) (LINE ITEM 32)

- A. This section refers to the decorative gate with footings and associated drop pins for a complete operating gate system, located at the maintenance access drive in the southwest corner of the project site.
- B. Decorative Gate (Double Leaf): Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Decorative Gate (Double Leaf)” as listed in the Bid Form – Unit Prices.

2.33 WEIR WALL STAINLESS STEEL WIER (LINE ITEM 33)

- A. This section refers to the stainless steel weir at the existing weir wall.
- B. Weir Wall Stainless Steel Wier: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Weir Wall Stainless Steel Weir” as listed in the Bid Form – Unit Prices.

2.34 LIMESTONE RETAINING WALL SLABS (LINE ITEM 34)

- A. This section refers to the Limestone retaining wall slabs throughout the project site. This includes the stacked limestone and associated base materials.
- B. Limestone Retaining Wall Slabs: Measured to the nearest 0.1 ton, complete in place and acceptable, shall be paid for at the contract unit price bid for “Limestone Retaining Wall Slabs” as listed in the Bid Form – Unit Prices.

2.35 PEA GRAVEL INFILL AT LIMESTONE WALL EDGE ALONG WALK (LINE ITEM 35)

- A. This section refers to the pea gravel used to infill the voids between the limestone slabs, electrical panel locations, and the curving walk. Pea gravel to infill the voids along the walk at this specific wall edge. This pea gravel will also be on the west side of the site around the electrical boxes.
- B. Pea Gravel Infill At Limestone Wall Edge: Measured to the nearest 0.1 ton, complete in place and acceptable, shall be paid for at the contract unit price bid for “Pea Gravel Infill at Limestone Wall Edge Along Walk” as listed in the Bid Form – Unit Prices.

2.36 OVERSTORY TREES (LINE ITEM 36)

- A. This section refers to the overstory trees through the project site.
- B. Overstory Tree: Measured per each tree, complete in place and acceptable, shall be paid for at the contract unit price bid for “Overstory Tree” as listed in the Bid Form – Unit Prices.

2.37 UNDERSTORY TREES (LINE ITEM 37)

- A. This section refers to the understory trees through the project site.
- B. Understory Tree: Measured per each tree, complete in place and acceptable, shall be paid for at the contract unit price bid for “Understory Tree” as listed in the Bid Form – Unit Prices.

2.38 PERENNIALS AND GRASSES – QT SIZE (LINE ITEM 38)

- A. This section refers to the perennials and grasses at quart size at 18” on center throughout the project site. Weed fabric is included in this line item.
- B. Perennials and Grasses: Measured per each quart size plant, complete in place and acceptable, shall be paid for at the contract unit price bid for “Perennials and Grasses – QT Size” as listed in the Bid Form – Unit Prices.

2.39 SUBMERGED PERENNIALS AND GRASSES – PLUG SIZE (LINE ITEM 39)

- A. This section refers to the submerged perennials and grasses at the waters edge at each pond. Weed fabric is included in this line item.
- B. Submerged Perennials and Grasses – Plug Size: Measured per each plug plant, complete in place and acceptable, shall be paid for at the contract unit price bid for “Submerged Perennials and Grasses – Plug Size” as listed in the Bid Form – Unit Prices.

2.40 MULCH (LINE ITEM 40)

- A. This section refers to the mulch throughout the project site in planting beds.
- B. Mulch: Measured to the nearest 0.1 cubic yard, complete in place and acceptable, shall be paid for at the contract unit price bid for “Mulch” as listed in the Bid Form – Unit Prices.

2.41 TURF (LINE ITEM 41)

- A. This section refers to the turn (sod) on the east side of the project and where turf areas need to be re-sodded due to site disturbance.
- B. Turf: Measured to the nearest 0.1 square yards, complete in place and acceptable, shall be paid for at the contract unit price bid for “Turf” as listed in the Bid Form – Unit Prices.

2.42 IRRIGATION (LINE ITEM 42)

- A. This section refers to the irrigation system for the project site as per the performance specifications.
- B. Irrigation: Measured to the nearest 0.1 square feet of irrigated area, complete in place and acceptable, shall be paid for at the contract unit price bid for “Irrigation” as listed in the Bid Form – Unit Prices.

2.43 PLANTING SOIL (LINE ITEM 43)

- A. This section refers to the planting soil throughout the project site.
- B. Planting Soil: Measured to the nearest 0.1 cubic yards, complete in place and acceptable, shall be paid for at the contract unit price bid for “Planting Soil” as listed in the Bid Form – Unit Prices.

2.44 COBBLE STONE – 4”-10” (LINE ITEM 44)

- A. This section refers to the 4” – 10” size cobble stone at the upper and lower pond adjacent to the weir wall.
- B. Cobble Stone – 4”-10” Size: Measured to the nearest 0.1 ton, complete in place and acceptable, shall be paid for at the contract unit price bid for “Cobble Stone (4”-10” Gray Cobble)” as listed in the Bid Form – Unit Prices.

2.45 WEIR WALL VENEER (LINE ITEM 45)

- A. This section refers to the weir wall limestone veneer on the existing weir wall. This section also refers to the weir wall cap on the weir wall.
- B. Weir Wall Veneer: Measured to the nearest 0.1 square face foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Weir Wall Veneer” as listed in the Bid Form – Unit Prices.

2.46 WEIR WALL CAP (LINE ITEM 46)

- A. This section refers to the weir wall cap on the existing weir wall.
- B. Weir Wall Cap: Measured to the nearest 0.1 lineal foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Weir Wall Cap” as listed in the Bid Form – Unit Prices.

2.47 LANDSCAPE EDGING (LINE ITEM 47)

- A. This section refers to the landscape edging at the electric boxes and along the turn adjacent to the landscape bed on the east side of the site.
- B. Landscape Edging: Measured to the nearest 0.1 lineal foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Landscape Edging” as listed in the Bid Form – Unit Prices.

2.48 CONCRETE LIGHT POLE BASES (LINE ITEM 48)

- A. This section refers to the light pole foundations for all LS1 and LS2 light fixtures. Reference plans for exact requirements. The light fixtures themselves are part of a separate bid item.
- B. Concrete Light Pole Bases: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Concrete Light pole Bases” as listed in the Bid Form – Unit Prices.

2.49 LS2 PEDESTRIAN POLE - HESS (LINE ITEM 49)

- A. This section refers to the lighting fixtures Type LS2 and all associated parts. Concrete light pole bases are part of a separate bid item.
- B. LS2 Pedestrian Pole: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “LS2 Pedestrian Pole” as listed in the Bid Form – Unit Prices.

2.50 TRENCHING AND BACKFILLING (LINE ITEM 50)

- A. This section refers to the trenching and backfilling for all electrical feeds to lighting fixtures.
- B. Trenching and Backfilling: Measured to the nearest 0.1 lineal foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Trenching and Backfilling” as listed in the Bid Form – Unit Prices.

2.51 #10 THHN/THWN COPPER CONDUCTORS (LINE ITEM 51)

- A. This section refers to the electrical wiring to all the lighting fixtures. Conduit shall be included in a separate bid item.
- B. #10 THHN/THWN Copper Conductors: Measured to the nearest 0.1 lineal foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “#10 THHN/THWN Copper Conductors” as listed in the Bid Form – Unit Prices.

2.52 1” PVC SCHEDULE 40 CONDUIT (LINE ITEM 52)

- A. This section refers to the conduit for the electrical wiring to all the lighting fixtures. Wiring shall be included in a separate bid item.
- B. 1” PVC Schedule 40 Conduit: Measured to the nearest 0.1 lineal foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “1” PVC Schedule 40 Conduit” as listed in the Bid Form – Unit Prices.

PART 3 – ALLOWANCES AND LUMP SUM ITEMS

3.01 GENERAL ALLOWANCE (LINE ITEM 53)

- A. All additional work requested by the Owner that is not specifically stated in the construction contract documents shall be paid as part of this item. Contractor's maximum upper limit for compensation includes a total allowance amount of \$200,000.00 not yet authorized by Owner that may be required throughout the course of the work. This allowance amount shall not be utilized unless specifically authorized in writing by the Owner to perform additional work. Additional work shall not be performed, nor is the Contractor approved to utilize any of the allowance amount, unless the Owner provides written authorization to Contractor that includes the scope of the work to be performed and a maximum billing limit for compensation that has been mutually agreed upon.

3.02 ROCK EXCAVATION ALLOWANCE (LINE ITEM 54)

- A. This section refers to excavation and removal of rock on the site required to finish the ponds, for installing the proposed features, and for constructing the proposed grades indicated in the Grading Drawings. Contractor's maximum upper limit for compensation includes an allowance amount of \$92 per cubic yard not yet authorized by Owner that may be required throughout the course of the work. This allowance amount shall not be utilized unless specifically authorized in writing by the Owner to perform the work.
- B. Rock Excavation Allowance: Measured to the nearest cubic yard of excavation, including furnishing the equipment and labor to break up, remove, haul, and dispose of rock encountered on site, shall be paid for at the unit price bid of \$92 per cubic yard for "Rock Excavation Allowance" as listed in the Bid Form – Unit Prices.

3.03 MOBILIZATION (LINE ITEM 55)

- A. Mobilization is a lump sum item and shall not exceed 3.5% of the calculated Adjustment Unit Price Extension Subtotal on Form 00412.
- B. This item shall be paid with the first Application for Payment.

3.04 BONDS AND INSURANCE (LINE ITEM 56)

- A. Bonds and insurance is a lump sum item and shall not exceed 1.5% of the Adjustment Unit Price Extension Subtotal on Form 00412, Table A plus any accepted items in Table B.
- B. This item shall be paid with the first Application for Payment.

3.05 FINAL COMPLETION, DEMOBILIZATION, RECORD DRAWINGS AND CLOSE-OUT (LINE ITEM 57)

- A. Shall be a lump sum item. There is no limit on the maximum value of this lump sum item.
- B. Regardless of the lump sum price, this item shall be included in the Schedule of Values at a minimum price amount shown on Form 00412.
- C. This item shall be paid after submittal of Record Drawings and CITY approval of the Record Drawing submittal.

PART 4 – BID ALTERNATE 1 ITEMS

4.01 SOUTHERN STAIRCASE + HANDRAILS (LINE ITEM 58)

- A. This section refers to the concrete sidewalk and stairs with handrails southeast of the Upper Pond.
- B. The unit price shall include all concrete, rebar, dowels and handrail necessary to prepare the subgrade and construct the sidewalk and staircase including the footing. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. Southern Staircase with Handrails: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Southern Staircase with Handrails” as listed in the Bid Form – Unit Prices.

4.02 LIMESTONE OUTCROPPINGS AT UPPER POND WATERS EDGE (LINE ITEM 59)

- A. This section refers to the limestone blocks installed in the Upper Pond water edge as indicated on the drawings.
- B. The unit price item shall include limestone blocks and work necessary install and place the blocks. Such payment and price shall constitute full compensation for all the labor materials, equipment, and for the performance of all related work.
- C. Limestone Outcroppings at Upper Pond Water Edge measured per ton complete in place and acceptable, shall be paid for the contract unit price bid for “Limestone Outcroppings at Upper Pond Water Edge” as listed on the Bid Form – Unit Prices.

4.03 DOCK FOUNDATION PIERS (LINE ITEM 60)

- A. This section refers to the 12-concrete pier/footing foundations used to support the dock located on the east side of the Lower Pond.
- B. The unit price shall include all concrete, rebar, and subgrade preparation to construct all dock concrete piers, including the footings, for all the concrete piers, indicated in the construction documents, to support the dock. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. Dock Concrete Piers: Measured to the nearest 0.1 cubic yards, complete in place and acceptable, shall be paid for at the contract unit price bid for "Dock Concrete Piers" as listed on the Bid Form – Unit Prices.

4.04 LOWER POND DOCK (EXCLUDES PIERS) (LINE ITEM 61)

- A. This section refers to the dock at the Lower Pond on the east side. Piers are part of the Dock Concrete Piers, a separate line item.
- B. The unit price shall include all materials necessary to construct the dock with the exception of the dock piers. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work necessary to complete the item.
- C. Lower Pond Dock: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for "Pedestrian Bridge (excludes footings)" as listed in the Bid Form – Unit Prices.

4.05 TURNDOWN SIDEWALK CURB (LINE ITEM 62)

- A. This section refers to the turndown sidewalk curbs that extends along the sidewalks in areas where the distance between the top of sidewalk and the adjacent grade is two feet or less. This includes only the turndown sidewalk curb at the dock at the Lower Pond on the east side.
- B. The unit price shall include all concrete, rebar, and dowels necessary to prepare the subgrade and construct the turndown sidewalk curb and the full width of sidewalk adjacent to the turndown. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.

4.06 LIMESTONE RETAINING WALL SLABS (LINE ITEM 63)

- A. This section refers to the Limestone retaining wall slabs adjacent to the turn down sidewalk at the dock at the Lower Pond on the east side. This includes stacked limestone and associated base materials.
- B. Limestone Retaining Wall Slabs: Measured to the nearest 0.1 ton, complete in place and acceptable, shall be paid for at the contract unit price bid for "Limestone Retaining Wall Slabs" as listed in the Bid Form – Unit Prices.

End of Section.

SECTION 02220 – IMPERMEABLE CLAY LINER

PART 1 – GENERAL

1.01 SUMMARY

- A. This section covers the furnishing of all labor, materials and equipment required to install the impermeable clay liner in the upper and lower ponds. All materials and construction shall be performed in accordance to the latest KCMO standards. Any work shown on the Construction Contract Documents or described in the Specifications that is not specifically covered by the bid items shall be considered subsidiary and costs included in other items of Work.

1.02 SPECIFICATION MODIFICATION

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements, or as otherwise indicated in the Contract Documents.

1.03 RELATED SECTIONS

- A. Section 01000 – General Project Requirements
- B. Section 02200 – Earthwork
- C. Section 02250 – Drainage Structures
- D. Section 02630 – Stormwater Pipe and Structures

1.04 QUALITY ASSURANCE

- A. The contractor is responsible for the quality assurance and quality control of the Work.
- B. Coordinate with the Engineer prior to placing or mixing bentonite.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Handle bentonite material and other associated material in such a manner to ensure delivery to the installation location in an undamaged condition.

PART 2 – MATERIALS

2.01 GENERAL

- A. Bentonite material is located in a Conex container at the southwest corner of the intersection of The Paseo and Independence Ave. The container is approximately 10-feet wide by 40-feet long.
- B. The bentonite material is on pallets inside the container and consists of 1,400 50-pound bags.

- C. Contractor will be responsible for the storage and security of the material after the Notice to proceed is issued.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Refer to manufacturer's instructions, attached, on the installation of the bentonite material.
- B. Bentonite liner shall not be placed over frozen soil.
- C. Prior to installation of bentonite layer, assure bottom of ponds are graded to the elevations as provided on the plans.
- D. Coordinate with the Engineer to review the pond bottoms prior to installation of the bentonite material for confirmation of thickness of bentonite liner within the pond bottoms.
- E. Use native or borrow material as specified in Section 02200 to mix with the bentonite.
- F. Contractor shall have a standard or modified proctor test density curve, and optimum moisture test developed from the soil to be mixed with the bentonite by a geotechnical engineer licensed in the State of Missouri. The soil shall also have a hydraulic conductivity (permeability) determined on a re-compacted sample to determine the amount of bentonite to mix with the material to achieve a maximum permeability of 1×10^{-7} centimeters per second.
- G. There is sufficient bentonite to provide a minimum rate of 3-pounds per square foot for the 6-inch blanket in the ponds.
- H. Disc or mix bentonite soil uniformly over the area to produce the clay liner in 6-inch lifts such that a minimum 6-inch thick compacted blanket of soil/bentonite agent is formed.
- I. The blanket should be laid along the floor and pond sidewalls to the elevations as shown on the plans.
- J. Compact the clay liner blanket in place to 95 percent density.
- K. Add fill material or topsoil as indicated on top of the bentonite liner and compact to 95 percent density. Layer over the clay liner shall be minimum of 4-inches.

3.02 TESTING

- A. Clay liner construction shall be tested and documented by testing firm for compaction requirements. 1 test per every 200 SY shall be performed.

END OF SECTION



BENSEAL®

Sealing and Plugging Agent

Description

BENSEAL® granular (8-mesh), natural Wyoming sodium bentonite is used in the sealing and grouting of well casings and earthen structures. BENSEAL is not recommended for use as a drilling mud.

**Applications/
Functions**

BENSEAL sealing and plugging agent assists or promotes the following:

- Seal or grout plastic or steel casings in monitor and water well construction
- Seal or plug abandoned boreholes
- Seal leaking ponds, ditches and dams
- Soil stabilization
- Prepare BENSEAL and EZ-MUD® grouting system
- Aid in controlling loss of circulation

Advantages

- High swelling capacity
- Uniform particle size
- No heat of hydration
- Prevents commingling of aquifers and contamination from surface
- Forms a flexible seal to protect casing from corrosive contaminants
- Allows for hole re-entry
- NSF/ANSI Standard 60 certified

**Typical
Properties**

- | | |
|---------------------------------|--------------------------------------------------------|
| • Appearance | Bluish to gray granules |
| • Dry screen analysis | 85% as 8 mesh |
| • Volume, ft ³ /sack | 0.7 (as packaged) |
| • Specific gravity | 2.6 |
| • Permeability | less than 1 x 10 ⁻⁸ cm/sec (in fresh water) |

**Recommended
Treatment**

As a casing drill and drive operation:

1. Dig a cone-shaped depression around casing. Depression should be 6 - 8 inches (152-203 mm) larger than the outside diameter of the casing and 2 - 3 feet (60-75 cm) deep.
2. Keep cone-shaped depression filled with dry BENSEAL while driving the casing.

**Recommended
Treatment
(continued)**

Note:

When drilling and driving a 4" (102mm) pipe, expect to use 2.5 pounds of BENSEAL[®] sealing and plugging agent per foot of hole or 3.7 kilograms per meter of hole.

Sealing ponds or earthen structures:

Depending on the native soil, disc in or mix 3 to 5 pounds of BENSEAL sealing and plugging agent per square foot (14-24 kg/m²) uniformly over the area to be sealed so that a 6-inch (~152 mm) blanket of soil and BENSEAL sealing and plugging agent is formed. Do not neglect the edges of the dam or the sides/walls of the pond. This sealing blanket should then be compacted in place. As added protection to the sealing blanket, 2 to 4 inches (51-102 mm) of local soil or sand should cover the sealing blanket and be compacted.

If the leaking area can be identified and isolated, an attempt can be made to broadcast BENSEAL uniformly at 4 to 6 pounds of BENSEAL per square foot (20-30 kg/m²) of surface area into the water over the area of concern.

Note: Bentonite is more effective as a sealing agent when confined. Therefore, every effort should be made to cover the BENSEAL after it is broadcast with a 2-3 inch (51-76 mm) layer of sand. This will reduce the potential for dispersion into the water and un-yielded bentonite particles interfering with the gill action of fish.

Lost returns (moderate):

1. Begin with the pit full of mud.
2. Raise the pump suction off bottom and place a shovel next to it and slightly under suction.
3. Pour dry BENSEAL slowly into the space between shovel and suction and pump it down the hole.

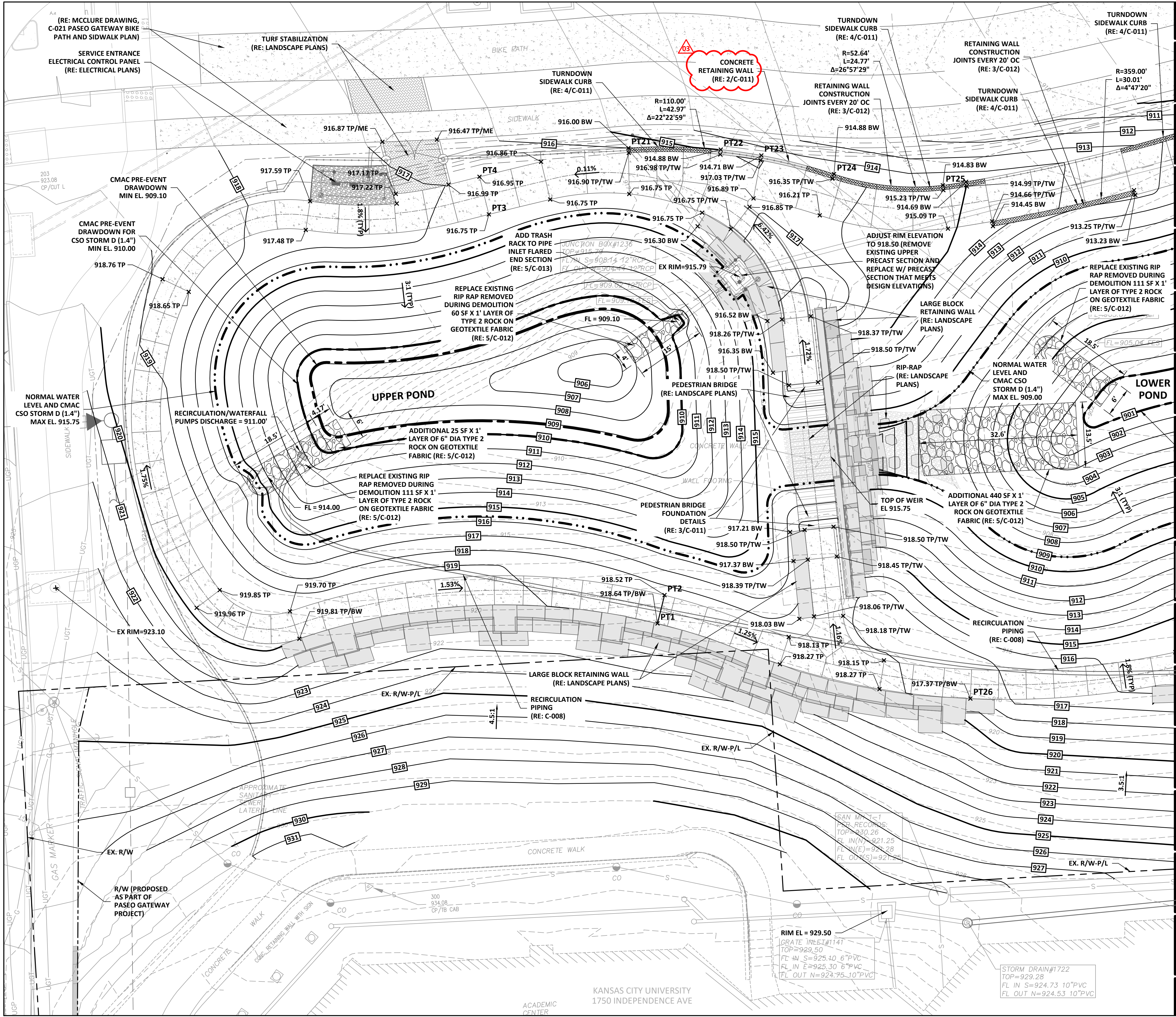
**Additional
Information**

- The grouting material and method selected will depend upon the specific subsurface environment including all prevailing geological and hydrological factors and any existing regulatory requirements. The grouting process may not be complete until the grout is static at the desired level.
- The use of bentonite may not be appropriate in environments where the formation water chemistry has a total hardness greater than 500 parts per million and/or a chloride content of greater than 1500 parts per million.
- If questions arise regarding subsurface environments it is always best to consult your local Baroid IDP representative to determine if the Baroid product of choice is appropriate for the given conditions.

Packaging

BENSEAL is packaged in 50-lb (22.7 kg) multiwall paper bags, containing 0.7 ft³ (0.02 m³).

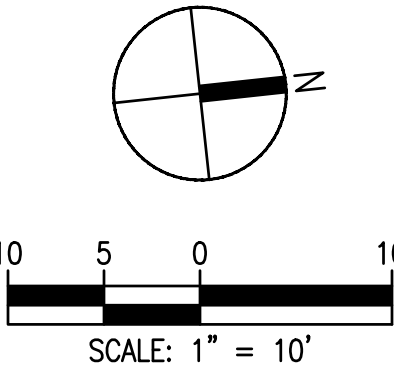
23 May 2024
DAVID BROWN
1:2.5849 MONO & COLOR STB
X:\C08\2019\19001-01 PASEO GATEWAY\KCU GREEN INFRA\3-PRODUCTION\03-SHEETS\C08-19001-01-GR.DWG



LEGEND

- XXX.XX TC - TOP OF CURB ELEVATION
- XXX.XX - SPOT ELEVATION
- XXX.XX TP - TOP OF PAVEMENT
- XXX.XX LC - LIP OF CURB ELEVATION
- XXX.XX G - GUTTER ELEVATION
- XXX.XX ME - MATCH EXISTING ELEVATION
- XXX.XX TW - TOP OF WALL ELEVATION
- XXX.XX BW - BOTTOM OF WALL ELEVATION
- XXX.XX HP - HIGH POINT
- XXX.XX LP - LOW POINT
- XXX.XX BS - BOTTOM STEP ELEVATION
- XXX.XX TS - TOP STEP ELEVATION
- XXX - PROPOSED MAJOR CONTOUR
- XXX - PROPOSED MINOR CONTOUR
- XXX - EXISTING CONTOUR
- XXX - PROPOSED CONTOURS DESIGNED BY OTHERS
- > - DRAINAGE PATH
- 2.0% - SLOPE
- - NORMAL WATER LEVEL AND CSO STORM D (1.4")
- - CMAC PRE-EVENT DRAWDOWN
- - EXISTING PROPERTY LINE
- - EXISTING RIGHT-OF-WAY LINE
- - PROPOSED RIGHT-OF-WAY LINE
- - TURNDOWN SIDEWALK CURB

GRADING SPOT ELEVATION TABLE			
POINT NUMBER (PT#)	ELEVATION	NORTHING	EASTING
PT1	918.64	1070706.31	2770732.92
PT2	918.52	1070708.38	2770727.26
PT3	916.75	1070680.77	2770645.25
PT4	916.95	1070679.67	2770637.32
PT21	916.00	1070710.87	2770634.72
PT22	914.88	1070729.79	2770637.10
PT23	914.71	1070738.00	2770639.19
PT24	914.88	1070752.48	2770644.63
PT25	914.83	1070774.57	2770649.34
PT26	917.37	1070768.85	2770755.26



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PROFESSIONAL ENGINEER SEAL

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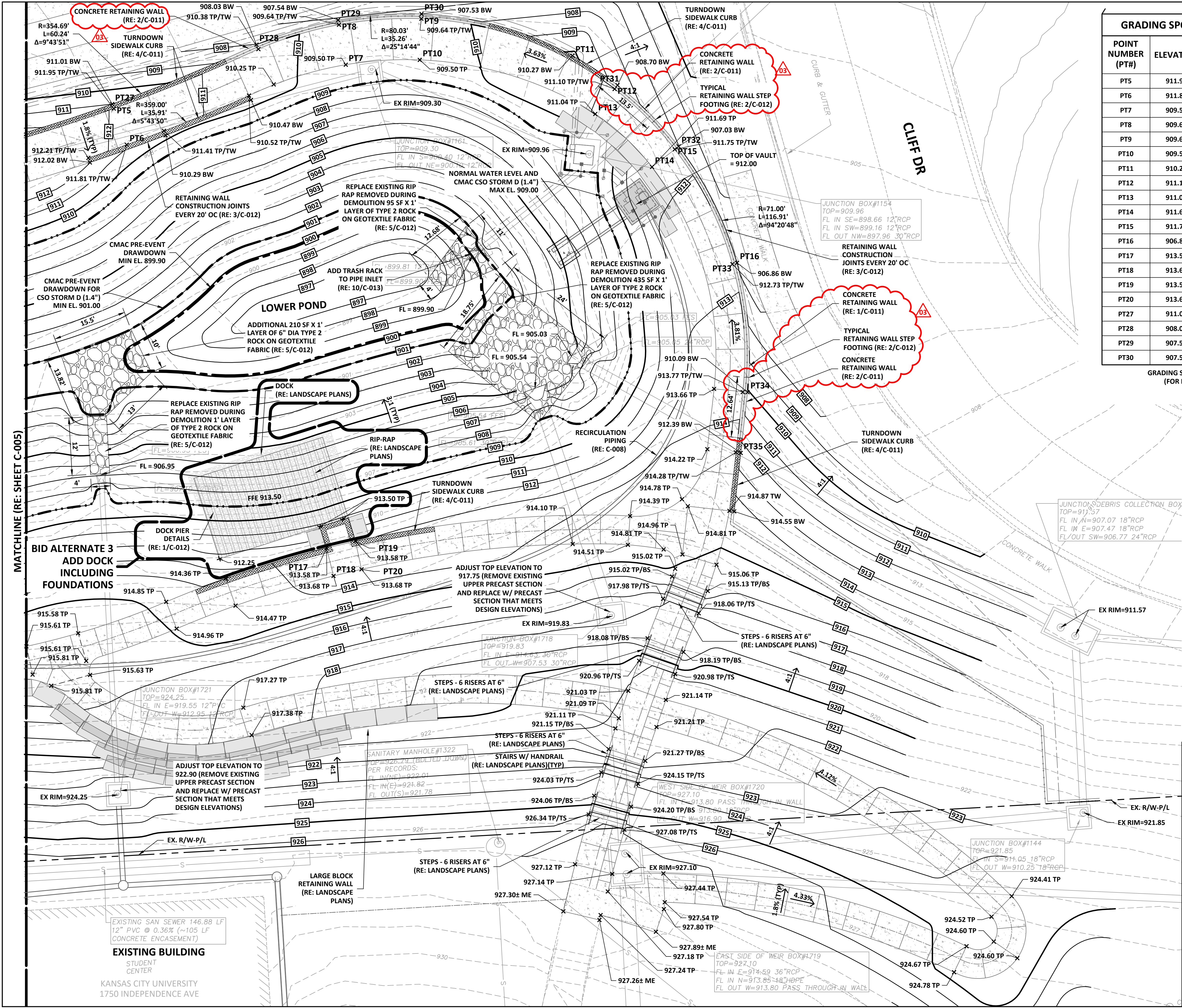
KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT

**GREEN INFRASTRUCTURE 1-2:
PASEO GATEWAY/KCU
THE PASEO & INDEPENDENCE
AVENUE**

**KANSAS CITY,
JACKSON COUNTY, MISSOURI**

UPPER POND GRADING PLAN

DRAWN BY D.M.B.	CHECKED BY D.E.S.	DATE SUBMITTED 04/12/2024	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO. 81000975	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO.		SHEET		6 OF 52	



GRADING SPOT ELEVATION TABLE			
POINT NUMBER (PT#)	ELEVATION	NORTHING	EASTING
PT5	911.95	1070842.07	2770640.90
PT6	911.81	1070843.93	2770648.66
PT7	909.50	1070891.08	2770637.01
PT8	909.64	1070890.57	2770628.58
PT9	909.64	1070907.76	2770629.18
PT10	909.50	1070906.51	2770637.67
PT11	910.27	1070938.23	2770640.20
PT12	911.10	1070946.21	2770648.04
PT13	911.04	1070941.65	2770652.78
PT14	911.69	1070952.21	2770665.02
PT15	911.75	1070957.33	2770661.88
PT16	906.86	1070967.67	2770686.77
PT17	913.58	1070876.30	2770736.63
PT18	913.68	1070877.12	2770742.57
PT19	913.58	1070882.43	2770735.86
PT20	913.68	1070883.06	2770741.82
PT27	911.01	1070841.83	2770639.93
PT28	908.03	1070873.04	2770630.85
PT29	907.54	1070890.50	2770627.58
PT30	907.53	1070907.90	2770628.19

GRADING SPOT ELEVATION TABLE
(FOR REFERENCE ONLY)

GRADING SPOT ELEVATION TABLE			
POINT NUMBER (PT#)	ELEVATION	NORTHING	EASTING
PT31	908.70	1070946.91	2770647.32
PT32	907.03	1070958.18	2770661.36
PT33	912.73	1070966.69	2770686.94
PT34	910.09	1070966.96	2770713.78
PT35	912.39	1070964.20	2770726.21

LEGEND	
XXX.XX TC	- TOP OF CURB ELEVATION
XXX.XX	- SPOT ELEVATION
XXX.XX TP	- TOP OF PAVEMENT
XXX.XX LC	- LIP OF CURB ELEVATION
XXX.XX G	- GUTTER ELEVATION
XXX.XX ME	- MATCH EXISTING ELEVATION
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XXX.XX HP	- HIGH POINT
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XXX.XX BS	- BOTTOM STEP ELEVATION
XXX.XX TS	- TOP STEP ELEVATION
XXX	- PROPOSED MAJOR CONTOUR
XXX	- PROPOSED MINOR CONTOUR
XXX	- EXISTING CONTOUR
XXX	- PROPOSED CONTOURS DESIGNED BY OTHERS
---	- DRAINAGE PATH
2.0%	- SLOPE
---	- NORMAL WATER LEVEL AND CSO STORM D (1.4")
---	- CMAC PRE-EVENT DRAWDOWN
---	- EXISTING PROPERTY LINE
---	- EXISTING RIGHT-OF-WAY LINE
---	- PROPOSED RIGHT-OF-WAY LINE
---	- TURN-DOWN SIDEWALK CURB

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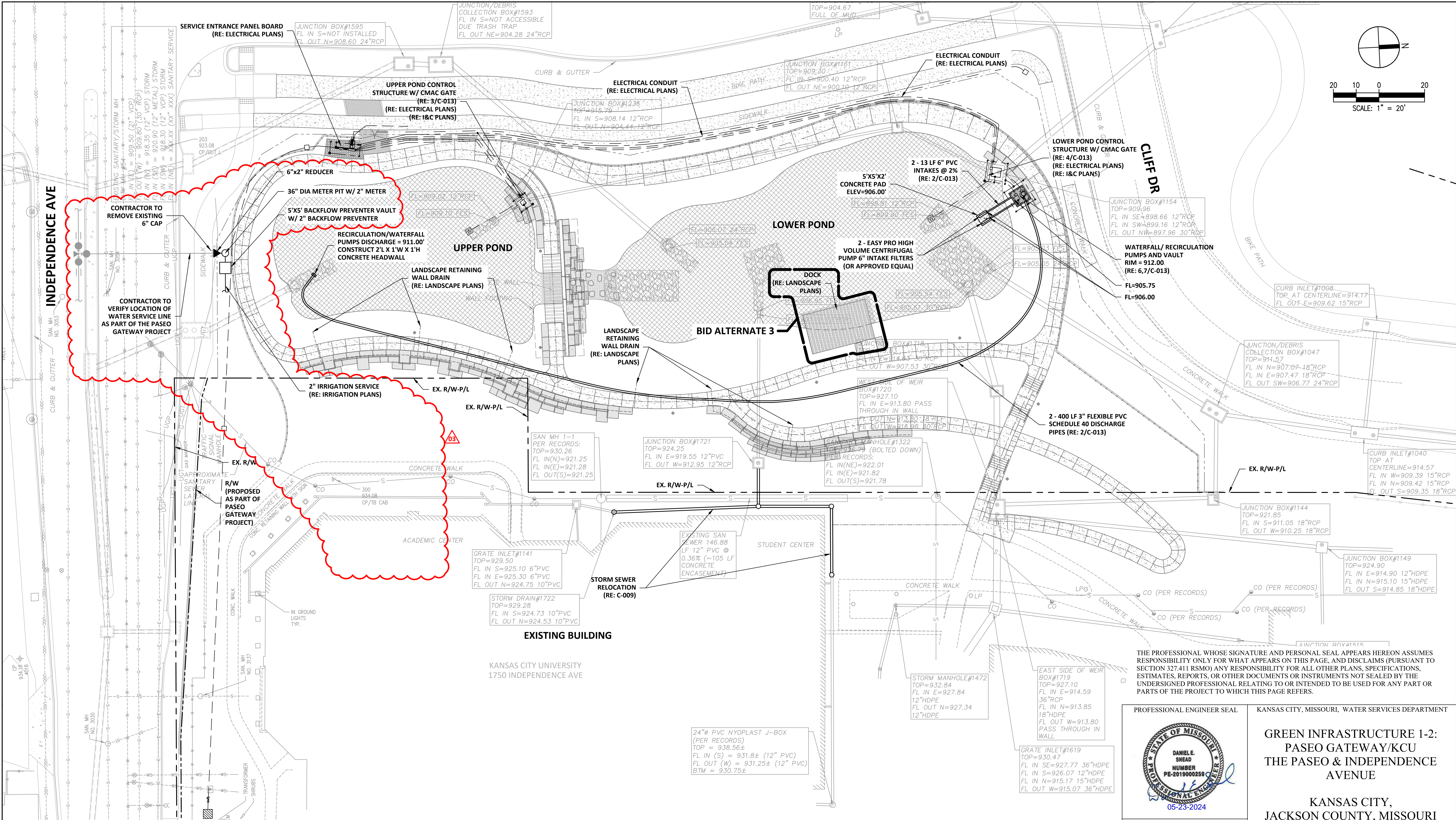
KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT

GREEN INFRASTRUCTURE 1-2:
PASEO GATEWAY/KCU
THE PASEO & INDEPENDENCE
AVENUE

KANSAS CITY,
JACKSON COUNTY, MISSOURI

LOWER POND GRADING PLAN

DRAWN BY D.M.B.	CHECKED BY D.E.S.	DATE SUBMITTED 04/12/2024	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO. DPS 1650 CCN 1889	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975	SHEET C-007	8 OF 52			

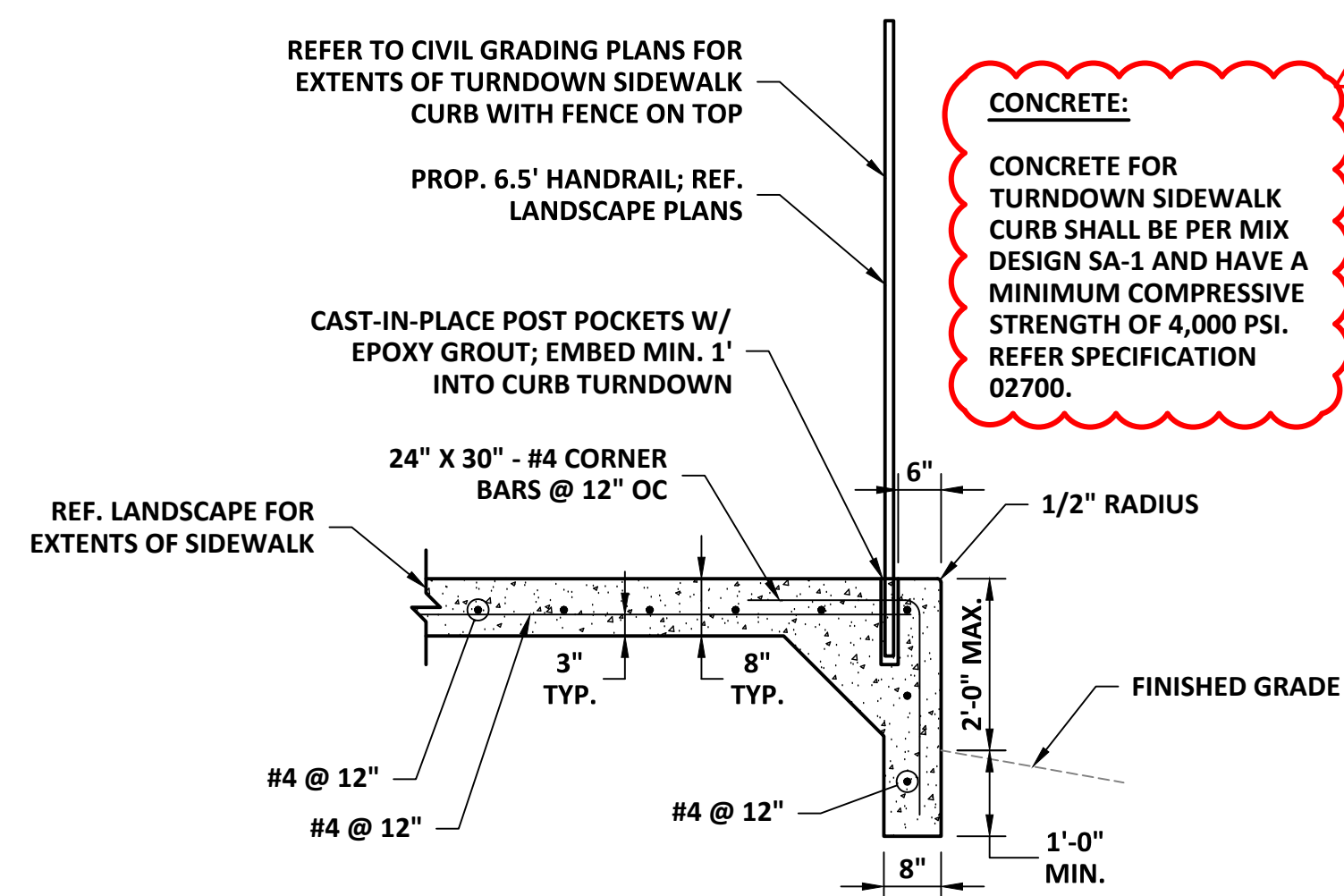
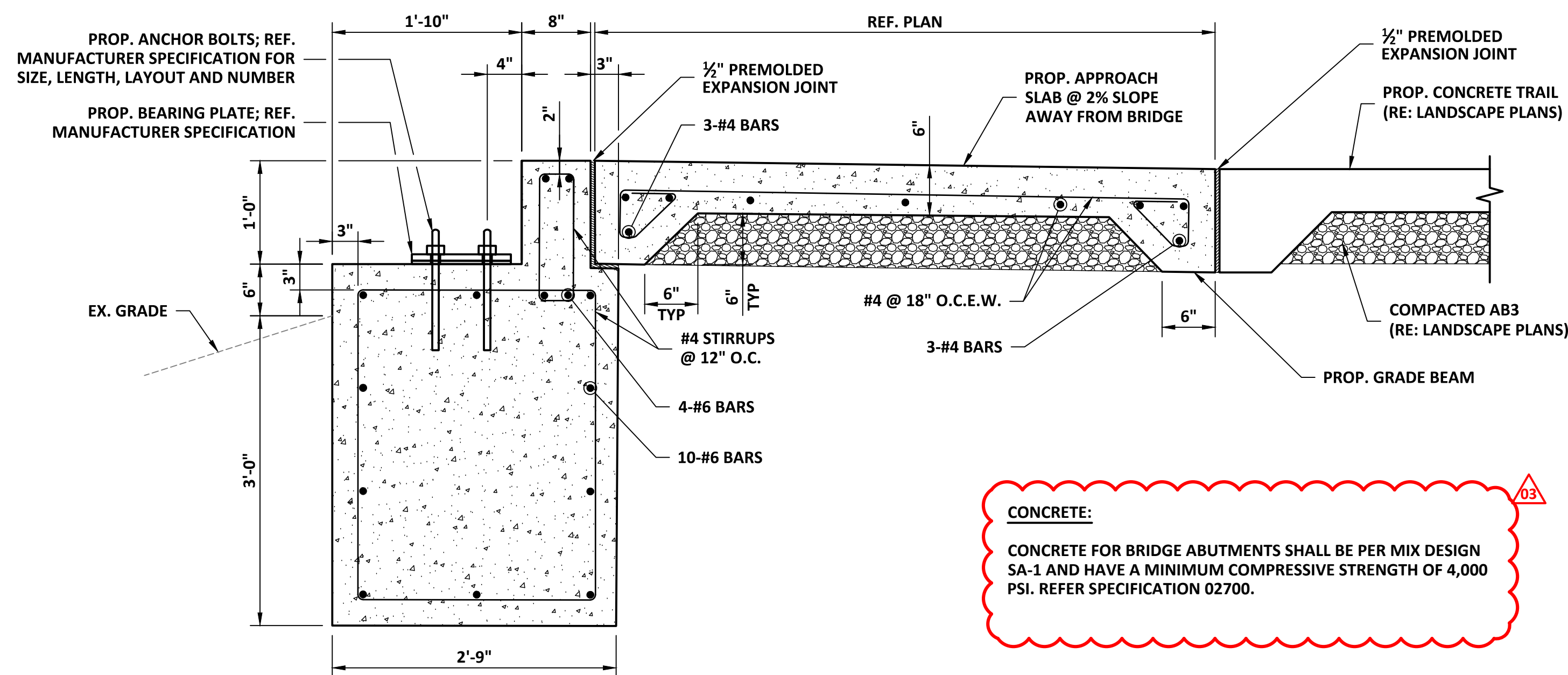
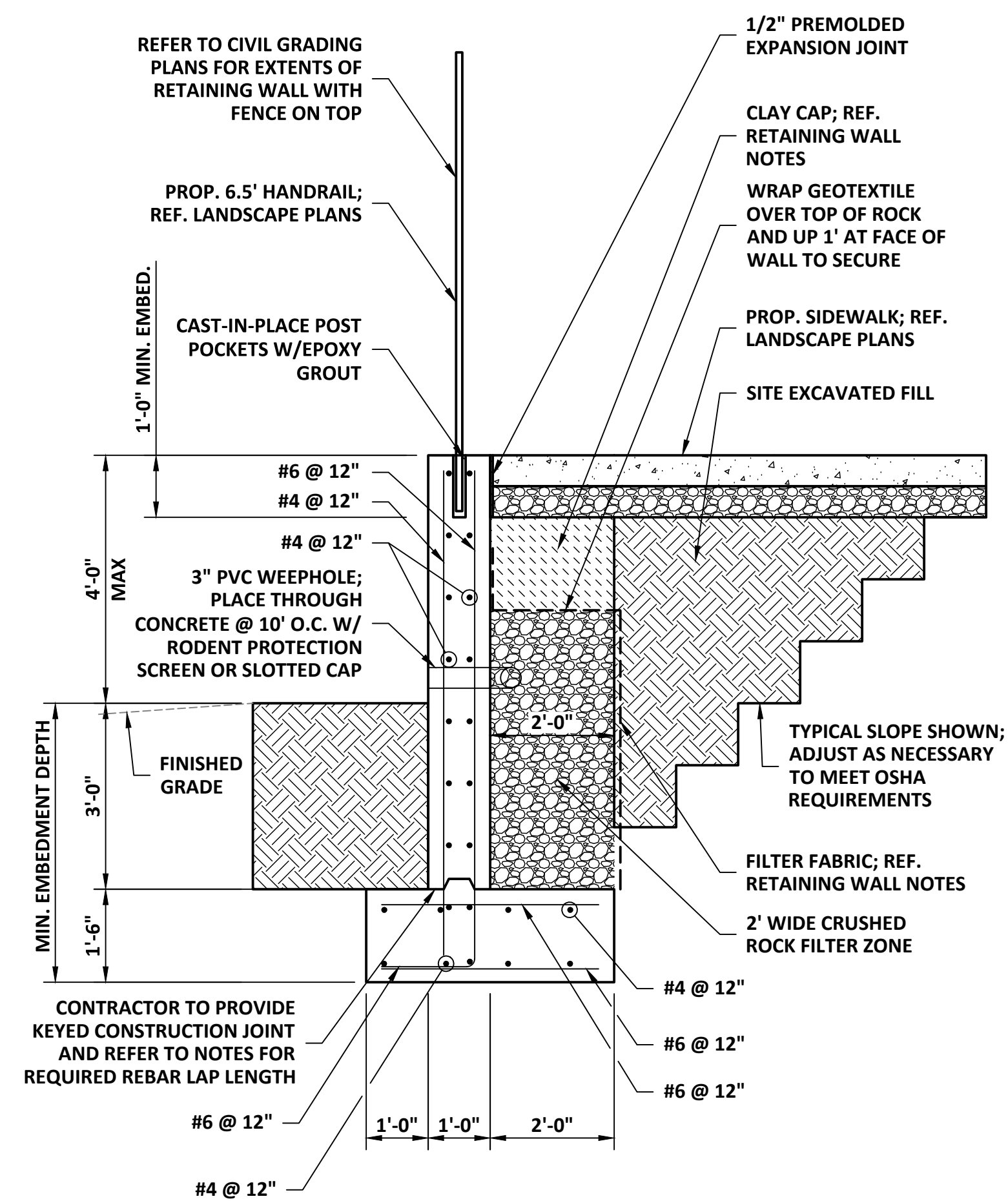
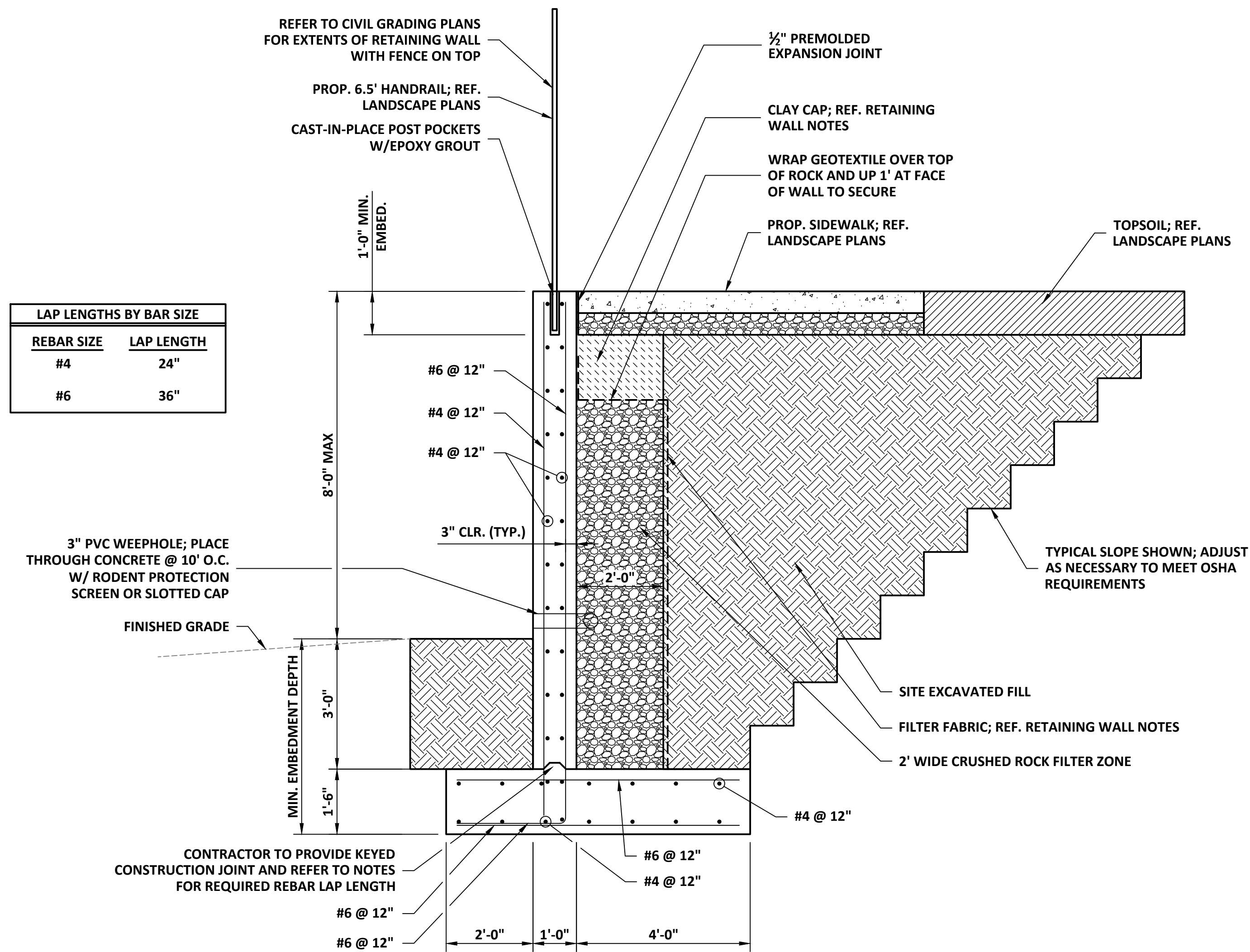


LEGEND

- NORMAL WATER LEVEL

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PROFESSIONAL ENGINEER SEAL		KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT			
		GREEN INFRASTRUCTURE 1-2: PASEO GATEWAY/KCU THE PASEO & INDEPENDENCE AVENUE			
FOR WSD USE:		KANSAS CITY, JACKSON COUNTY, MISSOURI			
UTILITY PLAN					
DRAWN BY D.M.B.	CHECKED BY D.E.S.	DATE SUBMITTED 04/12/2024	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO. DPS 1650 CCN 1889	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975	SHEET C-008	9 OF 52			



RETAINING WALL NOTES:

EARTHWORK

1. ESTABLISH THE BASE OF THE STRUCTURE AT THE ELEVATIONS SHOWN ON THE PLANS.
2. PRIOR TO THE PLACEMENT OF THE STRUCTURE, A TESTING LAB SHALL BE NOTIFIED TO ENSURE THAT A SUITABLE SOIL STRUTUM HAS BEEN REACHED. IF SUITABLE BEARING MATERIAL IS NOT PRESENT AT THE ELEVATION SHOWN IN THE SECTIONS, THE DESIGN ENGINEER SHALL BE CONTACTED IMMEDIATELY. COST OF TESTING SERVICES TO BE CARRIED IN CONTRACTOR'S BID.
3. FOOTING EXCAVATIONS SHOULD BE MAINTAINED IN A DRY CONDITION. THE BASE OF ALL FOUNDATION EXCAVATIONS SHALL BE FREE OF WATER AND LOOSE MATERIALS PRIOR TO PLACING CONCRETE. A SEAL SLAB OF FOOTING STRENGTH CONCRETE SHOULD BE PROVIDED IN THE BOTTOM OF ANY FOOTING WHICH WILL REMAIN OPEN FOR MORE THAN 72 HOURS.
4. A HIGHLY PERMEABLE FILTER FABRIC SUCH AS MIRAFI 140N, US FABRICS US 100NW, SKAPS GT-140, OR APPROVED SUBSTITUTE SHALL BE PLACED BETWEEN THE CRUSHED ROCK FILTER ZONE AND THE EARTH FILL AND CLAY CAP.
5. A TWO FOOT WIDE CRUSHED ROCK FILTER ZONE SHALL BE PLACED BETWEEN THE FILTER FABRIC AND THE CONCRETE WALL. CRUSHED ROCK SHALL HAVE A MAXIMUM SIZE OF 1-1/2 INCH AND SHALL CONFORM TO ASTM C-33, SIZE 67 OR COARSER.
6. THE CLAY CAP SHALL BE 2 FEET WIDE AND HIGH AND HAVE A LIQUID LIMIT BETWEEN 30 AND 50 AND A PLASTICITY INDEX BETWEEN 20 AND 30. CLAY CAP SHALL BE COMPACTED TO 95%-98% OF STANDARD PROCTOR DENSITY. THE MOISTURE CONTENT SHALL RANGE FROM OPTIMUM TO +/- 2% OF THE OPTIMUM AS DETERMINED BY THE STANDARD PROCTOR COMPACTION TEST. THE CLAY CAP SHALL BE SUBSIDIARY TO THE WALLS.

CONCRETE

1. CONCRETE FOR THE CONCRETE WALLS SHALL BE PER MIX DESIGN SA-1 AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI. REFER SPECIFICATION SECTION 02700.
2. ALL CONCRETE SHALL BE DESIGNED, MIXED, TRANSPORTED, AND PLACED IN ACCORDANCE WITH THE AMERICAN CONCRETE INSTITUTE. REFER SPECIFICATION SECTION 02700.
3. EXPANSION JOINTS SHALL BE PLACED AT A MAXIMUM SPACING OF 20'.

DESIGN LOADS

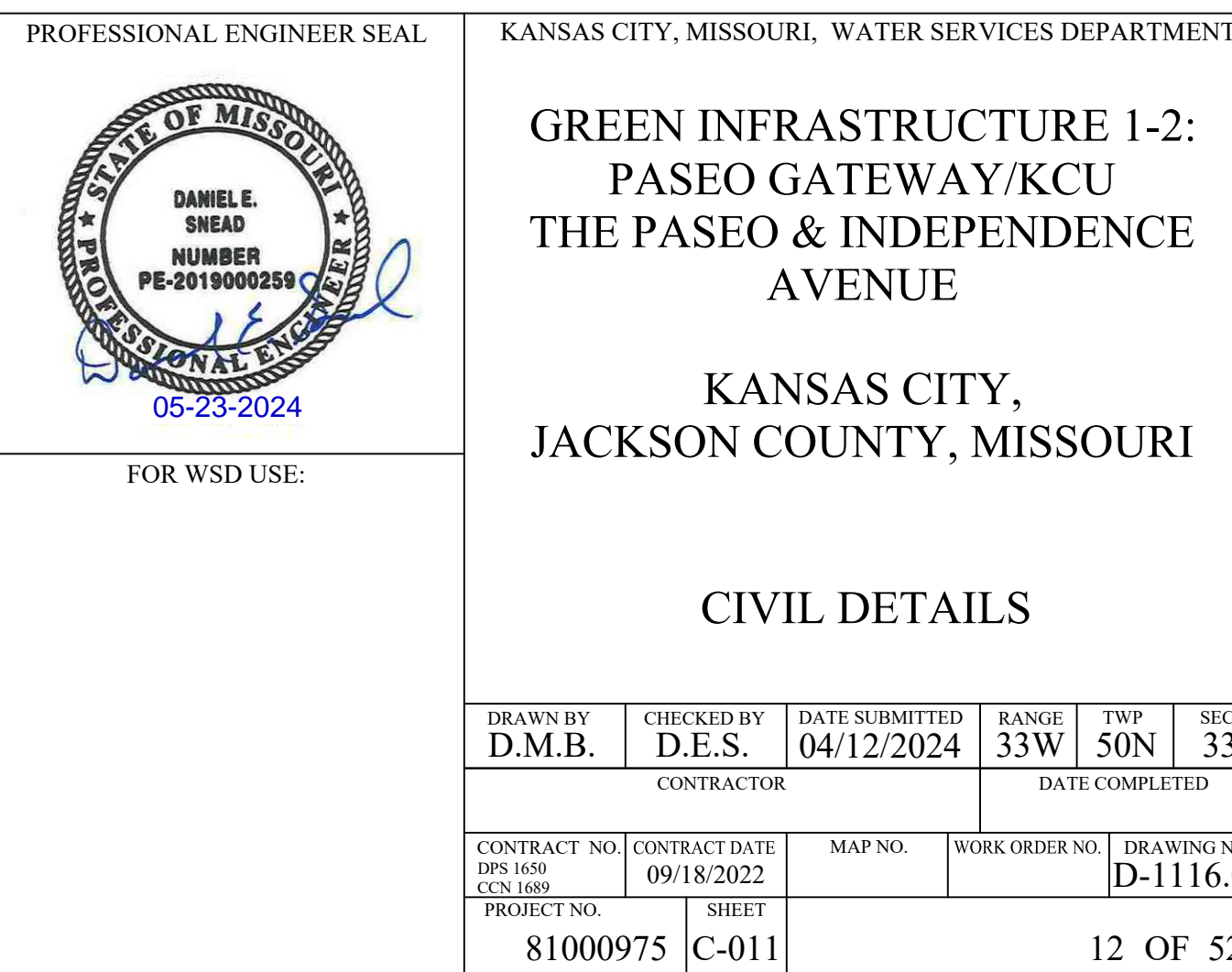
1. RETAINING WALL DESIGN IS IN ACCORDANCE WITH THE GEOTECHNICAL INFORMATION PROVIDED BY TSI GEOTECHNICAL, INC. PROJECT NO. 20192013. ALLOWABLE LOADS, DESIGN COEFFICIENTS, AND ASSUMPTIONS FOR THIS PROJECT ARE AS FOLLOWS.

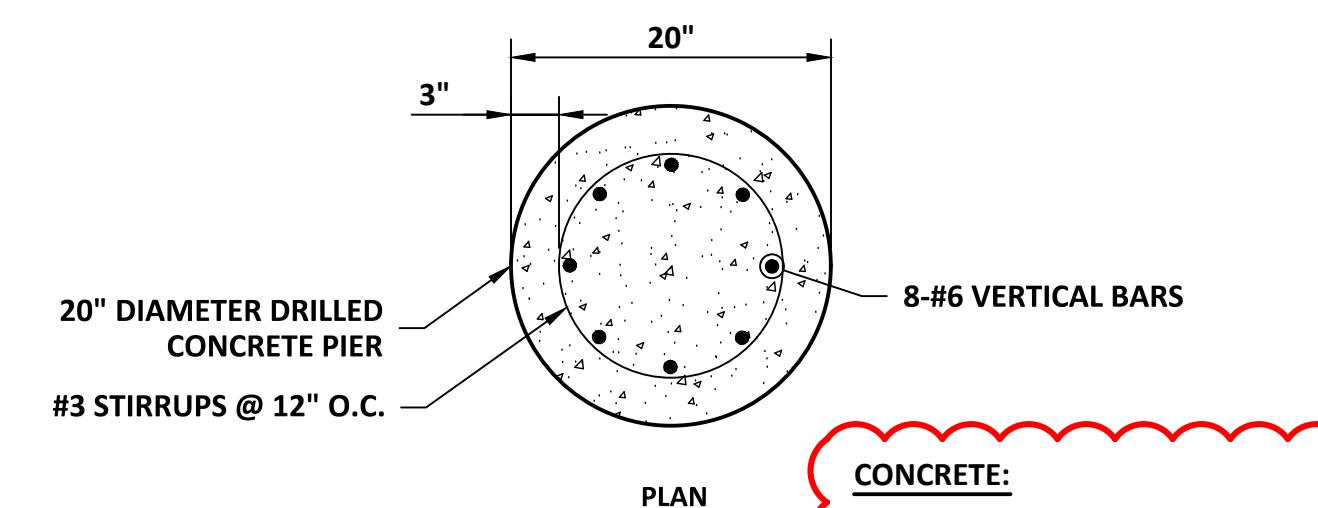
DRAINED EQUIVALENT FLUID PRESSURE (ACTIVE) FOR EXISTING FILL	36 PCF
UNIT WEIGHT OF AGGREGATE	100 PCF
ULTIMATE PASSIVE PRESSURE	277 PSF/FT
COEFFICIENT OF SLIDING	0.35
NET ALLOWABLE BEARING PRESSURE	2,000 PSF

TESTING

1. THE CONTRACTOR SHALL EMPLOY A TESTING LABORATORY TO PERFORM FIELD AND LAB TESTS OF THE CONCRETE, FILL AND MISCELLANEOUS MATERIALS USED FOR CONSTRUCTION.
2. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH TESTING LABORATORY FOR SAMPLE COLLECTION AND OBSERVATION.

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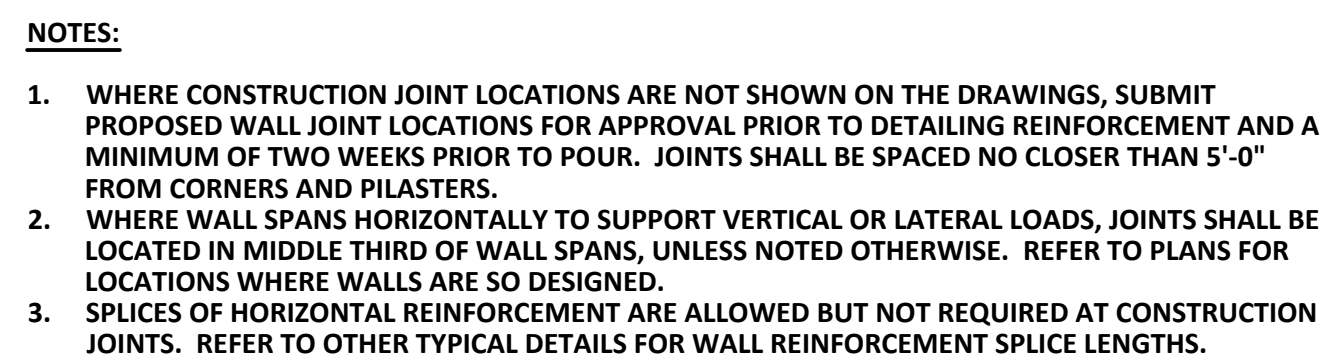


1 — **PIER**
1" = 1'-0"

BID ALTERNATE 3



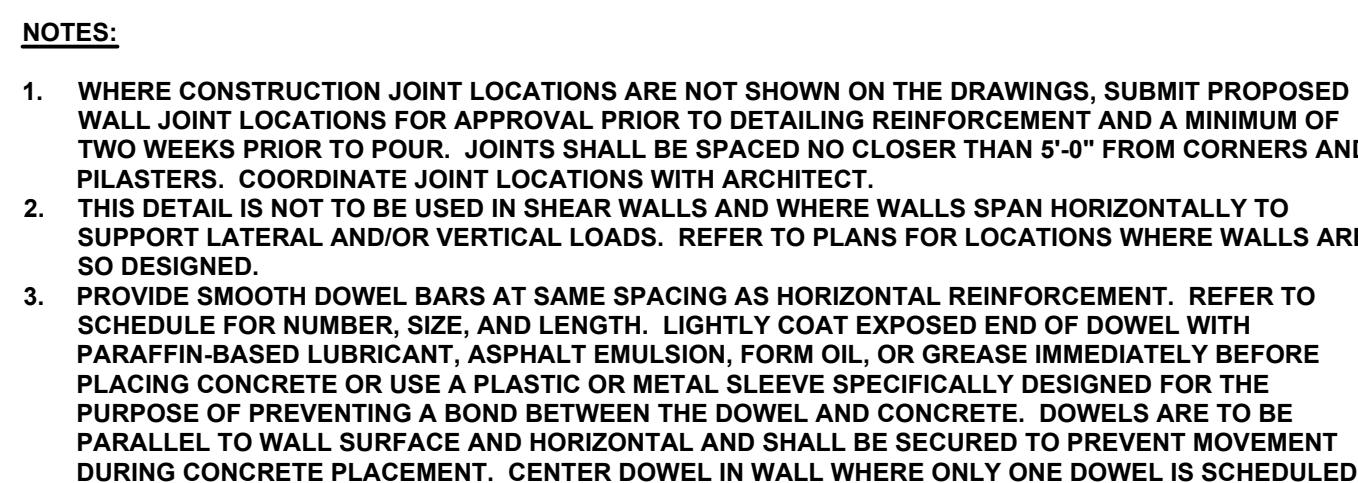
2) — W
NTS



4 NTS



6) **INTS**



3



1" = 1'-0"

ADDITIONAL DOWEL SCHEDULE		
HORIZONTAL BAR SIZE	DOWELS	
	T<12"	T>=12"
#4	(1) 1/2" Ø x2'-0"	(2) 3/8" Ø x2'-0"
#5	(1) 1/2" Ø x2'-0"	(2) 3/8" Ø x2'-0"
#6	(1) 3/4" Ø x3'-2"	(1) 1/2" Ø x2'-0"
#7	(1) 7/8" Ø x4'-4"	(2) 5/8" Ø x2'-6"
#8	(1) 7/8" Ø x4'-4"	(2) 5/8" Ø x2'-6"
#9	NA	(2) 3/4" Ø x3'-2"
#10	NA	(2) 7/8" Ø x4'-4"
#11	NA	(2) 1" Ø x6'-0"

4. PROVIDE CONTINUOUS VERTICAL GROOVE FORMED IN EACH FACE OF WALL. FORM GROOVE WITH WOOD, RUBBER, PLASTIC, OR METAL FORMER STRIPS WITH WALL FORMS. REFER TO SCHEDULE FOR DIMENSIONS. FILL GROOVE WITH PERMANENT SEALANT AS SHOWN ON THE ARCHITECTURAL DRAWINGS AND AT BELOW GRADE CONDITIONS.
5. PROVIDE CONTINUOUS WATERSTOP AT BELOW GRADE CONDITIONS AND WHERE SHOWN ON ARCHITECTURAL DRAWINGS. REFER TO SPECIFICATIONS FOR TYPE.
6. BREAK BOND BETWEEN NEW AND PREVIOUSLY PLACED CONCRETE BY SPRAYING OR PAINTING EXPOSED SIDE WITH A CURING COMPOUND, BOND BREAKER, OR FORM OIL.
7. REFER TO "TYPE 1" CONTROL JOINT AT CONCRETE WALL (VISUALLY CRITICAL) " FOR CONTROL JOINT DETAIL.

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KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT

KANSAS CITY,
JACKSON COUNTY, MISSOURI

CIVIL DETAILS

DRAWN BY D.M.B.	CHECKED BY D.E.S.	DATE SUBMITTED 04/12/2024	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO. DPS 1650 CCN 1689	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975		SHEET C-012	13 OF 52		

ELECTRICAL GENERAL NOTES

1.

ALL WORK SHALL CONFORM WITH THE NATIONAL 2017 ELECTRICAL CODE AND ALL STATE AND LOCAL CODES AND ORDINANCES AND O.S.H.A. WHERE MINIMUM CODE REQUIREMENTS ARE EXCEEDED BY THE REQUIREMENTS INDICATED IN THE SPECIFICATIONS AND ON THESE DRAWINGS, THE DRAWINGS AND SPECIFICATIONS SHALL TAKE PRECEDENCE. (IN THE CASE OF CODE CONFLICT DIRECTION SHALL BE TAKEN FROM THE MORE STRICT OF THE CONFLICTING CODES).
2.

CAREFULLY REVIEW CONTRACT DOCUMENTS INCLUDING DRAWINGS & PROJECT MANUAL. INFORMATION REGARDING WORK OF THE VARIOUS TRADES & SUBCONTRACTORS ARE DISPERSED THROUGHOUT THE DOCUMENTS & CANNOT BE ACCURATELY DETERMINED WITHOUT REFERENCE TO THE FULL SET OF DOCUMENTS. CONTRACTOR SHALL COORDINATE INSTALLATION OF UTILITIES TO PROVIDE THE GREATEST POSSIBLE CLEARANCE FOR INSTALLATION OF THE MECHANICAL, PLUMBING, & ETC. CONDUIT & PIPE TO BE RUN TO MAXIMIZE USE OF SPACE FOR USE BY OTHER TRADES.
3.

ALL EMPTY CONDUITS SHALL BE PROVIDED WITH A PULL WIRE OR STRING.
4.

AT THE CONCLUSION OF THIS PROJECT PROVIDE AN UPDATED TYPEWRITTEN, AS-BUILT DIRECTORY INSIDE EACH PANELBOARD PROPERLY IDENTIFYING EACH CIRCUIT USED & THE SPECIFIC LOAD SERVED. ALSO PROVIDE SCHEDULES ON USB STORAGE DRIVE.
5.

ALL ELECTRICAL DEVICES IN PUBLIC AREAS SHALL BE MOUNTED PER A.D.A. REQUIREMENTS.
6.

OPENINGS SHALL BE CUT TO THE EXACT SIZE REQUIRED IN ORDER TO MAINTAIN ANY MATERIAL RATINGS AND SEALED TO MAINTAIN RATING.
7.

CONCEAL ALL ELECTRICAL WIRING AND RACEWAYS WHERE CONSTRUCTION PERMITS. EXPOSED RACEWAY SHALL BE MINIMIZED WHERE STRUCTURE IS EXPOSED TO VIEW. WHERE NECESSARY, CAREFULLY INSTALL RACEWAYS PARALLEL TO WALLS, BEAMS AND COLUMNS. EXPOSED RACEWAY SHALL BE HELD TIGHT TO STRUCTURE & LOCATED SO AS TO KEEP IT AS INCONSPICUOUS AS POSSIBLE.
8.

INSTALL ANY/ALL CORD SETS SUPPLIED WITH THE EQUIPMENT.
9.

PROVIDE A DISCONNECT SWITCH AND HARD WIRED CONNECTION USING FLEXIBLE LIQUID-TIGHT CONDUIT AND FITTINGS, TO ANY EQUIPMENT THAT IS NOT SHOWN TO HAVE A POWER RECEPTACLE.
10.

ALL EXTERIOR MOUNTED ELECTRICAL DEVICES AND EQUIPMENT SHALL BE IN WEATHERPROOF ENCLOSURE AND U.L. LISTED FOR WET LOCATION.
11.

MOUNT DISCONNECT SWITCHES AND COMBINATION STARTERS AT 65" AFF. TO TOP OF ENCLOSURE UNLESS OTHERWISE INDICATED.
12.

COORDINATE AND INCLUDE IN BID ALL EVERGY COMPANY ELECTRICAL SERVICE AND METERING REQUIREMENTS, AND CHARGES EVERGY CONTACT PERSON BLAKE FALCONE, EMAIL BLAKE.FALCONE@EVERGY.COM.
13.

PROVIDE ALL NECESSARY FLOOR CUTTING/PENETRATIONS AND ALL OF THE REPATCHING NECESSARY FOR THE PROPER EXECUTION OF THIS WORK.
14.

ALL PANELBOARDS SHALL HAVE SEPARATE GROUNDING AND NEUTRAL BUSSES. ALL GROUNDING AND NEUTRAL WIRING SHALL BE TERMINATED ON THE PROPER BUS.
15.

ALL SINGLE-PHASE CIRCUITS SHALL HAVE A DEDICATED NEUTRAL CONDUCTOR.
16.

ALL EXTERIOR DEVICE FACEPLATES SHALL BE WEATHERPROOF.
17.

ALL SAFETY SWITCHES SHALL HAVE A GROUNDING BAR.
18.

ALL SAFETY FUSES/DISCONNECT SWITCHES SHALL BE HEAVY-DUTY GRADE.
19.

ALL FEEDERS SHALL HAVE A SEPARATE COPPER GROUNDING CONDUCTOR INSTALLED. IN NO CASE SHALL THE CONDUIT OR RACEWAY BE USED AS THE GROUNDING CONDUCTOR.
20.

ALL SERVICE, FEEDER, AND BRANCH CIRCUIT CONDUCTORS SHALL HAVE TYPE THWN/THHN (75 DEGREE) INSULATION.
21.

COORDINATE ALL DEVICES AND WIRING WITH EQUIPMENT NAMEPLATE DATA. VERIFY THE ELECTRICAL LOADS, MOUNTING HEIGHTS AND NEMA CONFIGURATIONS WITH THE MECHANICAL, PLUMBING, AND OTHER CONTRACTORS AND SUPPLIERS PRIOR TO ROUGH-IN.
22.

PROVIDE FINAL CONNECTION, WIRING, HOOK-UP, ETC. FOR ALL EQUIPMENT AND CONTROLS REQUIRING ELECTRICAL POWER TO OPERATE.
23.

FURNISH AND INSTALL ALL WIRE, WIREWAY, CONDUIT, CONNECTORS, OUTLETS, ETC. NECESSARY TO ACHIEVE A COMPLETE AND WORKING INSTALLATION.

GENERAL CONSTRUCTION NOTES

1.

ALL ELECTRICAL WORK SHALL CONFORM WITH LOCAL AND STATE ELECTRICAL CODES, O.S.H.A., AND ELECTRICAL SPECIFICATIONS.
2.

ALL ELECTRICAL LIGHT AND POWER WIRE SHALL NOT BE SMALLER THAN #12 A.W.G. COPPER. ALUMINUM CONDUCTORS SHALL NOT BE PERMITTED. ALL SERVICE, FEEDER, AND BRANCH CIRCUIT CONDUCTORS SHALL HAVE TYPE THWN/THHN (90 DEGREE) INSULATION. LIGHTING FIXTURE WIRE INSULATION SHALL HAVE A TEMPERATURE RATING NOT LESS THAN THE INDIVIDUAL LIGHTING FIXTURE'S MANUFACTURER RECOMMENDED RATING. NON-METALLIC CABLE IS NOT PERMITTED.
3.

E.C. SHALL FURNISH AND INSTALL, FOR WORK DESIGNATED AS THEIR RESPONSIBILITY, ALL WIRE, WIREWAY, CONDUIT, CONNECTORS, OUTLETS, ETC. NECESSARY TO ACHIEVE A COMPLETE ELECTRICAL INSTALLATION. WHERE AN ELECTRICAL DEVICE IS REQUIRED BY CODE BUT NOT SHOWN, IT SHALL BE FURNISHED AND INSTALLED BY E.C. AS THOUGH FULLY SHOWN AND SPECIFIED.
4.

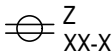
ELECTRICAL CONTRACTOR SHALL COORDINATE THIS WORK WITH OTHER TRADES.
5.

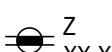
ELECTRICAL CONNECTION TO ALL EQUIPMENT SUPPLIED BY OTHERS SHALL BE THE RESPONSIBILITY OF THE E.C. UNLESS OTHERWISE NOTED.

SWITCH SYMBOLS


 SINGLE POLE WALL SWITCH - 42" AFF UNO


RECEPTACLE SYMBOLS


 DUPLEX CONVENIENCE RECEPTACLE - 18" AFF UNO
"Z" DESIGNATES TYPE
"XX" PANEL NAME
"X" CIRCUIT NUMBER


 GFCI RECEPTACLE
"Z" DESIGNATES TYPE
"XX" PANEL NAME
"X" CIRCUIT NUMBER


POWER SYMBOLS


 PANELBOARD

 DISCONNECT SWITCH

 COMBINATION MOTOR STARTER, DISCONNECT SWITCH




 MOTOR - "XX" DESIGNATES HORSEPOWER



 JUNCTION BOX - "Z" DESIGNATES TYPE
"XX" PANEL NAME
"X" CIRCUIT NUMBER


 EVERGY PAD MOUNTED TRANSFORMER


CONDUIT & CIRCUIT SYMBOLS


--- EXISTING ELECTRICAL CONDUIT BELOW GRADE
—— EXISTING ELECTRICAL CONDUIT ABOVE GRADE
----- ELECTRICAL CONDUIT BELOW GRADE
===== ELECTRICAL CONDUIT ABOVE GRADE
-.-.-.- FIBER CONDUIT BELOW GRADE
-.-.-.- FIBER CONDUIT ABOVE GRADE


 PHASE WIRE
 NEUTRAL WIRE
 GROUND WIRE

 CONDUIT TURNING UP
 CONDUIT TURNING DOWN



 CIRCUIT SIZE AS INDICATED ON PLAN
"Z" DESIGNATES AMOUNT OF WIRES
"X" DESIGNATES SIZE OF WIRES
"XX" DESIGNATES SIZE OF CONDUIT

 PULL BOX

 GROUNDING TEST WELL

 GROUNDING ROD

----- GROUNDING WIRE

 GROUND CLAMP CONNECTOR
 GROUND WELD CONNECTOR


INSTRUMENTATION SYMBOLS

 WATER LEVEL TRANSMITTER

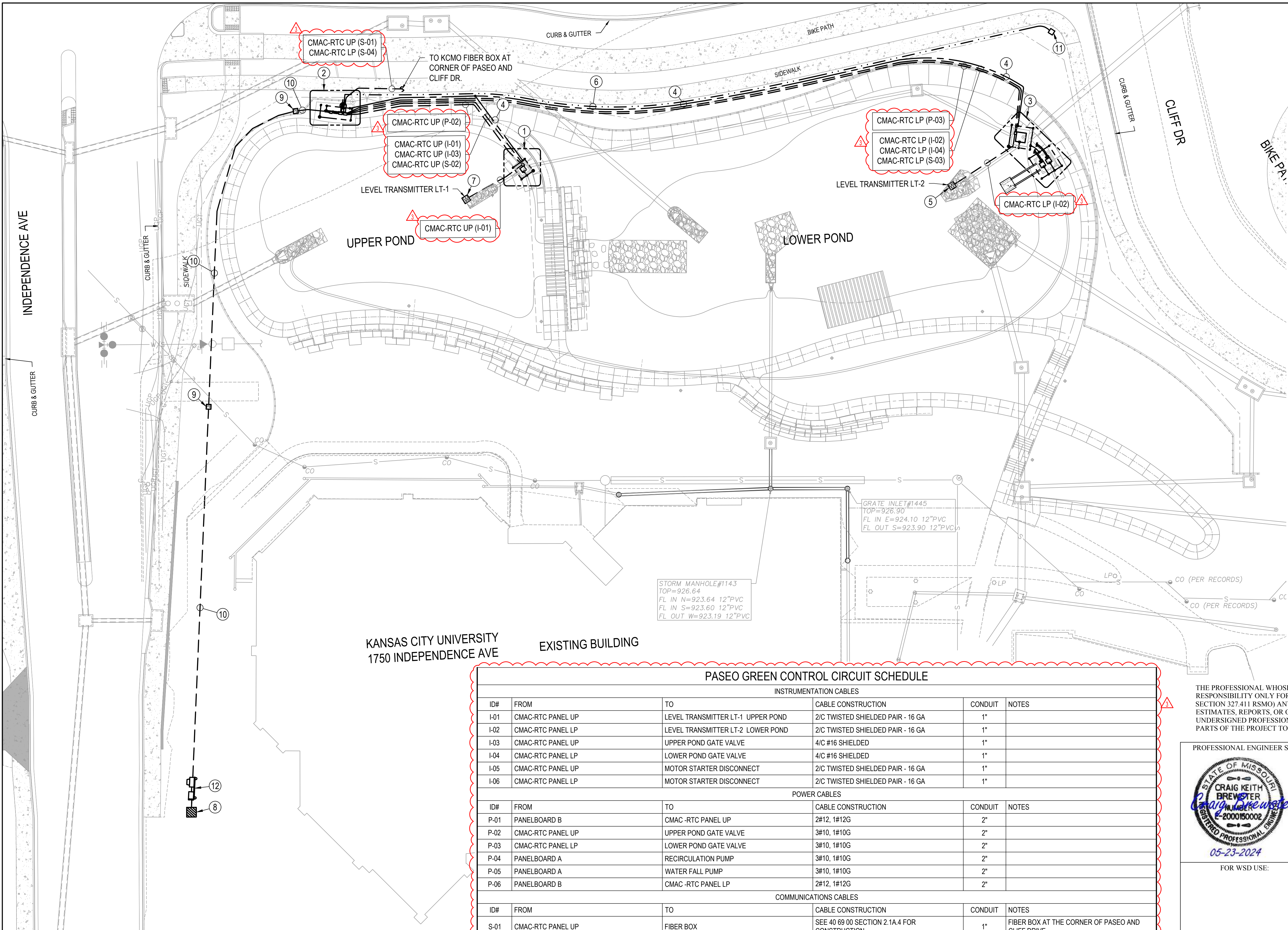
ABBREVIATIONS

AC ABOVE COUNTER
AFF ABOVE FINISHED FLOOR
AFG ABOVE FINISHED GRADE
DWG DRAWING
EC ELECTRICAL CONTRACTOR
EXIST EXISTING
GC GENERAL CONTRACTOR
GFCI GROUND FAULT CIRCUIT INTERRUPTER
GND GROUNDED
HOA HAND-OFF-AUTO SWITCH
KVA KILOVOLT
KW KILOWATT
MDP MAIN DISTRIBUTION PANEL
MLO MAIN LUGS ONLY
NEC NATIONAL ELECTRICAL CODE
NTS NOT TO SCALE
PNL PANELBOARD
S/E SERVICE ENTRANCE LISTED LABELED
SPD SURGE PROTECTION DEVICE
TYP TYPICAL
UNO UNLESS NOTED OTHERWISE
WP WEATHERPROOF
N NEUTRAL WIRE
G GROUND WIRE
φ WIRE PHASE
NWL NORMAL WATER LEVEL
LWL LOW WATER LEVEL
OFL OVER FLOW WATER LEVEL

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PROFESSIONAL ENGINEER SEAL		KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT					
		GREEN INFRASTRUCTURE 1-2: PASEO GATEWAY/KCU THE PASEO & INDEPENDENCE AVENUE KANSAS CITY, JACKSON COUNTY, MISSOURI					
FOR WSD USE:							
ELECTRICAL SYMBOLS & NOTES							
DRAWN BY R.A.L.	CHECKED BY C.K.B.	DATE SUBMITTED 04/12/2024	RANGE 33W	TWP 50N	SEC 33		
CONTRACTOR			DATE COMPLETED				
CONTRACT NO. DPS 1650 ECN 1689	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06			
PROJECT NO. 81000975		SHEET E-001		23 OF 52			

REV	DATE	DESCRIPTION
3	05/23/24	ADDITIONAL CMAC RE-DESIGN



GENERAL NOTES

- SEE SHEET E-001 FOR ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL REQUIREMENTS.
- REFER TO SHEET E-401 FOR GROUNDING, TRENCH, GROUND ROD TEST STATION AND PULL BOX DETAILS.

KEY NOTES:

- SEE ENLARGED ELECTRICAL PLAN 2 ON SHEET E-202.
- SEE ENLARGED ELECTRICAL PLAN 1 ON SHEET E-202 FOR SERVICE ENTRANCE PANELBOARD A.
- SEE ENLARGED ELECTRICAL PLAN 3 ON SHEET E-202.
- BARE #4/0 COPPER CONDUCTOR 36" BELOW GRADE CONNECT TO GROUND RING. REFER TO SHEET E-202 KEY NOTE 4.
- LEVEL TRANSMITTER - LT-2 (SEE INSTRUMENT INSTALLATION DETAIL ON MID-AMERICA PLANS). REFER FOR CONTROL CIRCUIT SCHEDULE ON SHEET E301. INSTALL TRANSDUCER AT LOWEST LEVEL OF POND.
- 2" PVC CONDUIT WITH 12GA TRACER WIRE AND PULL STRING, FOR FIBER.
- LEVEL TRANSMITTER - LT-1 (SEE INSTRUMENT INSTALLATION DETAIL ON I&C-003). REFER FOR CONTROL CIRCUIT SCHEDULE ON SHEET E301. INSTALL TRANSDUCER AT LOWEST LEVEL OF POND.
- EXISTING EVERGY TRANSFORMER 480V 3 ϕ SECONDARY, PAD MOUNTED.
- PROVIDE PULL BOX. REFER TO DETAIL 2, SHEET E-401.
- REFER TO ONE-LINE DIAGRAM SHEET E-301 FOR CIRCUIT REQUIREMENTS FROM EVERGY TRANSFORMER TO SERVICE ENTRANCE PANELBOARD 'A'.
- FIBER BOX EXISTING FIELD VERIFY EXACT LOCATION.
- UTILITY METER AND DISCONNECT RACK. COORDINATE EXACT LOCATION WITH EVERGY REPRESENTATIVE, REFER TO DETAIL 1, SHEET E-402.

KANSAS CITY UNIVERSITY
1750 INDEPENDENCE AVE

EXISTING BUILDING

PASEO GREEN CONTROL CIRCUIT SCHEDULE

INSTRUMENTATION CABLES					
ID#	FROM	TO	CABLE CONSTRUCTION	CONDUIT	NOTES
I-01	CMAC-RTC PANEL UP	LEVEL TRANSMITTER LT-1 UPPER POND	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
I-02	CMAC-RTC PANEL LP	LEVEL TRANSMITTER LT-2 LOWER POND	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
I-03	CMAC-RTC PANEL UP	UPPER POND GATE VALVE	4/C #16 SHIELDED	1"	
I-04	CMAC-RTC PANEL LP	LOWER POND GATE VALVE	4/C #16 SHIELDED	1"	
I-05	CMAC-RTC PANEL UP	MOTOR STARTER DISCONNECT	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
I-06	CMAC-RTC PANEL LP	MOTOR STARTER DISCONNECT	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
POWER CABLES					
ID#	FROM	TO	CABLE CONSTRUCTION	CONDUIT	NOTES
P-01	PANELBOARD B	CMAC -RTC PANEL UP	2#12, 1#12G	2"	
P-02	CMAC-RTC PANEL UP	UPPER POND GATE VALVE	3#10, 1#10G	2"	
P-03	CMAC-RTC PANEL LP	LOWER POND GATE VALVE	3#10, 1#10G	2"	
P-04	PANELBOARD A	RECIRCULATION PUMP	3#10, 1#10G	2"	
P-05	PANELBOARD A	WATER FALL PUMP	3#10, 1#10G	2"	
P-06	PANELBOARD B	CMAC -RTC PANEL LP	2#12, 1#12G	2"	
COMMUNICATIONS CABLES					
ID#	FROM	TO	CABLE CONSTRUCTION	CONDUIT	NOTES
S-01	CMAC-RTC PANEL UP	FIBER BOX	SEE 40 69 00 SECTION 2.1A.4 FOR CONSTRUCTION	1"	FIBER BOX AT THE CORNER OF PASEO AND CLIFF DRIVE
S-02	CMAC-RTC PANEL UP	UPPER POND GATE VALVE	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
S-03	CMAC-RTC PANEL UP	LOWER POND GATE VALVE	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
S-04	CMAC-RTC PANEL LP	FIBER BOX	SEE 40 69 00 SECTION 2.1A.4 FOR CONSTRUCTION	1"	FIBER BOX AT THE CORNER OF PASEO AND CLIFF DRIVE

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PROFESSIONAL ENGINEER SEAL



FOR WSD USE:

KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT

GREEN INFRASTRUCTURE 1-2:
PASEO GATEWAY/KCU
THE PASEO & INDEPENDENCE
AVENUE

KANSAS CITY,
JACKSON COUNTY, MISSOURI

OVERALL ELECTRICAL PLAN

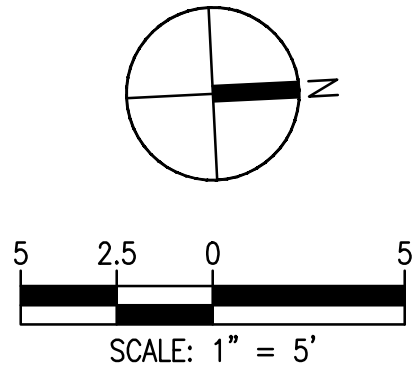
DRAWN BY R.A.L.	CHECKED BY C.K.B.	DATE SUBMITTED 04/12/2024	RANGE 33W	TWP 50N	SEC 33
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CONTRACTOR DATE COMPLETED

CONTRACT NO. DPS 1650 CCN 1689	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06
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PROJECT NO. 81000975	SHEET E-201	24 OF 52
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REV	DATE	DESCRIPTION
3	05/23/24	ADDITIONAL CMAC RE-DESIGN

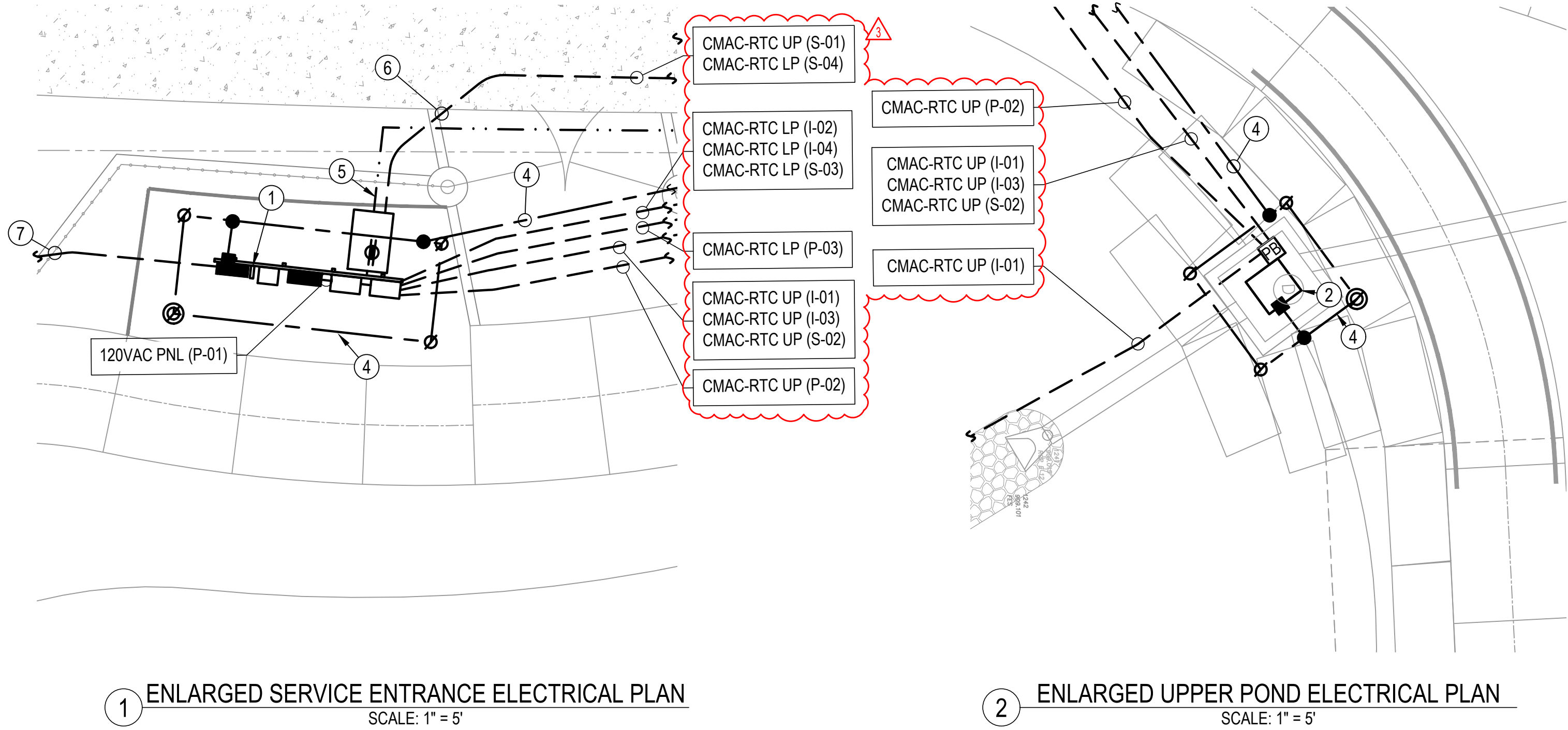


GENERAL NOTES

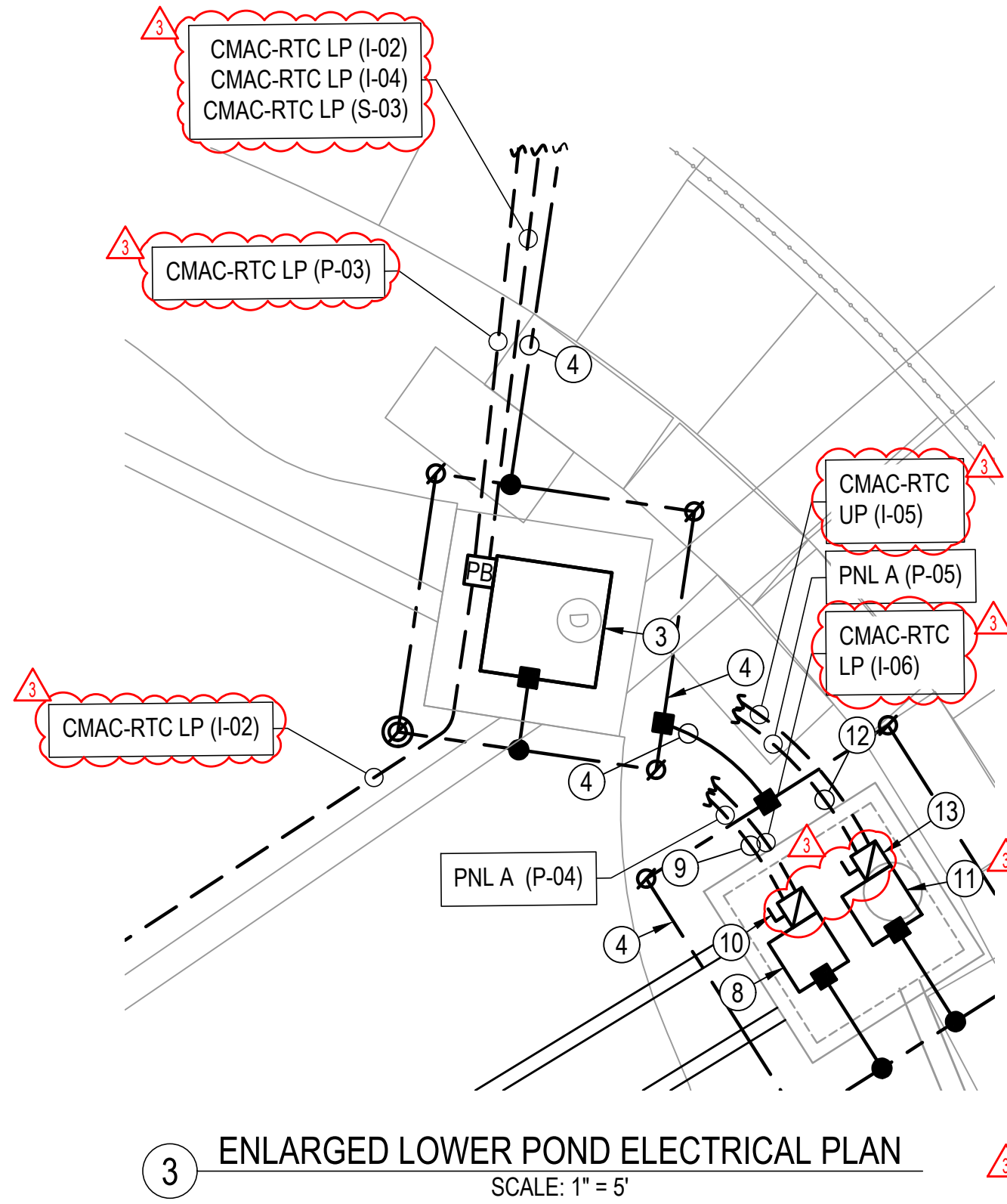
- SEE SHEET E-001 FOR ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL REQUIREMENTS.
- REFER TO SHEET E-401 FOR GROUNDING, TRENCH, GROUND ROD TEST STATION AND PULL BOX DETAILS.

KEY NOTES:

- SERVICE ENTRANCE PANELBOARD A. REFER TO DETAIL 2 SHEET E-402.
- OPEN/CLOSE GATE TO CONTROL FLOW FROM UPPER POND.
- OPEN/CLOSE GATE TO CONTROL FLOW FROM LOWER POND.
- GROUND RING, #4/0 BARE COPPER CONDUCTOR, 36" BELOW GROUND.
- FIBER ENCLOSURE, 24" X 36" TIER 2 POLYMER RECTANGULAR BOX WITH KCMO FIBER IMPRINTED ON THE LID WITH WEATHERPROOF GFCI RECEPTACLE 120V FOR COMPUTER USE ONLY INSIDE OF ENCLOSURE.
- 2" PVC CONDUIT WITH 12GA TRACER WIRE AND PULL STRING FOR FIBER.
- REFER TO SHEET E-201, KEY NOTE 10, FOR CONTINUATION.
- RECIRC PUMP. REFER TO ONE-LINE FOR REQUIREMENTS.
- 3#10, 1#10G, 2"C FROM WATERFALL RECIRC PUMP TO PANELBOARD 'A'.
- PROVIDE COMBINATION MOTOR STARTER, DISCONNECT SWITCH ON UNISTRUT ADJACENT TO RECIRC PUMP MOTOR. REFER TO ONE-LINE DIAGRAM FOR REQUIREMENTS ON SHEET E-301.
- WATERFALL PUMP. REFER TO ONE-LINE FOR REQUIREMENTS.
- 3#10, 1#10G, 2"C FROM WATERFALL WAERFALL PUMP TO PANELBOARD 'A'.
- PROVIDE COMBINATION MOTOR STARTER, DISCONNECT SWITCH ON UNISTRUT ADJACENT TO WATERFALL PUMP MOTOR. REFER TO ONE-LINE DIAGRAM FOR REQUIREMENTS ON SHEET E-301.



2 ENLARGED UPPER POND ELECTRICAL PLAN
SCALE: 1" = 5'



3 ENLARGED LOWER POND ELECTRICAL PLAN
SCALE: 1" = 5'

PASEO GREEN CONTROL CIRCUIT SCHEDULE					
INSTRUMENTATION CABLES					
ID#	FROM	TO	CABLE CONSTRUCTION	CONDUIT	NOTES
I-01	CMAC-RTC PANEL UP	LEVEL TRANSMITTER LT-1 UPPER POND	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
I-02	CMAC-RTC PANEL LP	LEVEL TRANSMITTER LT-2 LOWER POND	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
I-03	CMAC-RTC PANEL UP	UPPER POND GATE VALVE	4/C #16 SHIELDED	1"	
I-04	CMAC-RTC PANEL LP	LOWER POND GATE VALVE	4/C #16 SHIELDED	1"	
I-05	CMAC-RTC PANEL UP	MOTOR STARTER DISCONNECT	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
I-06	CMAC-RTC PANEL LP	MOTOR STARTER DISCONNECT	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
POWER CABLES					
ID#	FROM	TO	CABLE CONSTRUCTION	CONDUIT	NOTES
P-01	PANELBOARD B	CMAC -RTC PANEL UP	2#12, 1#12G	2"	
P-02	CMAC-RTC PANEL UP	UPPER POND GATE VALVE	3#10, 1#10G	2"	
P-03	CMAC-RTC PANEL LP	LOWER POND GATE VALVE	3#10, 1#10G	2"	
P-04	PANELBOARD A	RECIRCULATION PUMP	3#10, 1#10G	2"	
P-05	PANELBOARD A	WATER FALL PUMP	3#10, 1#10G	2"	
P-06	PANELBOARD B	CMAC -RTC PANEL LP	2#12, 1#12G	2"	
COMMUNICATIONS CABLES					
ID#	FROM	TO	CABLE CONSTRUCTION	CONDUIT	NOTES
S-01	CMAC-RTC PANEL UP	FIBER BOX	SEE 40 69 00 SECTION 2.1A.4 FOR CONSTRUCTION	1"	FIBER BOX AT THE CORNER OF PASEO AND CLIFF DRIVE
S-02	CMAC-RTC PANEL UP	UPPER POND GATE VALVE	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
S-03	CMAC-RTC PANEL UP	LOWER POND GATE VALVE	2/C TWISTED SHIELDED PAIR - 16 GA	1"	
S-04	CMAC-RTC PANEL LP	FIBER BOX	SEE 40 69 00 SECTION 2.1A.4 FOR CONSTRUCTION	1"	FIBER BOX AT THE CORNER OF PASEO AND CLIFF DRIVE

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KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT

GREEN INFRASTRUCTURE 1-2:
PASEO GATEWAY/KCU
THE PASEO & INDEPENDENCE
AVENUE

KANSAS CITY,
JACKSON COUNTY, MISSOURI

ENLARGED ELECTRICAL PLANS

DRAWN BY R.A.L.	CHECKED BY C.K.B.	DATE SUBMITTED 04/12/2024	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO. DPS 1650 CCN 1689	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975	SHEET E-202	25 OF 52			

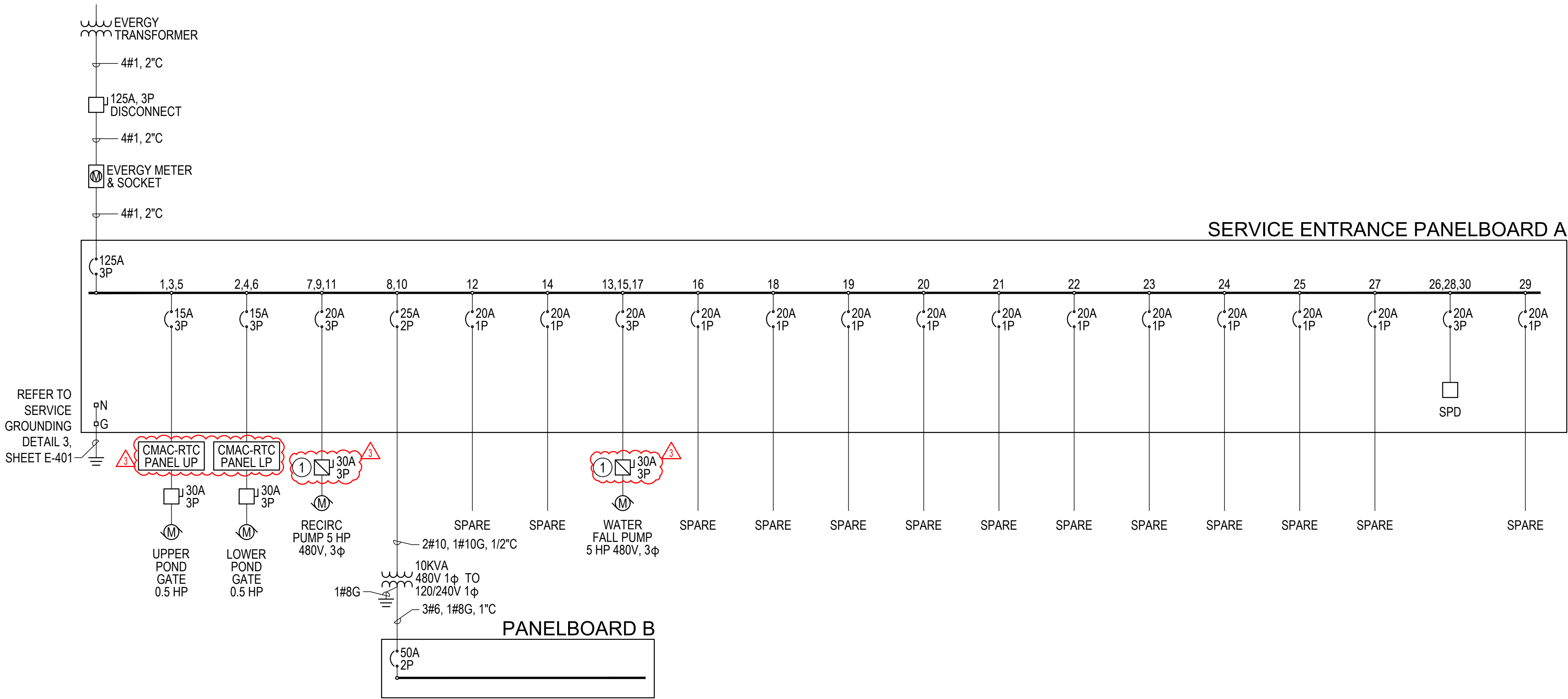
REV	DATE	DESCRIPTION
3	05/23/24	ADDITIONAL CMAC RE-DESIGN

P:\PROJ\2022\A22044 - PASEO GREEN INFRASTRUCTURE KCMO - WSD\CAD\MEP\ELEC\E-301 ONE LINE DIAGRAM & PANELBOARD SCHEDULES.DWG

1:2.584895M0NO & COLOR.STB

RYAN LARKEY

24 May 2024



GENERAL NOTES

- SEE SHEET E-001 FOR ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL REQUIREMENTS.
- REFER TO "SERVICE ENTRANCE PANELBOARD A" & "PANELBOARD B" SCHEDULE ON THIS SHEET.

KEY NOTES:

- COMBINATION MOTOR STARTER, DISCONNECT SWITCH WITH H.O.A. IN NEMA 4X STAINLESS STEEL ENCLOSURE. 480V, 30A, 3P RATED, FUSED AT 20A. NEMA SIZE 1 MOTOR STARTER. 120V CONTROL VOLTAGE.

PANELBOARD ID : SERVICE ENTRANCE PANELBOARD A

VOLTAGE : 480 / 277 V		LOCATION : ON UNISTRUT	
PHASE / WIRE : 3 PHASE, 4 WIRE		ENCLOSURE : NEMA 4X STAINLESS STEEL	
RATED AMPERAGE :	125 AMPS.	MOUNTING : SURFACE	
MAIN :	125 M.C.B.		
A.I.C. (RMS SYM. AMPS.) :	22 kA		

CKT. #	LOAD DESCRIPTION	CKT. VA	BREAKER		PHASE LOADS VA			BREAKER		CKT. VA	LOAD DESCRIPTION	CKT. #
			AMPS.	P	A	B	C	P	AMPS.			
1	UPPER POND GATE	550	15	3	1100	-	-	3	15	550	LOWER POND GATE	2
3		550			-	1100	-			550		4
5		550			-	-	1100			550		6
7	RECIRC PUMP	2220	20	3	4220	-	-	2	25	2000	PANELBOARD B	8
9		2220			-	3220	-			1000	VIA TRANSFORMER	10
11		2220			-	-	2220			1	20	0
13	WATER FALL PUMP	2220	20	3	2220	-	-	1	20	0	SPARE	14
15		2220			-	2220	-	1	20	0	SPARE	16
17		2220			-	-	2220	1	20	0	SPARE	18
19	SPARE	0	20	1	0	-	-	1	20	0	SPARE	20
21	SPARE	0	20	1	-	0	-	1	20	0	SPARE	22
23	SPARE	0	20	1	-	-	0	1	20	0	SPARE	24
25	SPARE	0	20	1	0	-	-	3	20	0	SURGE PROTECTION DEVICE	26
27	SPARE	0	20	1	-	0	-			0		28
29	SPARE	0	20	1	-	-	0			0		30
					7540	6540	5540					

TOTAL CONNECTED KVA : 19.6
TOTAL CONNECTED AMPERES : 23.6

TOTAL DEMAND KVA : 19.6
TOTAL DEMAND AMPERES : 23.6

PANELBOARD ID : PANELBOARD B

VOLTAGE : 120 / 240 V		LOCATION : ON UNISTRUT	
PHASE / WIRE : 1 PHASE, 3 WIRE		ENCLOSURE : NEMA 4X STAINLESS STEEL	
RATED AMPERAGE :	125 AMPS.	MOUNTING : SURFACE	
MAIN :	50 M.C.B.		
A.I.C. (RMS SYM. AMPS.) :	14 kA		

CKT. #	LOAD DESCRIPTION	CKT. VA	BREAKER		PHASE LOADS VA		BREAKER		CKT. VA	LOAD DESCRIPTION	CKT.. #
			AMPS.	P	A	B	P	AMPS.			
1	120V RECEPT	1000	20	1	2000	-	1	20	1000	CMAC CONTROL PANEL UP	2
3	WALKWAY LIGHTING	1000	20	1	-	2000	1	20	1000	CMAC CONTROL PANEL LP	4
5	SPARE	0	20	1	0	-	1	20	0	SPARE	6
7	SPARE	0	20	1	-	0	1	20	0	SPARE	8
9	SPARE	0	20	1	0	-	1	20	0	SPARE	10
11	SPARE	0	20	1	-	0	1	20	0	SPARE	12
13	SPARE	0	20	1	0	-	1	20	0	SPARE	14
15	SPARE	0	20	1	-	0	1	20	0	SPARE	16
17	SPARE	0	20	1	0	-	1	20	0	SPARE	18
19	SPARE	0	20	1	-	0	1	20	0	SPARE	20
21	SPARE	0	20	1	0	-	1	20	0	SPARE	22
23	SPARE	0	20	1	-	0	1	20	0	SPARE	24
25	SPARE	0	20	1	0	-	1	20	0	SPARE	26
27	SPARE	0	20	1	-	0	2	20	0	SURGE PROTECTION DEVICE	28
29	SPARE	0	20	1	0	-			0		
					2000	2000					

TOTAL DEMAND KVA : 4.0
TOTAL DEMAND AMPERES : 17.7

PROFESSIONAL ENGINEER SEAL

KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT



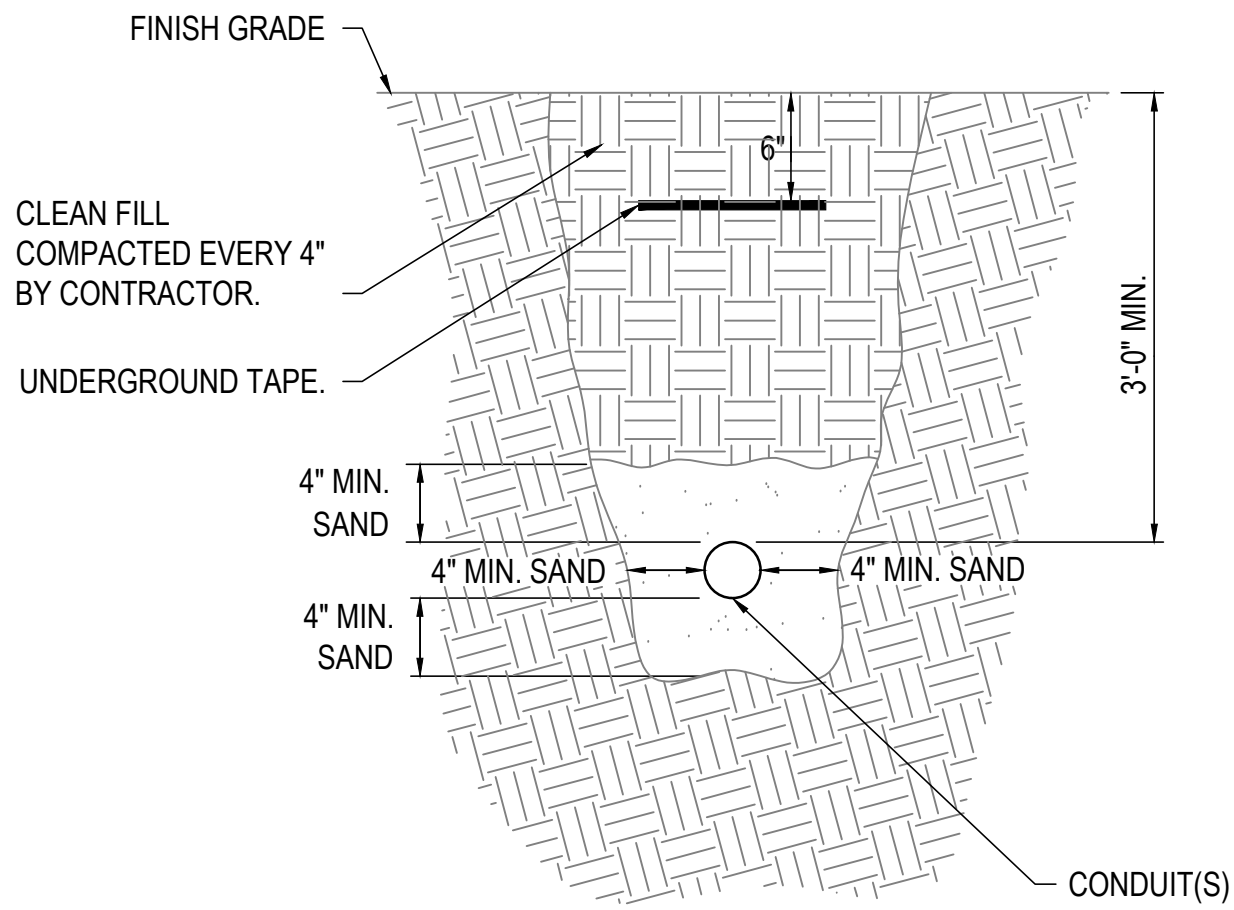
GREEN INFRASTRUCTURE 1-2:
PASEO GATEWAY/KCU
THE PASEO & INDEPENDENCE
AVENUE

KANSAS CITY,
JACKSON COUNTY, MISSOURI

ONE LINE DIAGRAM &
PANELBOARD SCHEDULES

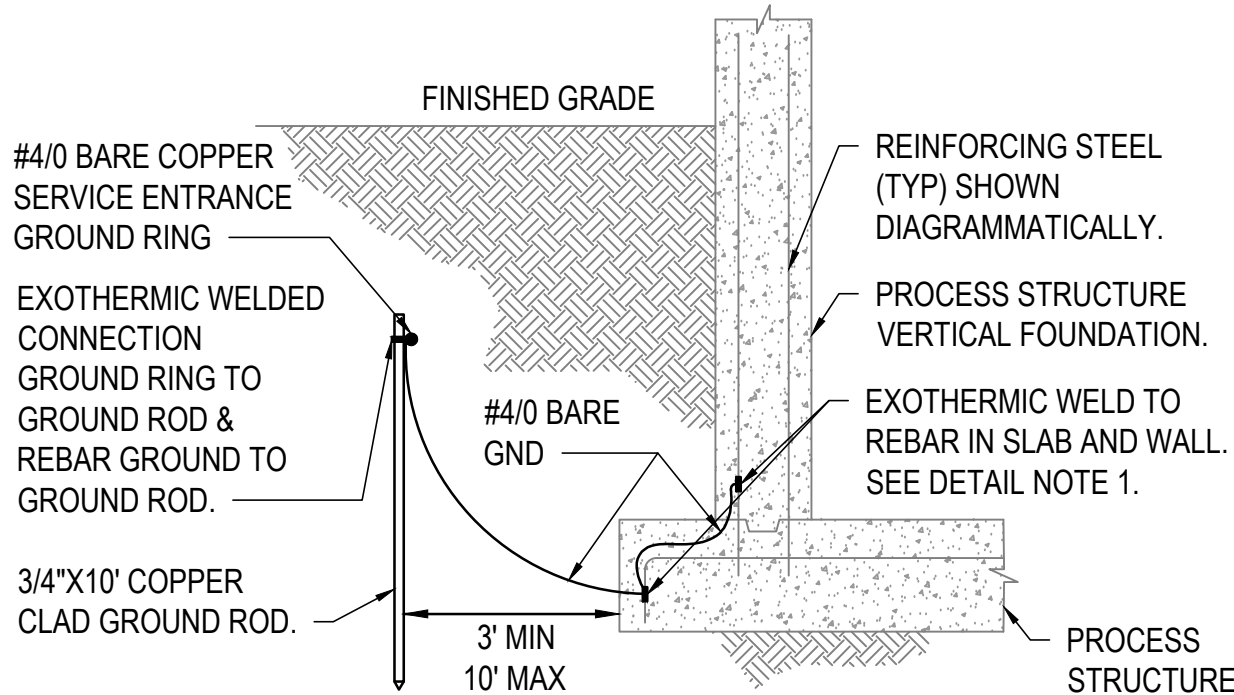
DRAWN BY R.A.L.	CHECKED BY C.K.B.	DATE SUBMITTED 04/12/2024	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO. DPS 1650 ECN 1689	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975		SHEET E-301		26 OF 52	

REV	DATE	DESCRIPTION
3	05/23/24	ADDITIONAL CMAC RE-DESIGN



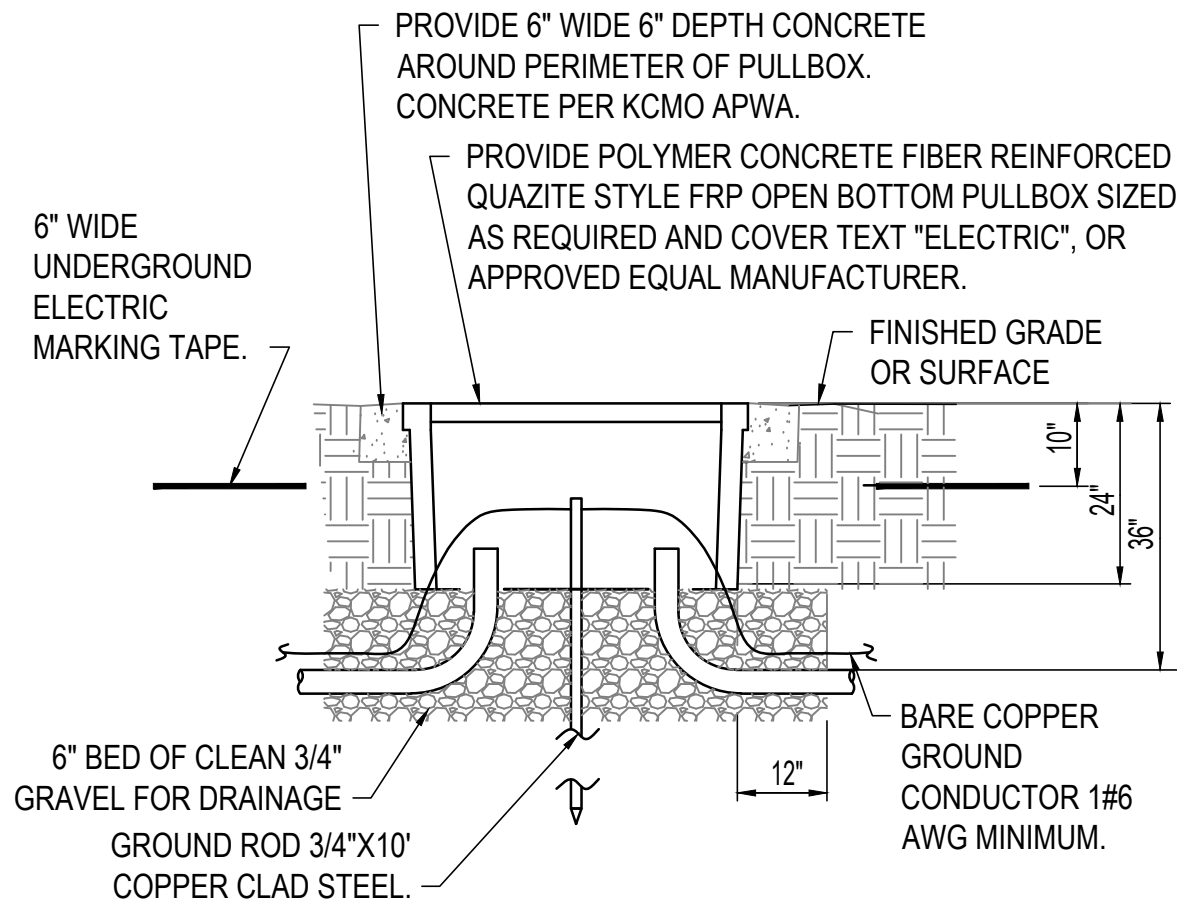
1 UNDERGROUND CONDUIT TRENCH DETAIL
NOT TO SCALE

- DETAIL 1 NOTES:
- ALL CONDUIT AND ACCESSORIES SHALL MEET ELECTRICAL GRADE SPECIFICATIONS.
 - ALL SERVICE ENTRANCE WIRING SHALL BE COMPLETE AND ALL NECESSARY EXCAVATION AND CONDUIT READY PRIOR TO THE TIME OF INSTALLATION OF THE UNDERGROUND SERVICE LATERAL CONDUCTORS BY THE UTILITY CO.
 - ALL WIRING AND MATERIALS MUST CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE AND TO APPLICABLE LOCAL CODES. WHERE CONFLICT EXISTS, THE MORE STRINGENT CODE WILL APPLY.
 - REFER TO PLANS FOR ACTUAL QUANTITY AND SIZE OF CONDUITS REQUIRED.



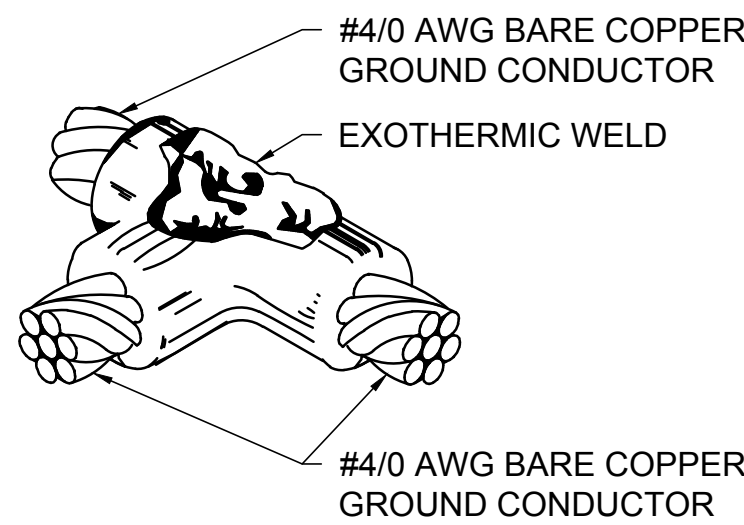
5 GROUND RING AND REBAR BONDING DETAIL
NOT TO SCALE

- DETAIL 4 NOTES:
- BOND REBAR VIA EXOTHERMIC WELD USING #4/0 AWG BARE GROUND BETWEEN VERTICAL AND HORIZONTAL SECTIONS, CONSTRUCTION JOINTS, EXPANSION JOINTS AND ISOLATION JOINTS INCLUDING GROUND RING AND THE TOP SLAB.

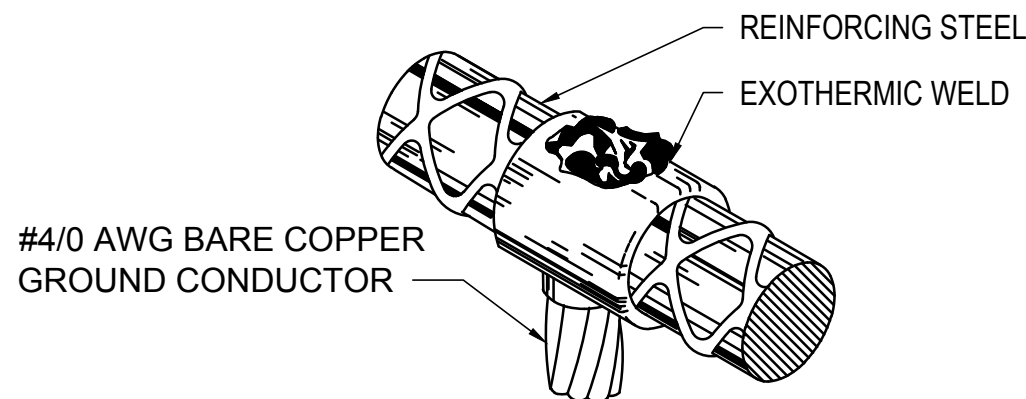


2 FLUSH MOUNTED PULL BOX ELEVATION
NOT TO SCALE

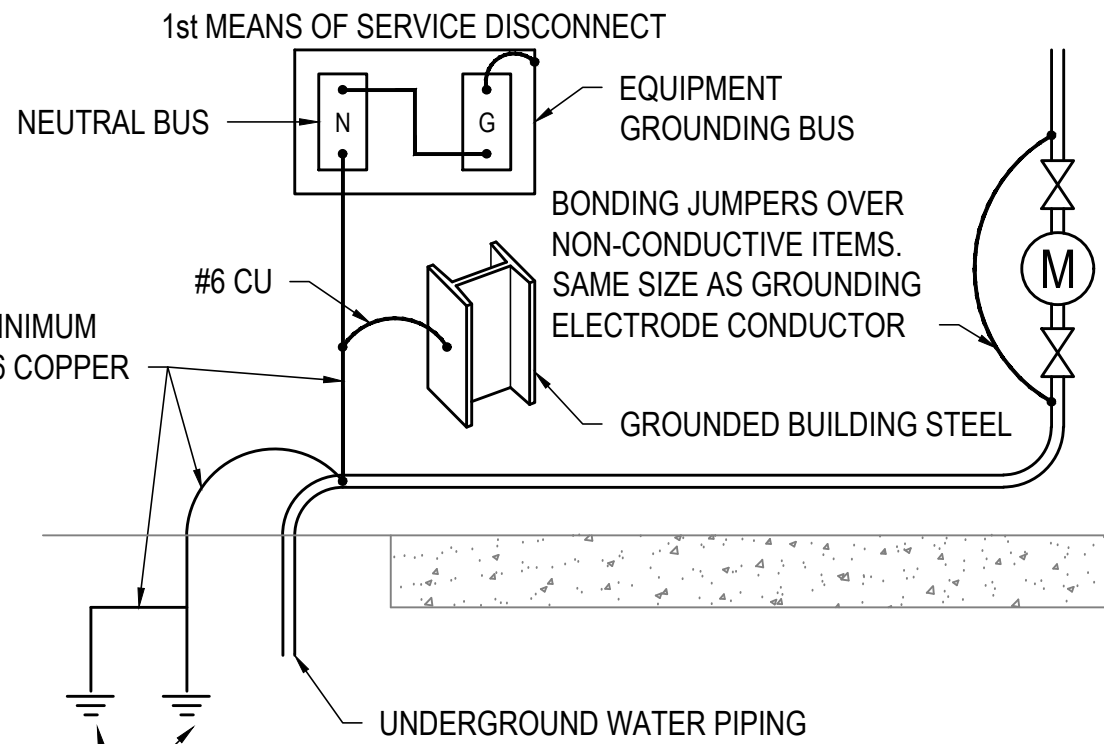
- DETAIL 2 NOTES:
- PROVIDE ANSI TIER 8 RATED PULLBOX FOR GRASS AREAS.
 - PROVIDE ANSI TIER 22 RATED PULLBOX FOR DIRVEWAY, PARKING LOT AND OTHER PAVED OR CONCRETE FINISHED LOCATIONS.
 - CONDUIT SIZE AND QUANTITIES AS INDICATED ON PLANS.
 - CONNECT GROUND CONDUCTOR TO GROUND ROD WITH UL LISTED CLAMP.
 - PROVIDE STAINLESS STEEL HEX HEAD BOLTS AND 4 WASHERS TO FASTEN COVER TO PULL BOX.



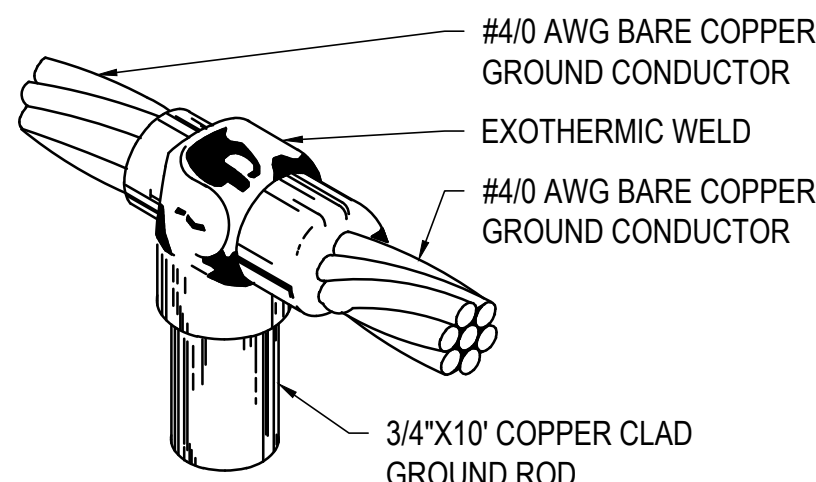
6 TYPICAL EXOTHERMIC WELD-TEE CONNECTION
NOT TO SCALE



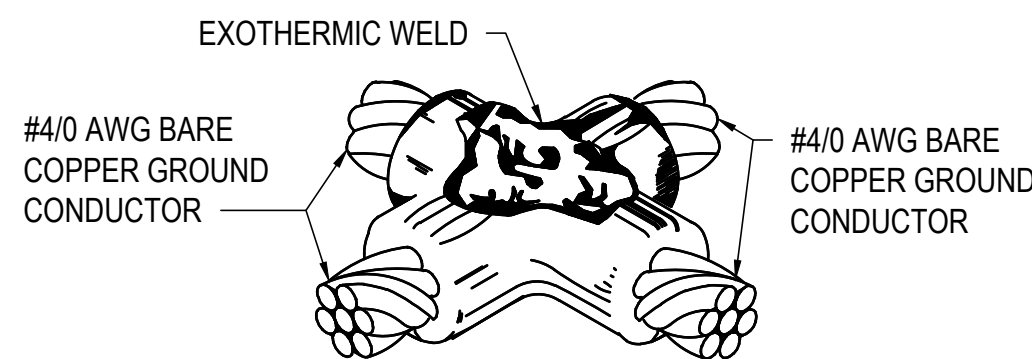
8 TYP. EXOTHERMIC WELD TO REBAR CONNECTION
NOT TO SCALE



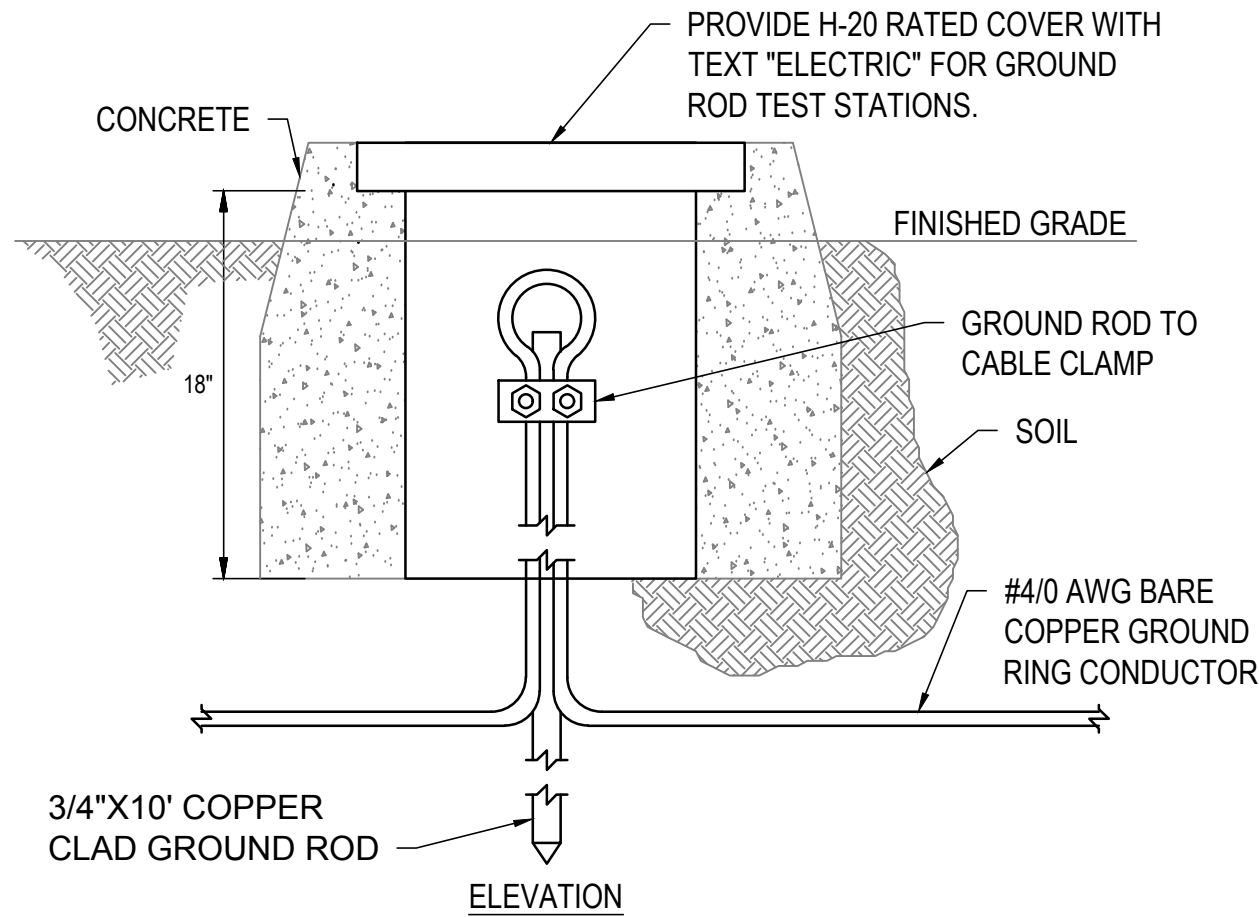
3 SERVICE GROUNDING DETAIL
(BOND TO ALL THAT ARE AVAILABLE)
NOT TO SCALE



7 TYPICAL EXOTHERMIC WELD-TO REBAR CONNECTION
NOT TO SCALE



9 TYP. EXOTHERMIC WELD CROSS CONNECTION
NOT TO SCALE



10 TYPICAL GROUND ROD TEST STATION
NOT TO SCALE

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PROFESSIONAL ENGINEER SEAL



FOR WSD USE:

KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT

GREEN INFRASTRUCTURE 1-2:
PASEO GATEWAY/KCU
THE PASEO & INDEPENDENCE
AVENUE

KANSAS CITY,
JACKSON COUNTY, MISSOURI

ELECTRICAL DETAILS 1

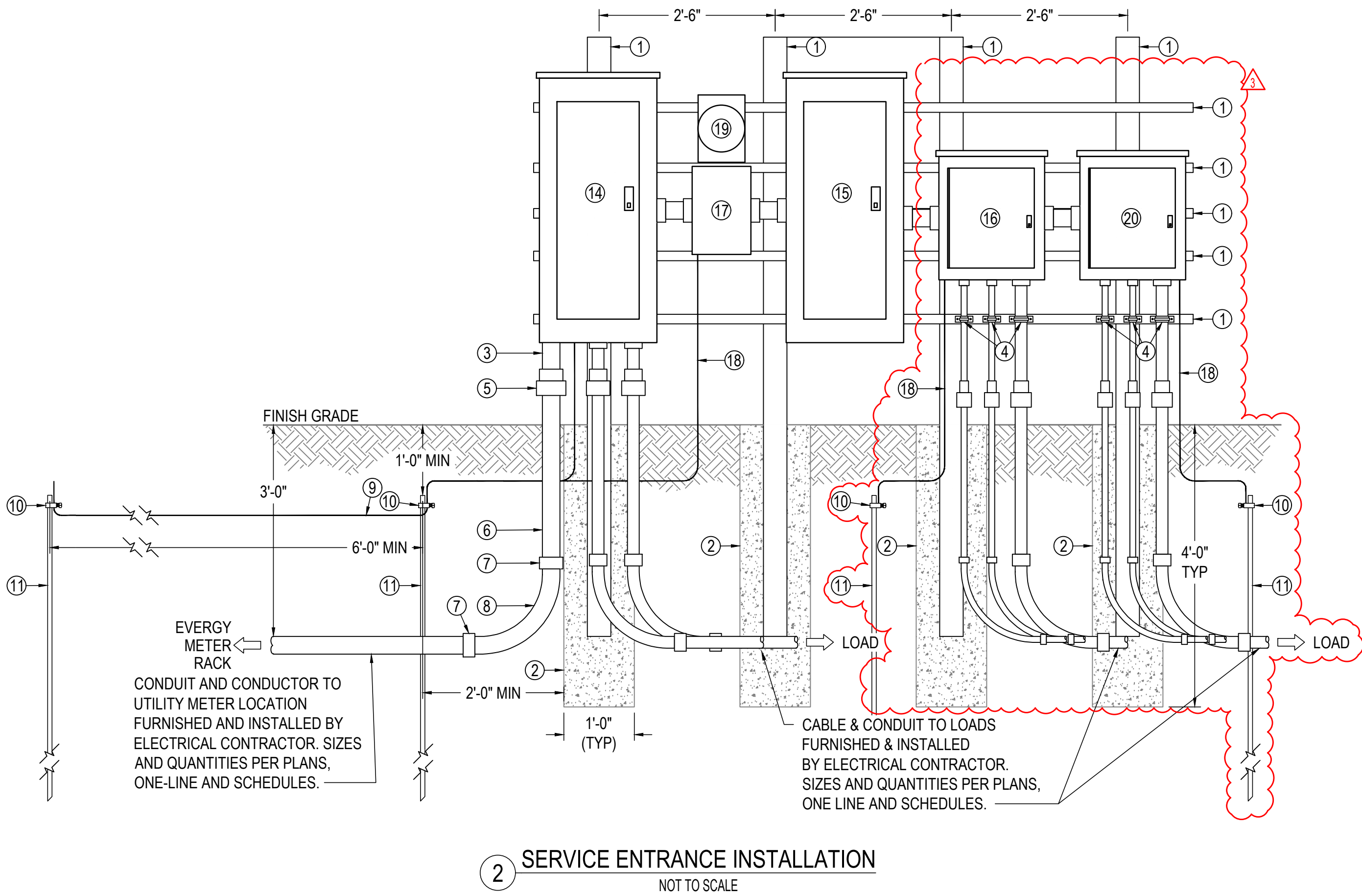
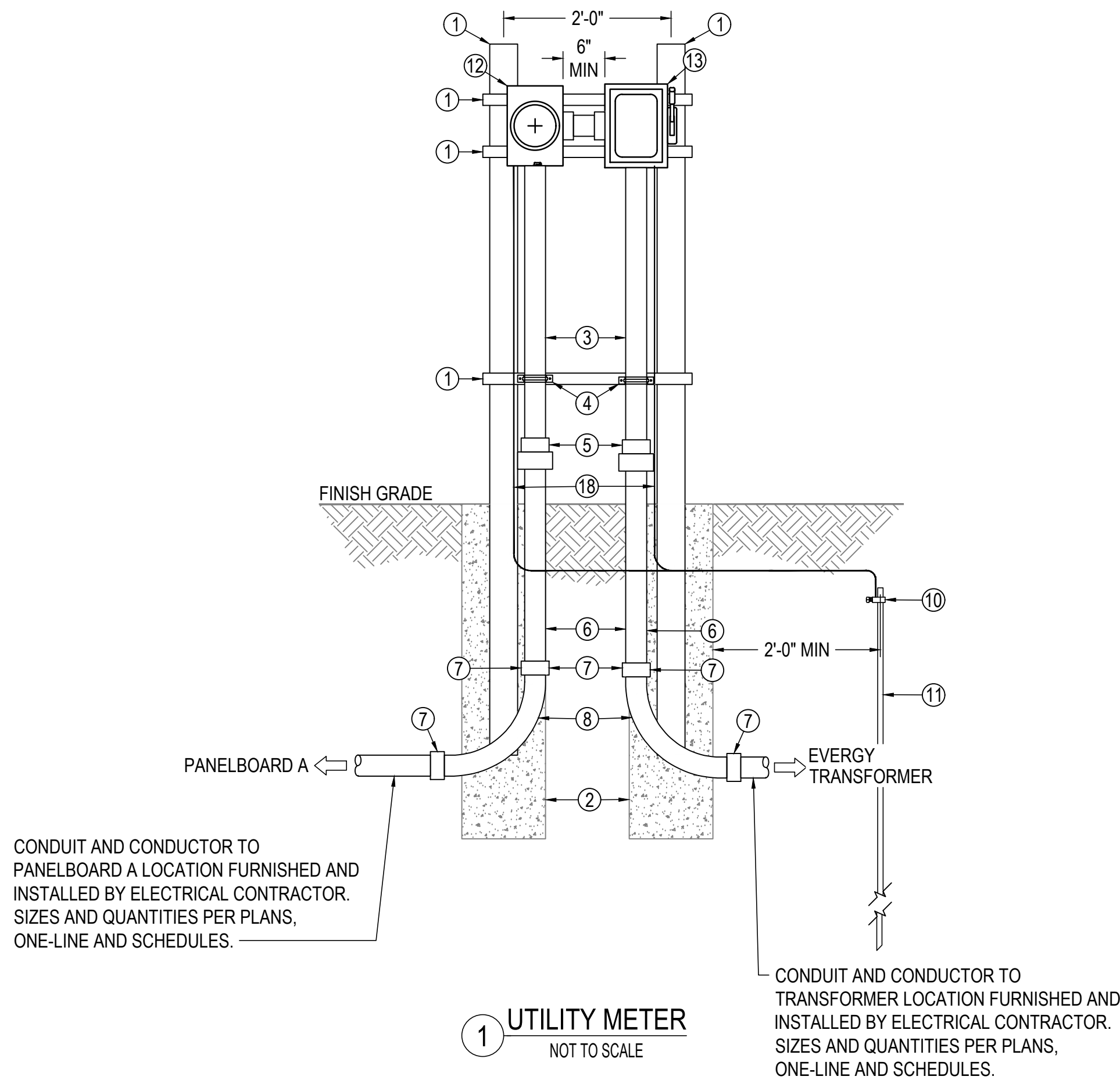
DRAWN BY R.A.L.	CHECKED BY C.K.B.	DATE SUBMITTED 04/12/2024	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO. DPS 1650 ECN 1689	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975	SHEET E-401	27 OF 52			

REV	DATE	DESCRIPTION
3	05/23/24	ADDITIONAL CMAC RE-DESIGN

24 May 2024 RYAN LARKEY 1:2.584895 MO NO & COLOR STB P:\PROJ\2022\A22044 - PASEO GREEN INFRASTRUCTURE KCMO - WSD\CAD\MEP\ELEC\E-402 ELECTRIC DETAILS 2.DWG

GENERAL NOTES

1. SEE SHEET E-001 FOR ELECTRICAL LEGEND, ABBREVIATIONS AND GENERAL REQUIREMENTS.



MATERIALS LIST

① SUPPORT SYSTEM STAINLESS STEEL UNISTRUT.	⑨ GROUND WIRE NO. 6 COPPER (MIN. SIZE) BONDED TO ALL ABOVE GROUND METAL DEVICES BY ELECTRICAL CONTRACTOR AS REQ'D.	⑮ PANELBOARD B REFER TO PANELBOARD A SCHEDULE ON SHEET E-302 FOR REQUIREMENTS.
② CONCRETE BASE CONCRETE PER KCMO APWA REQUIREMENTS.	⑩ GROUND ROD CONNECTORS	⑯ CMAC CONTROL PANEL UP 22"H X 18"W X 10"D NEMA 4X LOCKABLE ENCLOSURE.
③ CONDUIT CONDUIT PER PLAN AND SPECIFICATIONS.	⑪ GROUND RODS (2) MIN. 10'-0" x 3/4" DIAMETER COPPER CLAD	⑰ TRANSFORMER: 10KVA 480V TO 240/120V - REFER TO ONE-LINE DIAGRAM FOR REQUIREMENTS.
④ PIPE STRAPS STAINLESS STEEL.	⑫ METER SOCKET TO BE SECURELY ATTACHED TO MOUNTING RACK BY ELECTRICAL CONTRACTOR	⑱ GROUND WIRE NO. 8 COPPER GROUND WIRE.
⑤ SLIP-JOINT : SEE SIZE ON DETAIL FROST HEAVE PROTECTION INSTALLED ABOVE GRADE	⑬ OUTDOOR DISCONNECT REFER TO ONE-LINE DIAGRAM ON SHEET E-301 FOR REQUIREMENTS.	⑲ PHOTOCELL TIME-CLOCK FOR LIGHTING ON/OFF CONTROL.
⑥ CONDUIT : SEE SIZE ON DETAIL SCHEDULE 40 PVC. BELOW FINISH GRADE.	⑭ PANELBOARD A REFER TO PANELBOARD A SCHEDULE ON SHEET E-302 FOR REQUIREMENTS.	⑳ CMAC CONTROL PANEL LP 22"H X 18"W X 10"D NEMA 4X LOCKABLE ENCLOSURE.
⑦ ADAPTER		
⑧ 90° SWEEP		

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KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT

GREEN INFRASTRUCTURE 1-2:
PASEO GATEWAY/KCU
THE PASEO & INDEPENDENCE
AVENUE

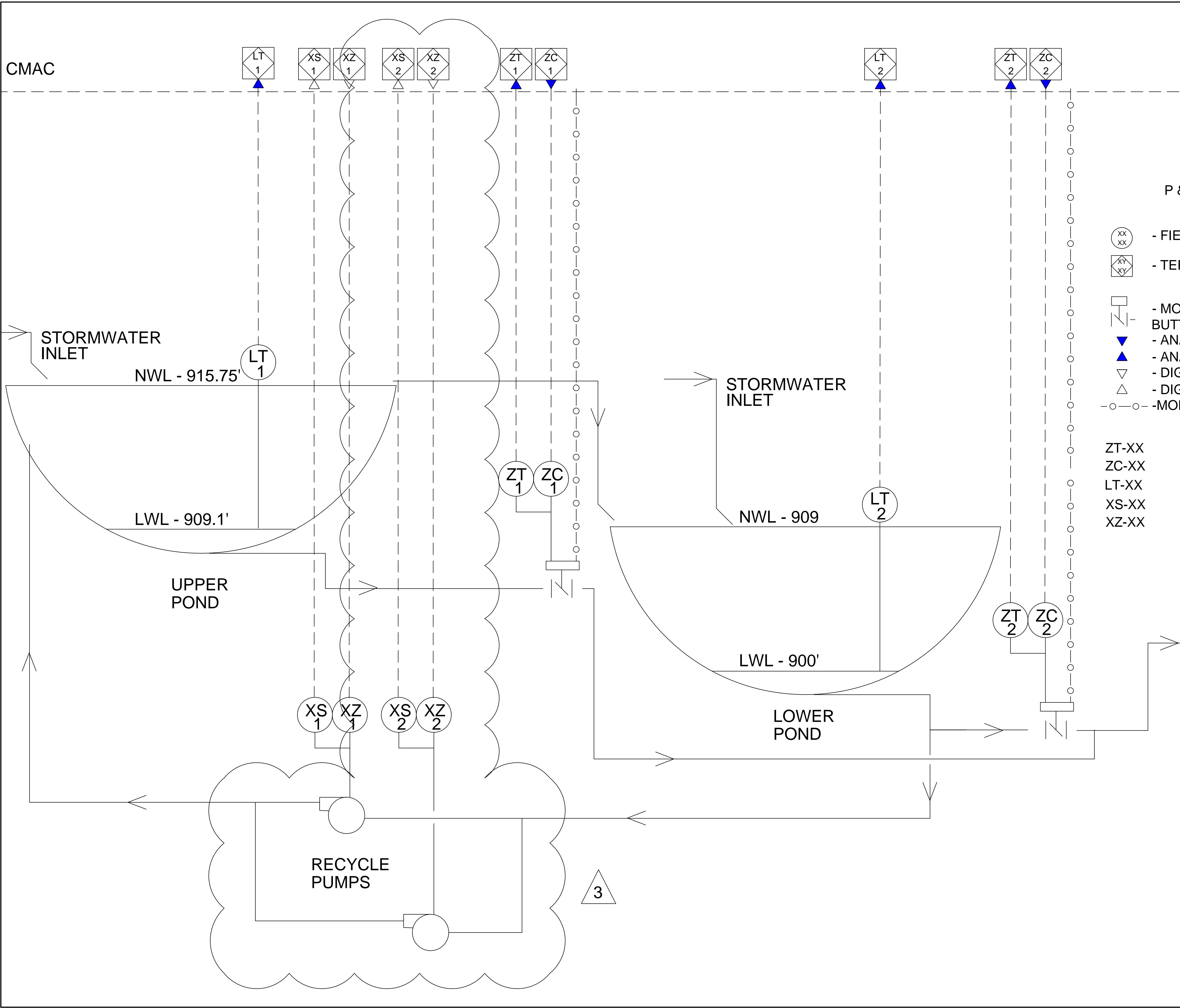
KANSAS CITY,
JACKSON COUNTY, MISSOURI

ELECTRICAL DETAILS 2

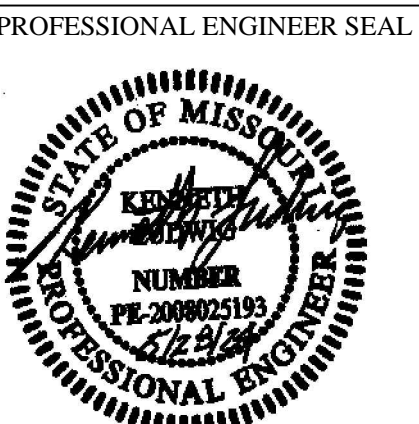
DRAWN BY R.A.L.	CHECKED BY C.K.B.	DATE SUBMITTED 04/12/2024	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO DPS 1650 CCN 1689	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975	SHEET E-402	28 OF 52			

REV	DATE	DESCRIPTION
3	05/23/24	ADDITIONAL CMAC RE-DESIGN

Z:\PROJECTS DWGS\WALTER P MOORE\A22044 - PASEO GREEN INFRASTRUCTURE KCMO\MACI DWGS\&C001 P&ID.DWG
1:1.043
XPMUSER
28 May 2024



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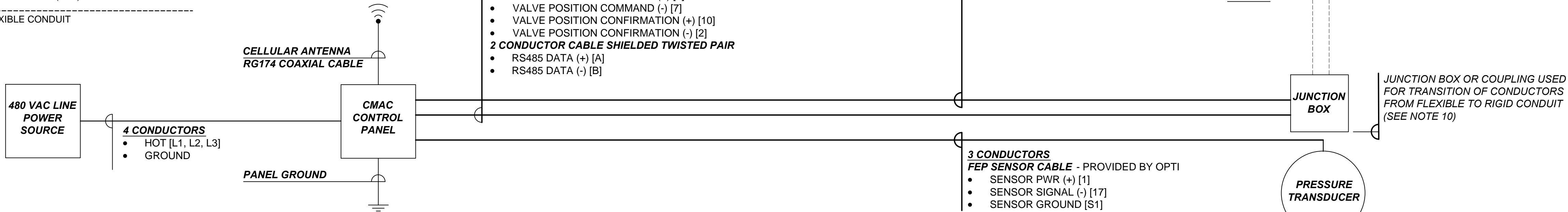
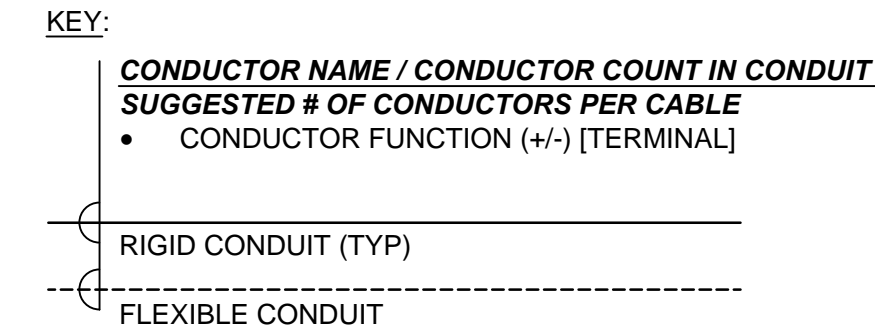


KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT

KANSAS CITY,
JACKSON COUNTY, MISSOURI

P&ID

DRAWN BY SM	CHECKED BY KL	DATE SUBMITTED 05/28/24	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO DPS 1050 CCN 1689	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975	SHEET 1&C-001	SHEET 31 OF 52			



120VAC WIRING GUIDE - V 2.0.4				
CONTROL PANEL TERMINAL	EXTERNAL DEVICE TERMINAL	WIRE COLOR/CABLE LOCATION	PURPOSE	PROCURED BY
LINE POWER CONNECTION				
L1, L2, L3	-----	-----	480 VAC HOT, LINE POWER	-----
GROUNDING NUT	-----	-----	GROUND, LINE POWER	-----
ACTUATOR - ROTORK IQT SERIES 393M2000				
4	2	4 CONDUCTOR CABLE	480 VAC HOT, ACTUATOR POWER	CONTRACTOR
GROUND LUG	GND SYMBOL	3 CONDUCTOR CABLE	GROUND, ACTUATOR POWER	CONTRACTOR
5	26	4 CONDUCTOR CABLE	VALVE POSITION COMMAND SIGNAL (+)	CONTRACTOR
7	27	4 CONDUCTOR CABLE	VALVE POSITION COMMAND SIGNAL (-)	CONTRACTOR
10	22	4 CONDUCTOR CABLE	VALVE POSITION CONFIRMATION SIGNAL (+)	CONTRACTOR
2	23	4 CONDUCTOR CABLE	VALVE POSITION CONFIRMATION SIGNAL (-)	CONTRACTOR
A +	32	2 CONDUCTOR CABLE, SHIELDED TWISTED PAIR	RS485 DATA (+)	CONTRACTOR
B -	28	2 CONDUCTOR CABLE, SHIELDED TWISTED PAIR	RS485 DATA (-)	CONTRACTOR
PRESSURE TRANSDUCER (4-20mA) - PMC VL2000 SERIES				
1	-----	RED (+), PMC	PRESSURE TRANSDUCER, POWER	CONTRACTOR (NOTE 15)
17	-----	BLACK (-), PMC	PRESSURE TRANSDUCER, SIGNAL	CONTRACTOR (NOTE 15)
S1	-----	GREEN (GND), PMC	PRESSURE TRANSDUCER, GROUNDING	CONTRACTOR (NOTE 15)

ACTUATOR POWER CABLE AWG SPECIFICATIONS	
ROTORK IQT1000	
WIRE GAUGE	MAX. LENGTH (FT)
8	2449
10	1540
12	969
14	609
16	383
18	241

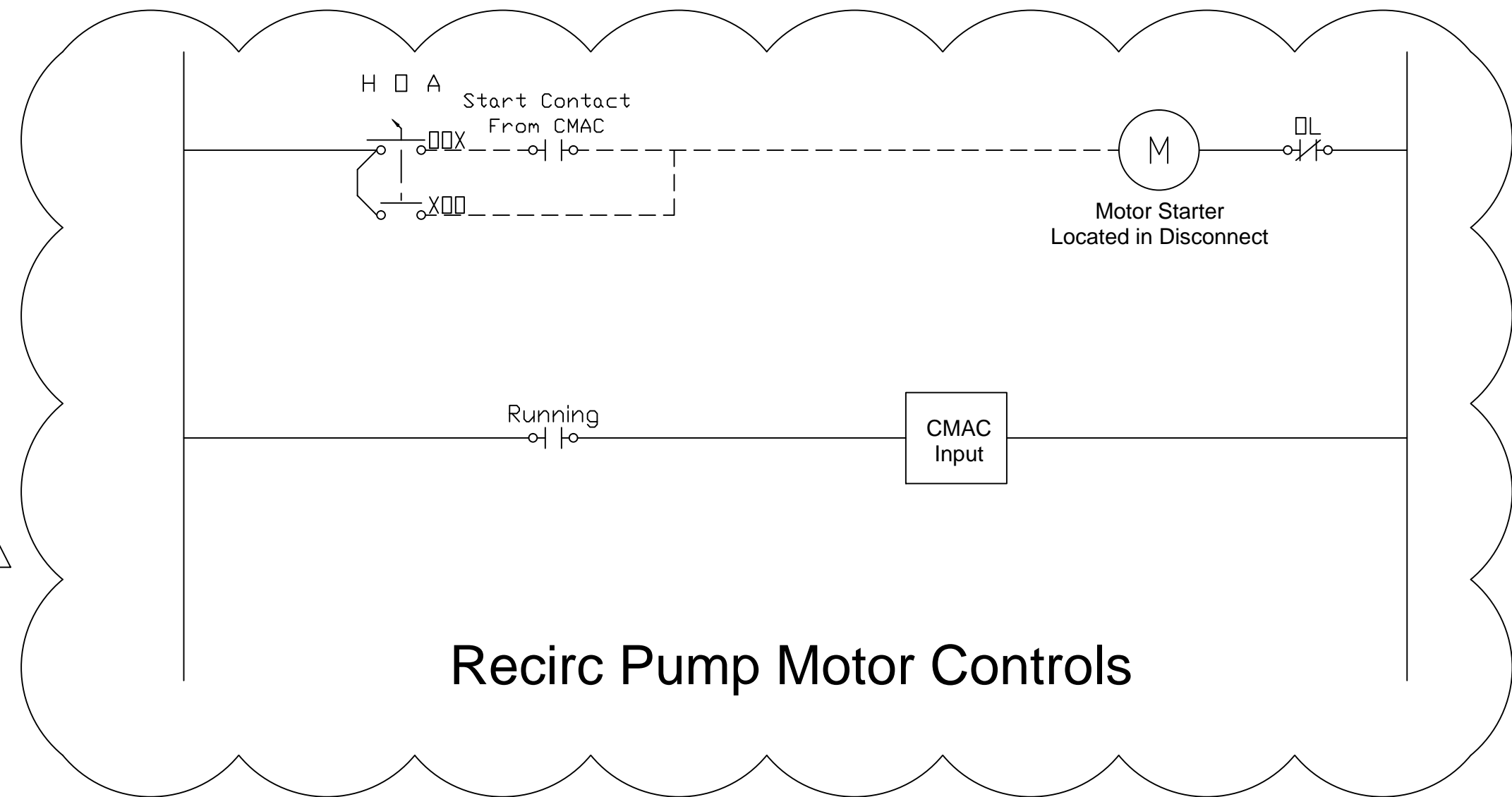
MINIMUM CONDUIT SIZE SPECIFICATIONS	
NO. CONDUCTORS	MIN. CONDUIT SIZE (IN)
2	½
3 - 6	¾
7 - 9	1
10 - 12	1-¼

ELECTRICAL INSTALLATION NOTES

- DETERMINE IF THERE ARE UNDERGROUND UTILITIES IN THE WORK AREA PRIOR TO EXCAVATION, BY CALLING MISSOURI ONE CALL AT LEAST 48 HOURS PRIOR TO STARTING WORK. CONTRACTOR SHALL BE LIABLE FOR ANY DAMAGE TO UNDERGROUND UTILITIES CAUSED BY TRENCHING OR EXCAVATION.
- INSTALLATION OF THE CONTROL PANELS AND ASSOCIATED COMPONENTS (E.G., CABLING, CONDUIT, SENSORS) MUST BE PERFORMED BY A ELECTRICIAN LICENSED IN THE STATE OF MISSOURI. ELECTRICIAN SHALL BE RESPONSIBLE FOR ENSURING THAT THE CONTROL PANELS AND ASSOCIATED COMPONENTS ARE PROPERLY CONNECTED TO THE LINE POWER SOURCE AND THAT CONDUIT AND CABLING IS SIZED AND INSTALLED PER THE NEC.
- ALL CONDUCTORS SHALL BE IDENTIFIED AT EACH END (LABELED OR COLOR CODED) AND THE IDENTIFIED CONDUCTORS DOCUMENTED IN THE SITE LAYOUT MAP.
- PENETRATIONS INTO CONTROL PANELS MUST BE IP68 RATED (NO WATER SHALL PENETRATE ANY SEALS). SUBSURFACE TERMINATIONS SHALL BE SEALED WITH POLYWATER CLOSED-CELL FOAM DUCT SEALANT (PROCURED THROUGH CMAC WITH CONTROL PANELS).
- REFERENCE "ACTUATOR POWER CABLE AWG SPECIFICATIONS" TABLE FOR THE CORRECT CONDUCTOR GAUGE FOR ACTUATOR POWER CONNECTIONS. ALL OTHER CONDUCTORS MUST BE AT LEAST 16AWG.
- REFER TO RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS SPECIFICATION 260533 FOR CONDUIT MATERIALS AND INSTALLATION REQUIREMENTS.
- CONDUIT SHALL BE SIZED PER THE NEC TO HAVE AN ADEQUATE CROSS-SECTIONAL AREA FOR INSTALLED CABLES. REFERENCE CMAC PROVIDED TABLE FOR MINIMUM CONDUIT SIZE. ACTUATOR HAS ¾" PORTS FOR CONDUIT, USE REDUCING FITTING IF NEEDED.
- LEAVE A MINIMUM OF 1 FOOT SPARE CABLING NEATLY COILED IN CONTROL PANELS FOR FUTURE MAINTENANCE OR SYSTEM MODIFICATIONS.
- LEAVE A MINIMUM 3 FEET LOOP OF FLEXIBLE CONDUIT IN OUTLET STRUCTURE FOR EASE OF FUTURE MAINTENANCE. FLEXIBLE CONDUIT SHALL RUN FROM ACTUATOR TO JUNCTION BOX LOCATED IN OUTLET STRUCTURE. RIGID CONDUIT SHALL RUN FROM JUNCTION BOX TO CMAC CONTROL PANELS.
- ALL SUBMERGED/SATURATED METAL HARDWARE SHALL BE STAINLESS STEEL. ALUMINUM OR STAINLESS STEEL MAY BE USED ABOVEGROUND OR IN DRY LOCATIONS.
- PRESSURE REFERENCE DEVICE (COMPONENT OF LEVEL SENSOR AT CABLE TERMINATION) TO BE LOCATED IN CMAC CONTROL PANELS.
- CONNECT ALL EQUIPMENT GROUNDING CONDUCTORS TO THE CMAC CONTROL PANELS GROUNDING LUGS. GROUND THE CMAC CONTROL PANELS TO A GROUNDING ROD, OR A CONCRETE-ENCASED GROUNDING ELECTRODE.
- AFTER INSTALLATION, COMPLETE CONTRACTOR INSTALLATION CHECKLIST PROVIDED BY CMAC PROVIDER AND PROVIDE PHOTOS OF ALL INSTALLED EQUIPMENT. SEND SIGNED CHECKLIST AND PHOTOS TO CMAC.
- CMAC PROVIDER WILL INSPECT INSTALLED COMPONENTS PRIOR TO ENERGIZING THE SYSTEM. FINAL COMPLETION SHALL BE REACHED WHEN: (1) CONSTRUCTION OF THE SYSTEM PER THE PLANS IS COMPLETE; (2) THE ENGINEER OF RECORD HAS COMPLETED FINAL INSPECTION OF WORK AND ALL NOTED DEFICIENCIES HAVE BEEN CORRECTED TO THE SATISFACTION OF THE ENGINEER OF RECORD, CMAC, AND THE SITE OWNER; AND (3) AS-BUILT DRAWING HAS BEEN PROVIDED OF ALL INSTALLED COMPONENTS IF FINAL INSTALL LOCATIONS HAVE VARIED FROM PLANSET.
- CONTRACTOR SHALL PROCURE EQUIPMENT FROM CMAC PROVIDER.

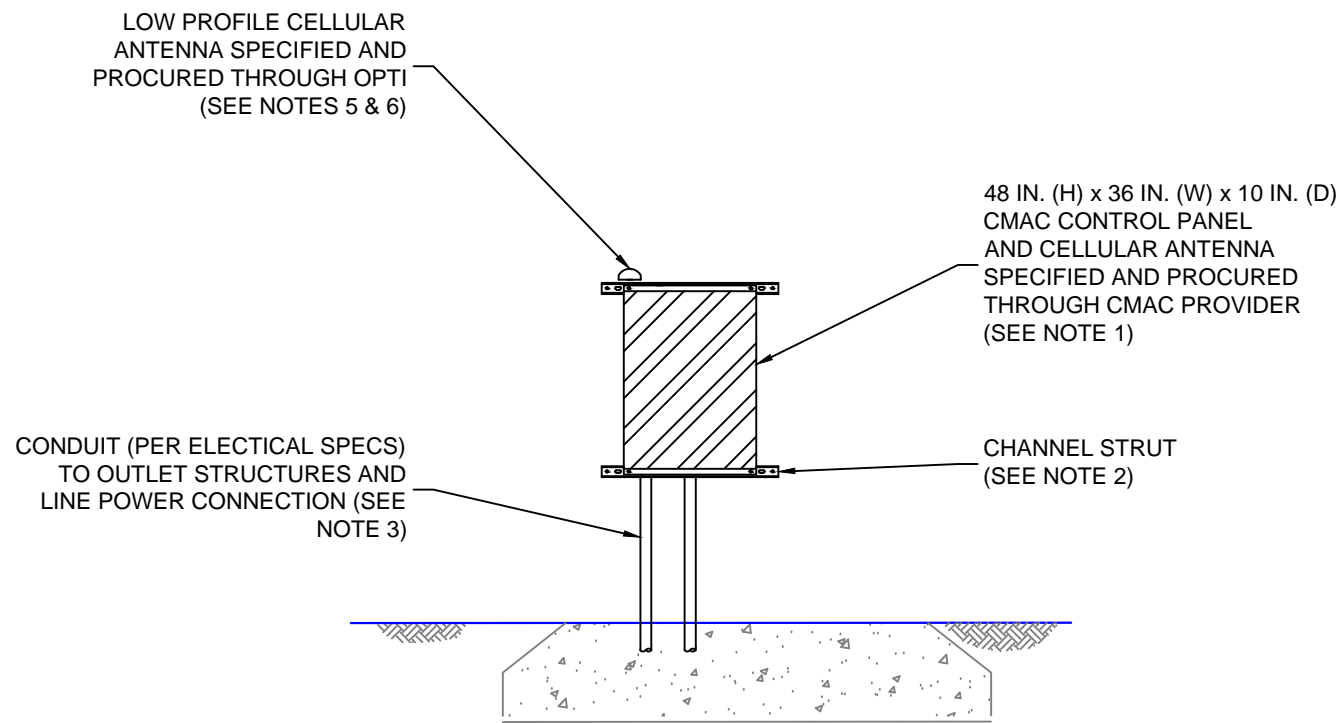
3

3



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PROFESSIONAL ENGINEER SEAL	KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT
	GREEN INFRASTRUCTURE 1-2: PASEO GATEWAY/KCU THE PASEO & INDEPENDENCE AVENUE
FOR WSD USE:	KANSAS CITY, JACKSON COUNTY, MISSOURI
ACTUATOR WIRING DIAGRAM	
DRAWN BY SM	CHECKED BY KL
DATE SUBMITTED 05/21/24	RANGE 33W
TWP 50N	SEC 33
CONTRACTOR	
DATE COMPLETED	
CONTRACT NO. DPS 1650 CCN 1689	CONTRACT DATE 09/18/2022
MAP NO.	WORK ORDER NO.
DRAWING NO. D-1116.06	
PROJECT NO. 81000975	SHEET 1&C-002
SHEET 32 OF 52	

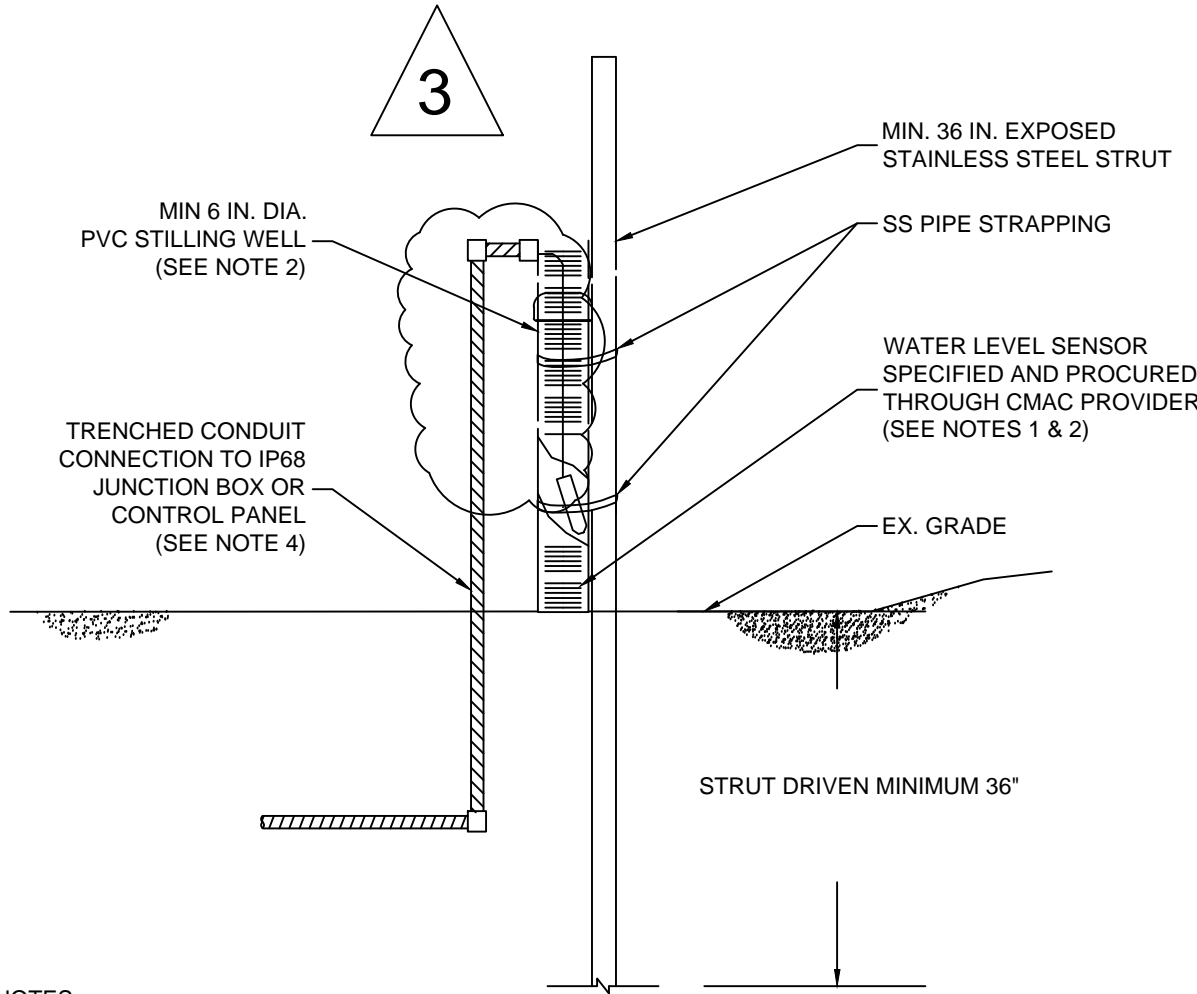


CMAC PANEL MOUNTED ON SERVICE ENTRANCE RACK SEE DETAIL 4 ON E-401 FOR ACTUAL OREINTATION AND MOUNTING. THIS DETAIL INTENDED TO SHOW SPECIFIC CMAC PANEL INSTALLATION REQUIREMENTS.

NOTES:

- CMAC PROVIDER SPECIFIED EQUIPMENT (TO BE PROCURED BY CONTRACTOR FROM CMAC PROVIDER HARDWARE LIST):
 - 48 IN. x 36 IN. x 10 IN. NEMA 4X CABINET WITH CELLULAR ANTENNA AND CHANNEL STRUT MOUNTING CLIPS
 - POLYWATER FOAM DUCT SEALANT (SENT WITH CMAC CONTROL PANELS)
 - MOUNT ON SERVICE ENTRANCE RACK AS SHOW ON E-401
- STAINLESS STEEL CHANNEL STRUT TO BE MOUNTED TO INTERIOR ENCLOSURE WALL. CONTROL PANELS TO BE BOLTED TO CHANNEL STRUT (CHANNEL STRUT MOUNTING CLIP SHIPPED WITH CONTROL PANELS).
- ALL CONDUIT PENETRATIONS ARE TO BE IP68 RATED AND SEALED WITH POLYWATER FOAM DUCT SEALANT. SEE ELECTRICAL DIAGRAM FOR CABLE AND CONDUIT SPECIFICATION.
- ALL EQUIPMENT TO BE GROUNDED TO CONTROL PANEL GROUNDING LUGS. CMAC CONTROL PANELS TO BE GROUNDED TO A GROUNDING ROD, GALVANIZED STEEL POLE, OR CONCRETE-ENCASED GROUNDING ELECTRODE. (SEE ELECTRICAL DIAGRAM)
- THE ANTENNA MUST BE MOUNTED EXTERNAL TO THE MECHANICAL ENCLOSURE. PROVIDE CABLE REQUIRED BETWEEN ANTENNA AND RADIO.
7. 1 IN. HOLE TO BE DRILLED IN MECHANICAL ENCLOSURE TO CONNECT ANTENNA. CONNECTION TO BE SEALED USING THE COMPRESSION FITTING SHIPPED WITH ANTENNA. APPLY SEALANT OR GASKET TO THE FITTING AS NECESSARY TO ENSURE WATERTIGHT CONNECTION.
- MINIMUM 1 FOOT SPARE CABLE TO BE NEATLY COILED IN CONTROL PANELS FOR FUTURE MAINTENANCE OR SYSTEM MODIFICATIONS.
- PROVIDE 2 CMAC PANELS.

CMAC CONTROL PANEL DETAIL
MECHANICAL
ENCLOSURE (LINE
POWER)



NOTES:

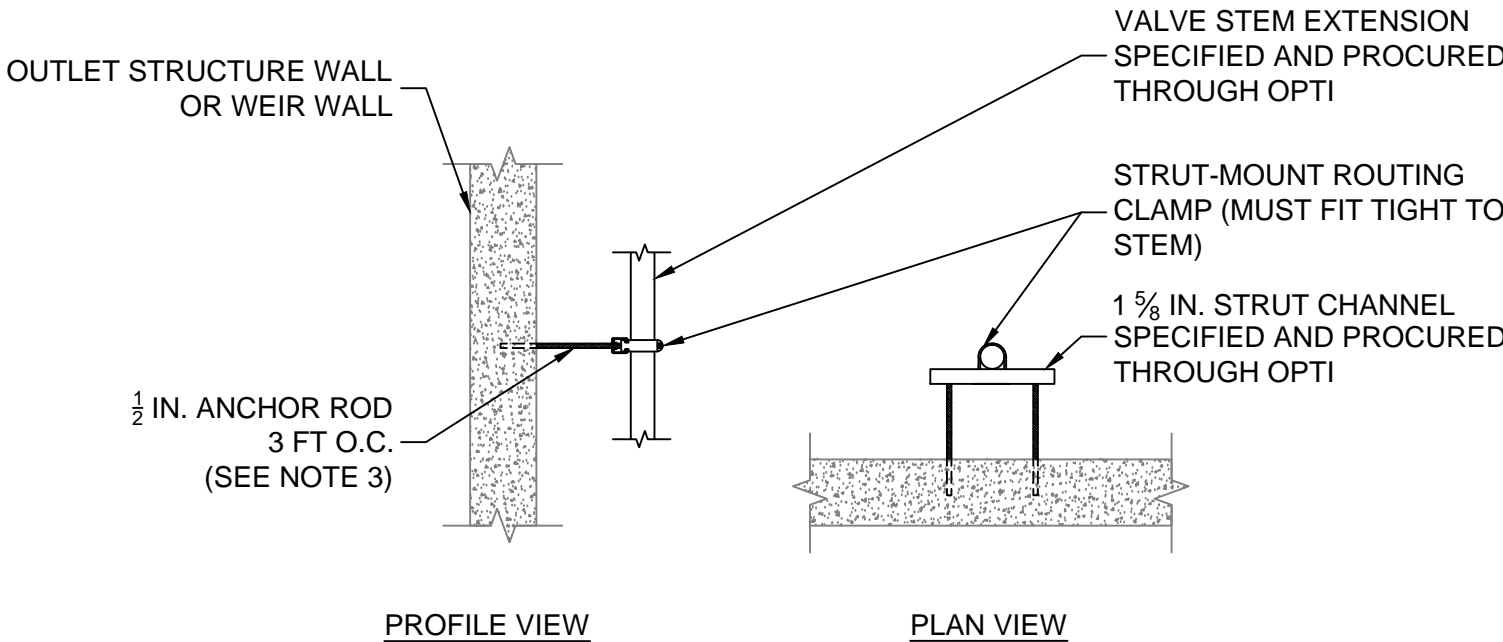
CMAC PROVIDER SPECIFIED EQUIPMENT (TO BE PROCURED BY CONTRACTOR FROM CMAC PROVIDER):

- WATER LEVEL SENSOR
- POLYWATER FOAM DUCT SEALANT (SENT WITH CMAC CONTROL PANEL)

ALL OTHER EQUIPMENT TO BE PROCURED BY INSTALLATION CONTRACTOR.

- WATER LEVEL SENSOR TO REST WITHIN PVC STILLING WELL. SENSOR TO REST AT BOTTOM OF FACILITY OR AT SPECIFIED MINIMUM ELEVATION. STILLING WELL MADE FROM SLOTTED PVC SCREEN, ALTERNATIVE WELL BY CMAC APPROVAL. SCREENING MUST CONTINUE ABOVE GROUND.
- CMAC-SPECIFIED JUNCTION BOX REQUIRED IF CABLE LENGTH EXCEEDS 100 FT. JUNCTION BOX LOCATION TO BE SPECIFIED BY CMAC PROVIDER. BOTTOM OF JUNCTION BOX TO BE MOUNTED AT LEAST 4 IN. ABOVE OVERFLOW ELEVATION.
- PENETRATIONS INTO ALL EQUIPMENT AND CONNECTIONS WITHIN JUNCTION BOXES SHALL BE IP68 RATED AND SEALED WITH POLYWATER FOAM DUCT SEALANT. SEE ELECTRICAL DIAGRAM FOR CABLE AND CONDUIT SPECIFICATION.
- PRESSURE REFERENCE DEVICE TO BE LOCATED IN CMAC CONTROL PANEL. DO NOT SPLICE WATER LEVEL SENSOR CABLE.
- MINIMUM 1 FOOT SPARE CABLE TO BE NEATLY COILED IN CONTROL PANEL FOR FUTURE MAINTENANCE OR SYSTEM MODIFICATIONS.

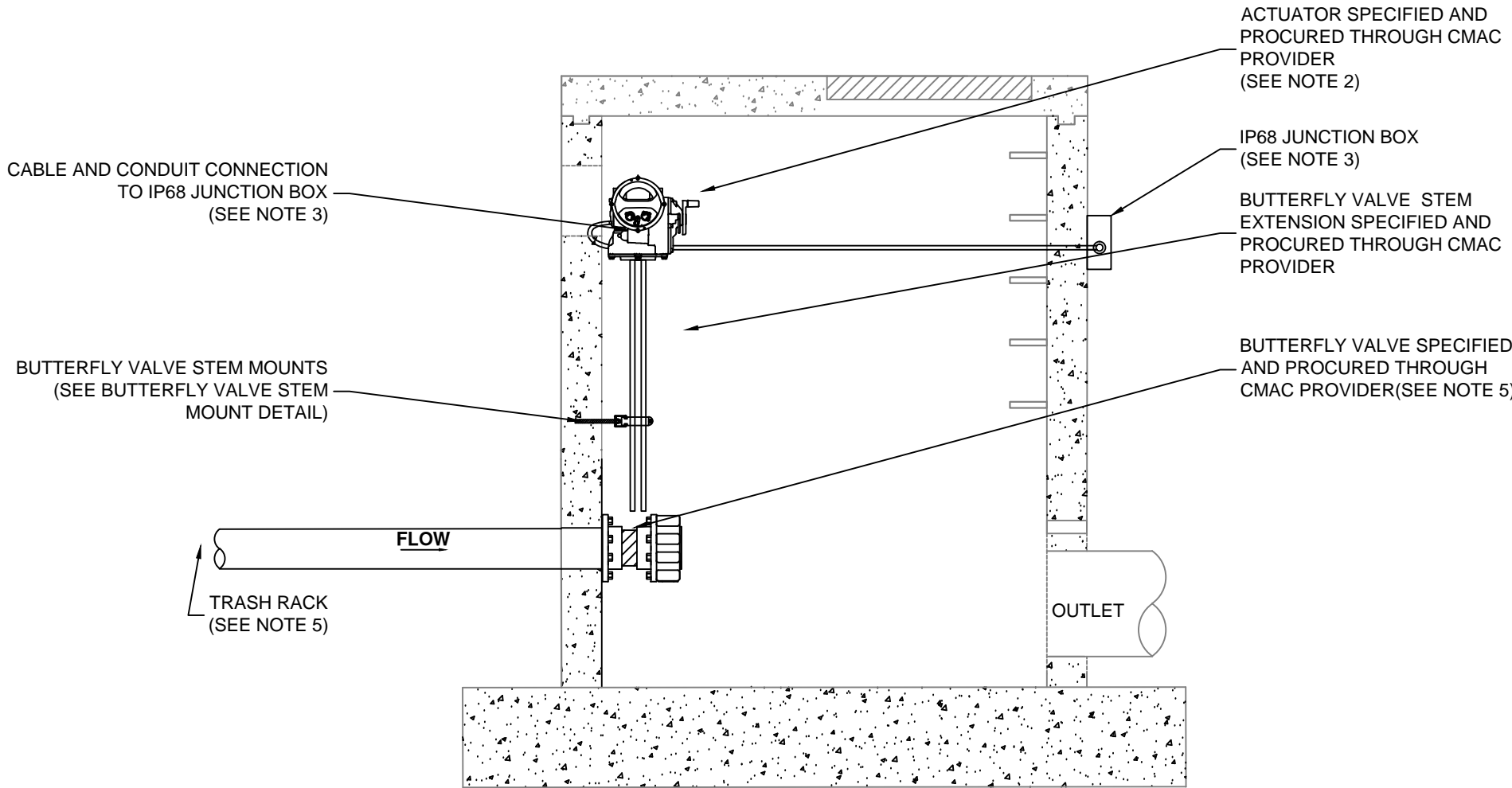
WATER LEVEL SENSOR DETAIL
STRUT-MOUNTED
WATER LEVEL SENSOR



NOTES:

- CMAC PROVIDER SPECIFIED EQUIPMENT (TO BE PROCURED BY CONTRACTOR FROM CMAC PROVIDER):
 - VALVE STEM EXTENSION (DELIVERED WITH VALVE)
 - 12" x 1 1/2 IN. STRUT CHANNEL
 - 18" x 1/2 IN. ANCHOR RODS (2 PER STRUT)
 - STRUT-MOUNT ROUTING CLAMPS (2 PER STRUT)
- ALL BRACKET MATERIALS MUST BE #304 STAINLESS STEEL.
- MINIMUM SPACING: 1 STEM MOUNT FOR STEM LENGTH BELOW 3 FEET. ADD VALVE STEM MOUNTS PER ADDITIONAL 3 FEET OF STEM LENGTH.
- 1/2 IN. ANCHOR ROD TO BE SET USING INJECTABLE ADHESIVE ANCHOR WITH AUTO CLEANING DRILL BIT OR CLEAN HOLE THOROUGHLY WITH COMPRESSED AIR. USE QUIKRETE HIGH STRENGTH ANCHORING EPOXY (PRODUCT #8620-31) OR EQUIVALENT. ROD SET IN CONCRETE MIN 3 IN..

BUTTERFLY VALVE STEM MOUNT DETAIL
WALL MOUNTED



NOTES:

CMAC PROVIDER SPECIFIED EQUIPMENT (TO BE PROCURED BY CONTRACTOR FROM CMAC PROVIDER HARDWARE LIST):


- ACTUATOR, BUTTERFLY VALVE, AND VALVE STEM EXTENSION (DELIVERED PRE-ASSEMBLED ON PALLET)
- POLYWATER FOAM DUCT SEALANT (SENT WITH CMAC CONTROL PANEL)

ALL OTHER EQUIPMENT TO BE PROCURED BY INSTALLATION CONTRACTOR.

- ACTUATOR TO BE ORIENTED WITH WHEEL FACING AWAY FROM WALL. BUTTERFLY VALVE SHALL BE ATTACHED TO THE WALL. CMAC PROVIDER TO PROVIDE ANY SUPPORTS NEEDED FOR ACTUATOR AND STEM.
- JUNCTION BOX LOCATION TO BE SPECIFIED BY CMAC PROVIDER. MOUNT INSIDE THE UPPER POND CONTROL STRUCTURE AND OUTSIDE FOR THE LOWER POND CONTROL STRUCTURE BOTTOM OF JUNCTION BOX TO BE MOUNTED AT LEAST 4 IN. ABOVE OVERFLOW ELEVATION. ALL CONDUIT CONNECTIONS TO BE IP68 RATED AND SEALED WITH POLYWATER FOAM DUCT SEALANT. CONDUIT TO BE SIZED BY CONTRACTOR. ACTUATOR CONDUIT PORT IS 1/2 IN. INTERNAL THREADED. DOWNSIZE CONDUIT IF NEEDED. CONDUIT ALONG WALL TO BE SECURED WITH #304 SS CLIPS (3' SPACING MAXIMUM).
- BUTTERFLY VALVE TO WALL CONNECTION: BOLT CAVITIES TO BE CLEANED OF DEBRIS USING AUTO CLEANING DRILL BIT OR COMPRESSED AIR PRIOR TO ANCHORING. BOLT CAVITIES TO BE FILLED WITH INJECTABLE ADHESIVE ANCHOR (HILTI HIT SERIES EPOXY #2123401 OR EQUIVALENT). BOLTS TO BE EMBEDDED TO MINIMUM DEPTH SPECIFIED BY MANUFACTURER, 1 IN. CLEARANCE FROM REBAR.
- TRASH RACK SPECIFIED BY ENGINEER OF RECORD (OR OTHERS) TO BE PROCURED BY CONTRACTOR. TRASH RACKS ARE REQUIRED PRIOR TO OPERATION OF THE CMAC ACTUATED SLIDE GATE AND SOFTWARE.
- THIS IS A TYPICAL INSTALLATION DETAIL. SEE C-011 FOR ACTUAL LAYOUT FOR BOTH CONTROL STRUCTURES.

ACTUATED BUTTERFLY VALVE DETAIL
WALL IN OUTLET
STRUCTURE

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PROFESSIONAL ENGINEER SEAL		KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT									
		GREEN INFRASTRUCTURE 1-2: PASEO GATEWAY/KCU THE PASEO & INDEPENDENCE AVENUE									
		KANSAS CITY, JACKSON COUNTY, MISSOURI									
		INSTRUMENT INSTALLATION DETAILS									
		FOR WSD USE:									
DRAWN BY SM		CHECKED BY KL		DATE SUBMITTED 05/28/24		RANGE 33W		TWP 50N		SEC 33	
CONTRACTOR						DATE COMPLETED					
CONTRACT NO. DPS 1650 CCN 1689		CONTRACT DATE 09/18/2022		MAP NO.		WORK ORDER NO.		DRAWING NO. D-1116.06			
PROJECT NO. 81000975		SHEET 1&C-003		SHEET 33 OF 52							



KEYNOTE LEGEND

- (A) PCC PAVEMENT
RE: 01/L-201
- (B) FENCE (TO MATCH KCU STANDARD)
RE: 11/L-201
- (C) FENCE ON TOP OF RETAINING WALL
RE: CIVIL
- (D) MAINTENANCE ACCESS GATE
RE: 11/L-201
- (E) PEDESTRIAN BRIDGE
RE: 5/L-202
- (F) NOT USED
- (G) CONCRETE RETAINING WALL WITH FENCE
RE: CIVIL
- (H) EXISTING WEIR WALL
- (I) WOOD DOCK (BID ALTERNATE 1)
RE: 1/L-203
- (J) PEDESTRIAN LIGHT
RE: ELECTRICAL
- (K) FENCE IN CONCRETE FOOTING
RE: 13/L-201
- (L) STORM UTILITY
RE: CIVIL
- (M) 4-6" STONE RIP RAP; RE: CIVIL
- (N) BIRCH WHITE LIMESTONE SLABS
RE: 1/L-107
- (O) 3.0' HT. STAIRS
RE: 06/L-201
- (P) MAINTENANCE ACCESS DRIVE
RE: 9/L-201
- (Q) ADA HANDICAP RAMP WITH HANDRAIL
RE: 7/L-201
- (R) GUARDRAIL: RAIL TO MATCH PED BRIDGE RAIL
RE: 04/L-202
- (S) STEEL EDGING
RE: 07/L-400
- (T) BIRCH WHITE LIMESTONE SLABS AT CONTROL STRUCTURES
RE: 7/L-200
- (U) 4-10" GRAY STONE COBBLE RIPRAP BY HOUSE OF ROCKS OR
APPROVED EQUAL
- (V) ELECTRICAL PANEL; RE: ELECTRICAL PLANS
- (W) DECORATIVE ROCK - PEA GRAVEL; RE: 12/L-201
- (X) TURNDOWN SIDEWALK CURB (HATCHED); RE: CIVIL
- (Y) 4" PERFORATED DRAIN PIPE BEHIND
SLAB WALL; RE: 1/L-107

LEGEND:

- PRAIRIE PLANTINGS
- WATER'S EDGE PLANTING
- WATER'S EDGE PLANTING (SUBMERGED)
- TURF
- CONCRETE PAVING
- CONCRETE SIDEWALK WITH TURNDOWN
CURB, RE: CIVIL
- SERVICE DRIVE PAVING
- POND/WATER SURFACE

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PROFESSIONAL ENGINEER SEAL

KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT



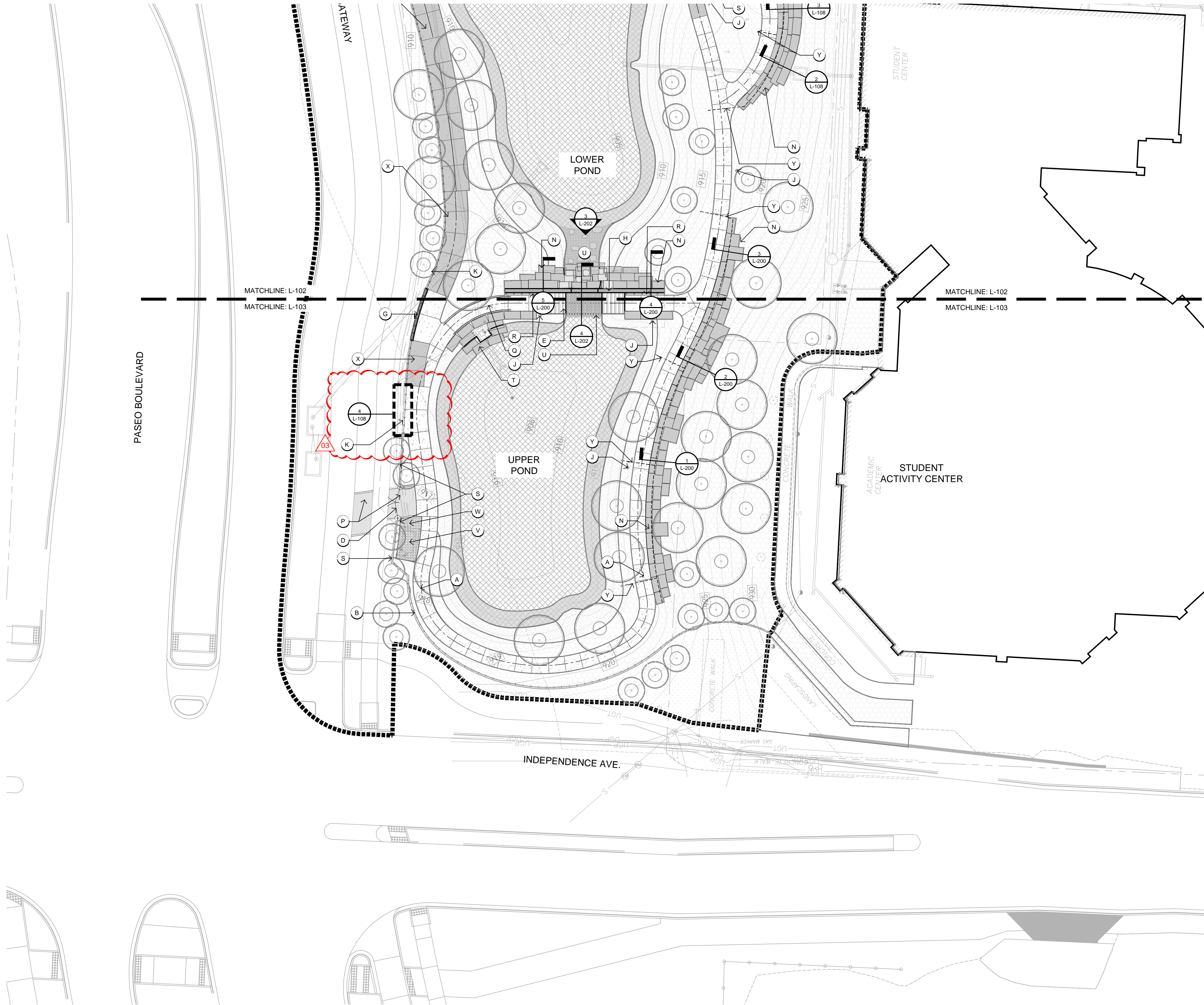
GREEN INFRASTRUCTURE 1-2:
PASEO GATEWAY/KCU
THE PASEO AND INDEPENDENCE
AVENUE

KANSAS CITY,
JACKSON COUNTY, MISSOURI

ISSUE FOR BID
FOR WSD USE:

SITE PLAN
ENLARGEMENT

DRAWN BY AH	CHECKED BY ME	DATE SUBMITTED 04/12/24	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO. DPS 1689 CCR 1689	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975	SHEET NUMBER L-102	SHEET 36 OF 52			



- KEYNOTE LEGEND**
- (A) PCC PAVEMENT
RE: 01/L-201
 - (B) FENCE (TO MATCH KCU STANDARD)
RE: 11/L-201
 - (C) FENCE ON TOP OF RETAINING WALL
RE: CIVIL
 - (D) MAINTENANCE ACCESS GATE
RE: 11/L-201
 - (E) PEDESTRIAN BRIDGE
RE: 5/L-202
 - (F) NOT USED
 - (G) CONCRETE RETAINING WALL WITH FENCE
RE: CIVIL
 - (H) EXISTING WEIR WALL
 - (I) WOOD DOCK (BID ALTERNATE 1)
RE: 1/L-203
 - (J) PEDESTRIAN LIGHT
RE: ELECTRICAL
 - (K) FENCE IN CONCRETE FOOTING
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 - (L) STORM UTILITY
RE: CIVIL
 - (M) 4-6" STONE RIP RAP; RE: CIVIL
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RE: 1/L-107
 - (O) 3.0' HT. STAIRS
RE: 06/L-201
 - (P) MAINTENANCE ACCESS DRIVE
RE: 9/L-201
 - (Q) ADA HANDICAP RAMP WITH HANDRAIL
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RE: 04/L-202
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 - (U) 4-10" GRAY STONE COBBLE RIPRAP BY HOUSE OF ROCKS OR APPROVED EQUAL
 - (V) ELECTRICAL PANEL; RE: ELECTRICAL PLANS
 - (W) DECORATIVE ROCK - PEA GRAVEL; RE: 12/L-201
 - (X) TURNDOWN SIDEWALK CURB (HATCHED); RE: CIVIL
 - (Y) 4" PERFORATED DRAIN PIPE BEHIND SLAB WALL; RE: 1/L-107
- LEGEND:**
- PRAIRIE PLANTINGS
 - WATER'S EDGE PLANTING
 - WATER'S EDGE PLANTING (SUBMERGED)
 - TURF
 - CONCRETE PAVING
 - CONCRETE SIDEWALK WITH TURNDOWN CURB; RE: CIVIL
 - SERVICE DRIVE PAVING
 - POND/WATER SURFACE

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PROFESSIONAL ENGINEER SEAL

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**GREEN INFRASTRUCTURE 1-2:
PASEO GATEWAY/KCU
THE PASEO AND INDEPENDENCE
AVENUE**

**KANSAS CITY,
JACKSON COUNTY, MISSOURI**

**SITE PLAN
ENLARGEMENT**

DRAWN BY AH	CHECKED BY ME	DATE SUBMITTED 04/12/24	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO. DPS 1650 CCN 1689	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975	SHEET NUMBER L-103		SHEET 37 OF 52		

03

PCC PAVEMENT WITH THICKENED
EDGE; RE: 02/L-201

PEA GRAVEL INFILL IN
VOIDS AS NEEDED

18" THICK BIRCH WHITE TOP LEDGE LIMESTONE SLABS,
TYP. SLAB TO SIT 4" ABOVE ADJACENT SIDEWALK

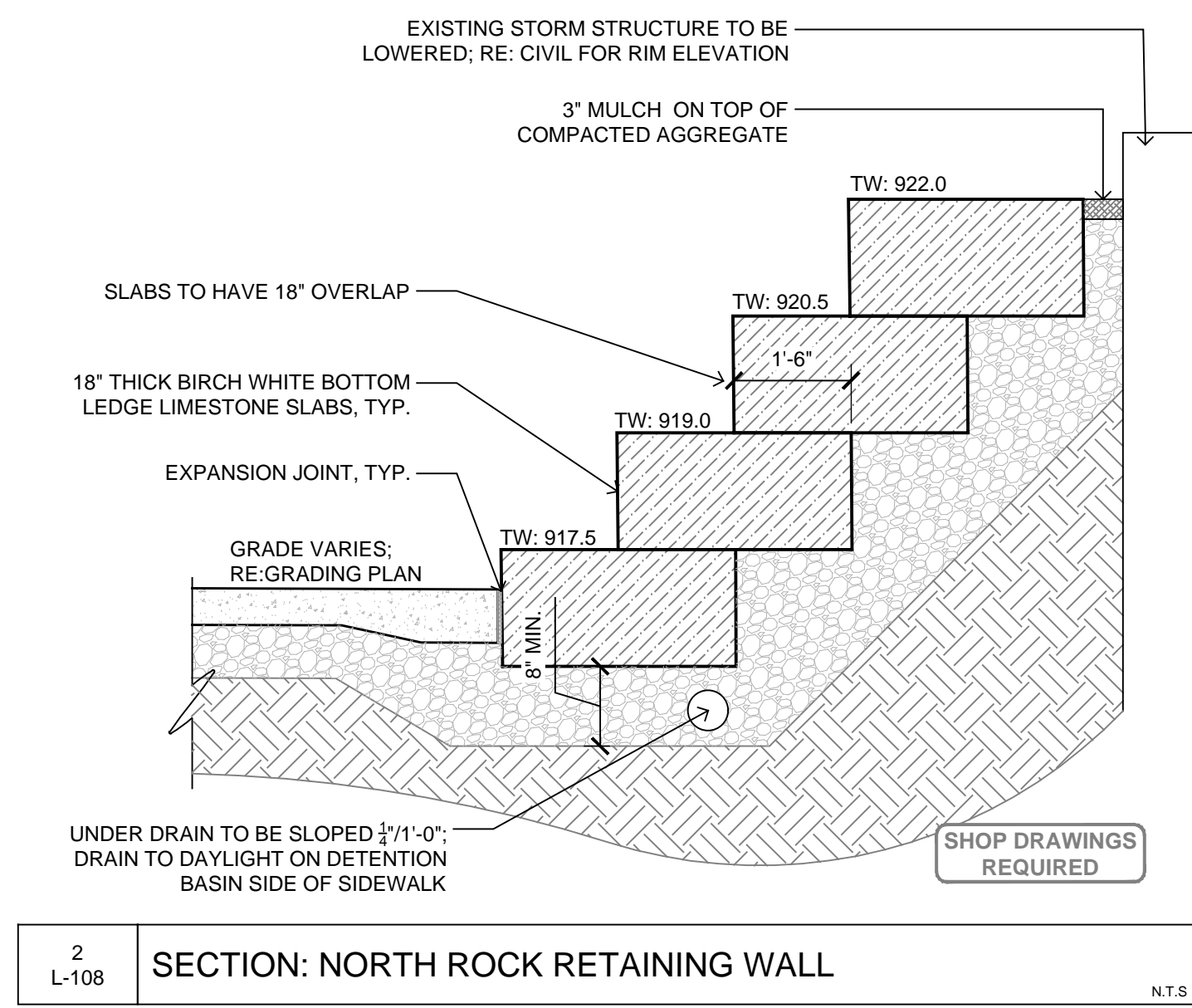
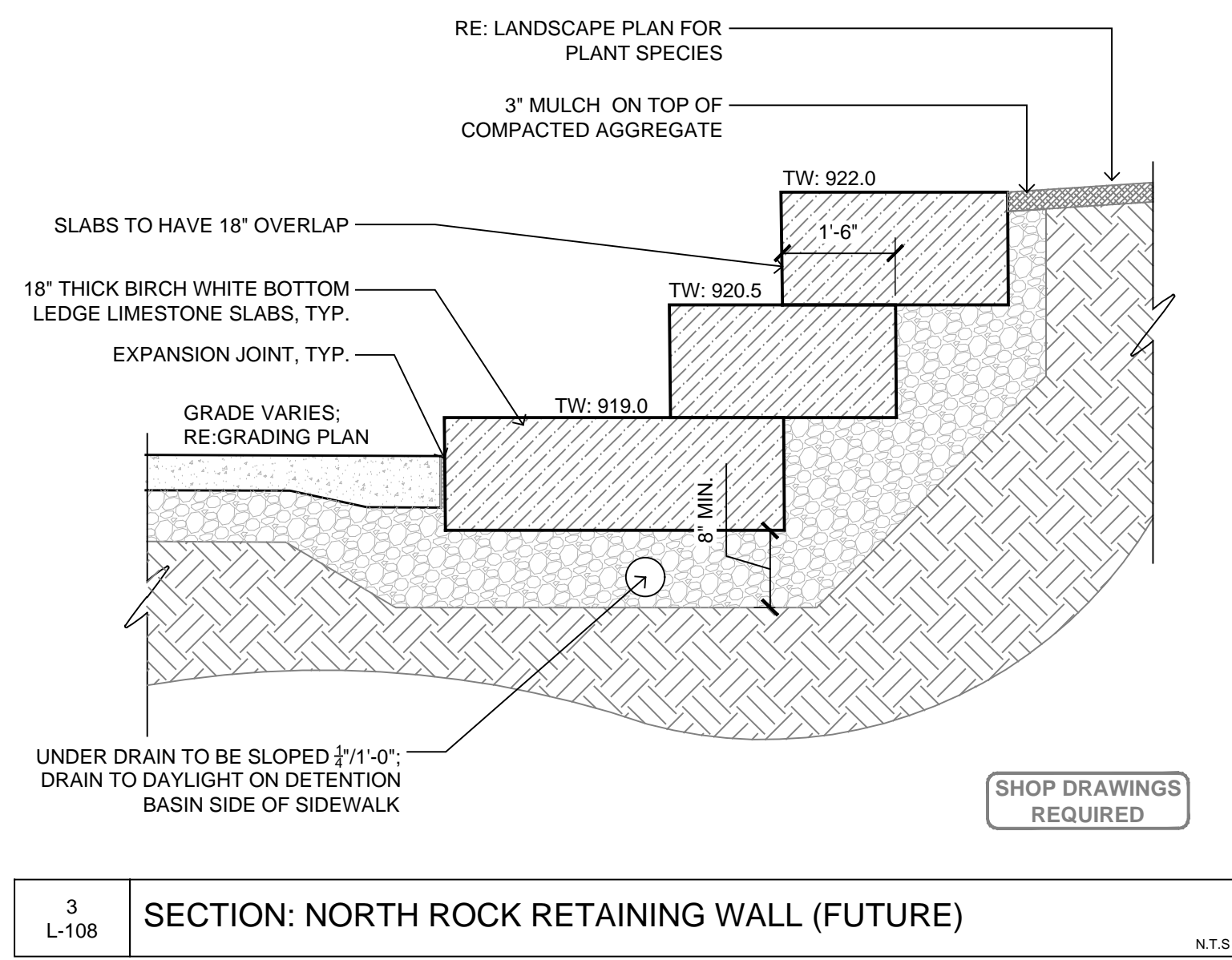
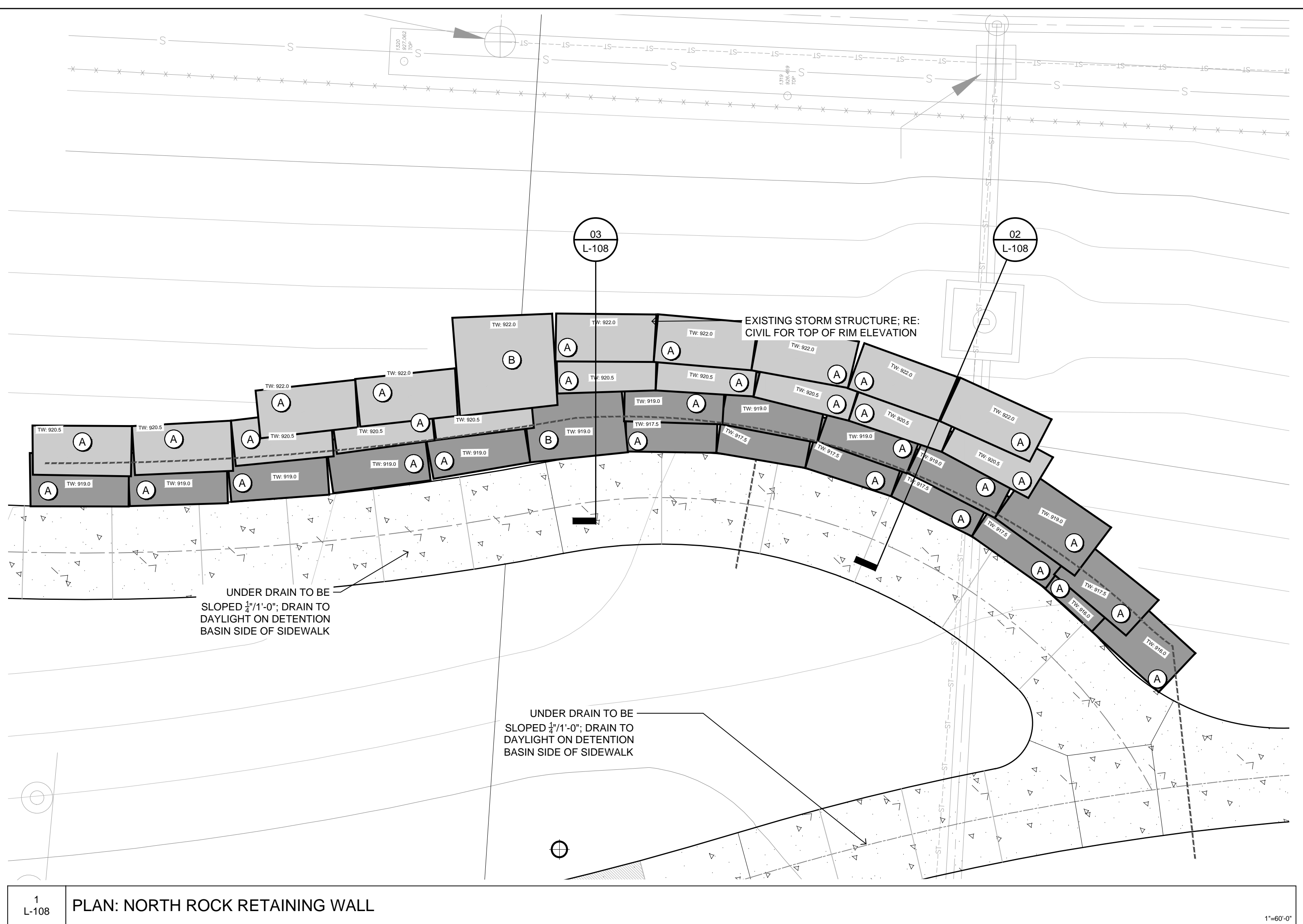
COMPACTED AGGREGATE

COMPACTED SUBGRADE

5
L-108

SECTION: ROCK STEPPERS (BID ALT. 2)

1/2" = 1'-0", 1



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PROFESSIONAL ENGINEER SEAL

KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT



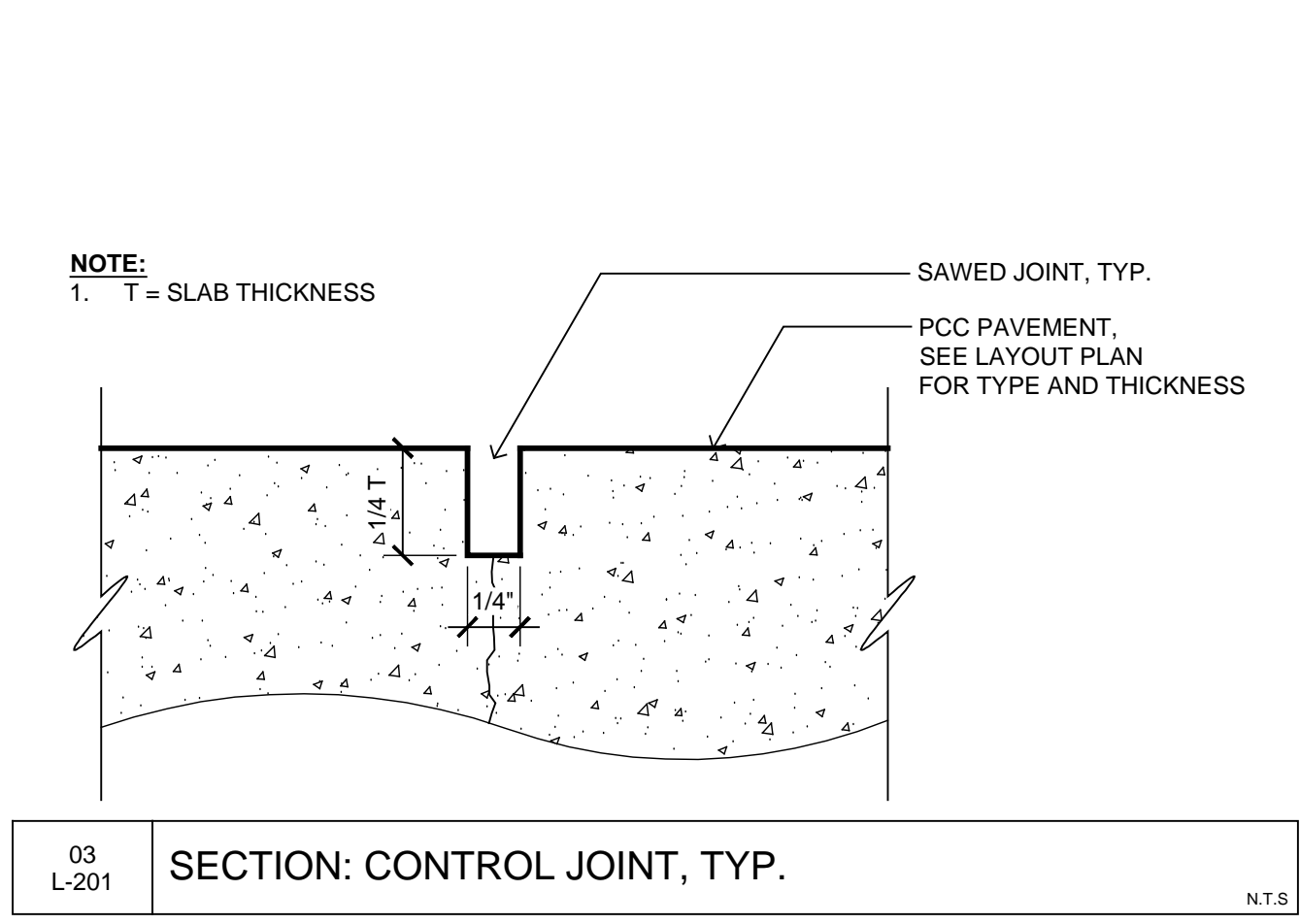
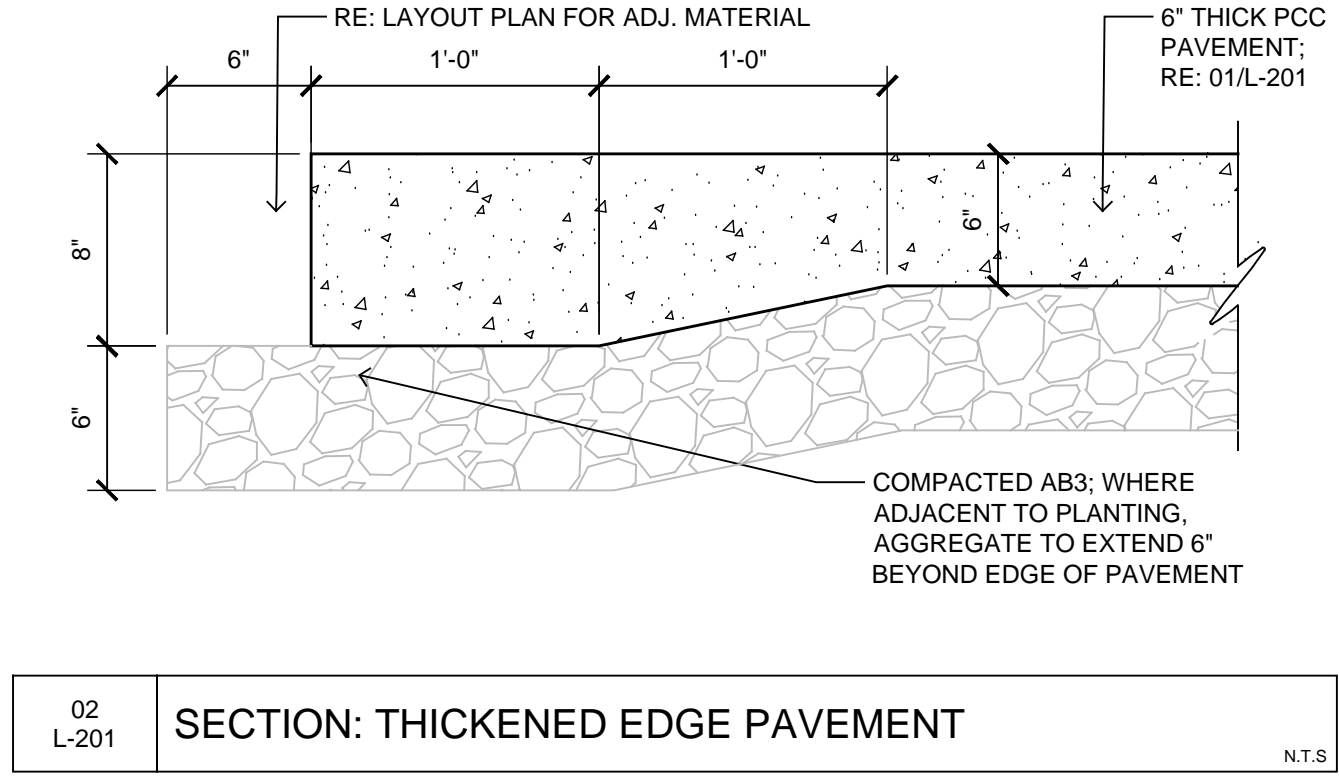
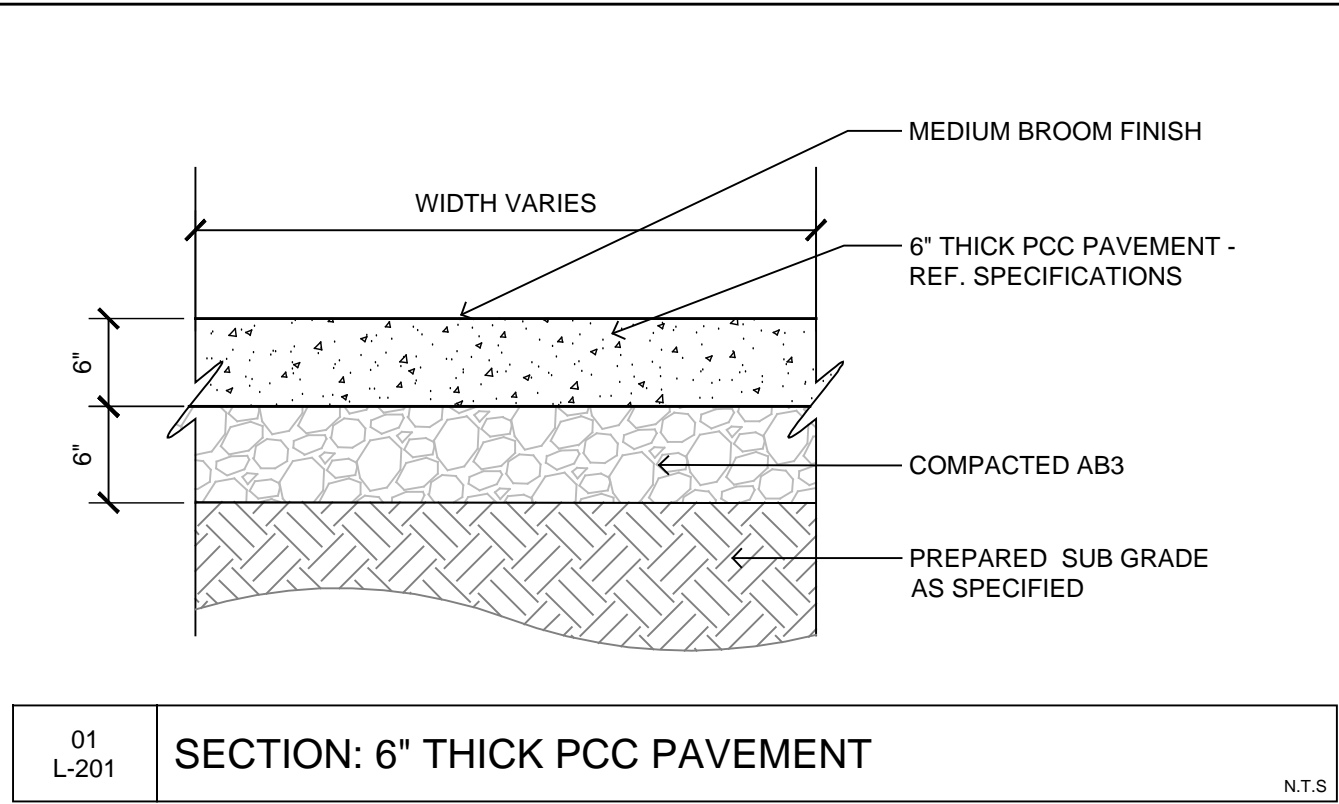
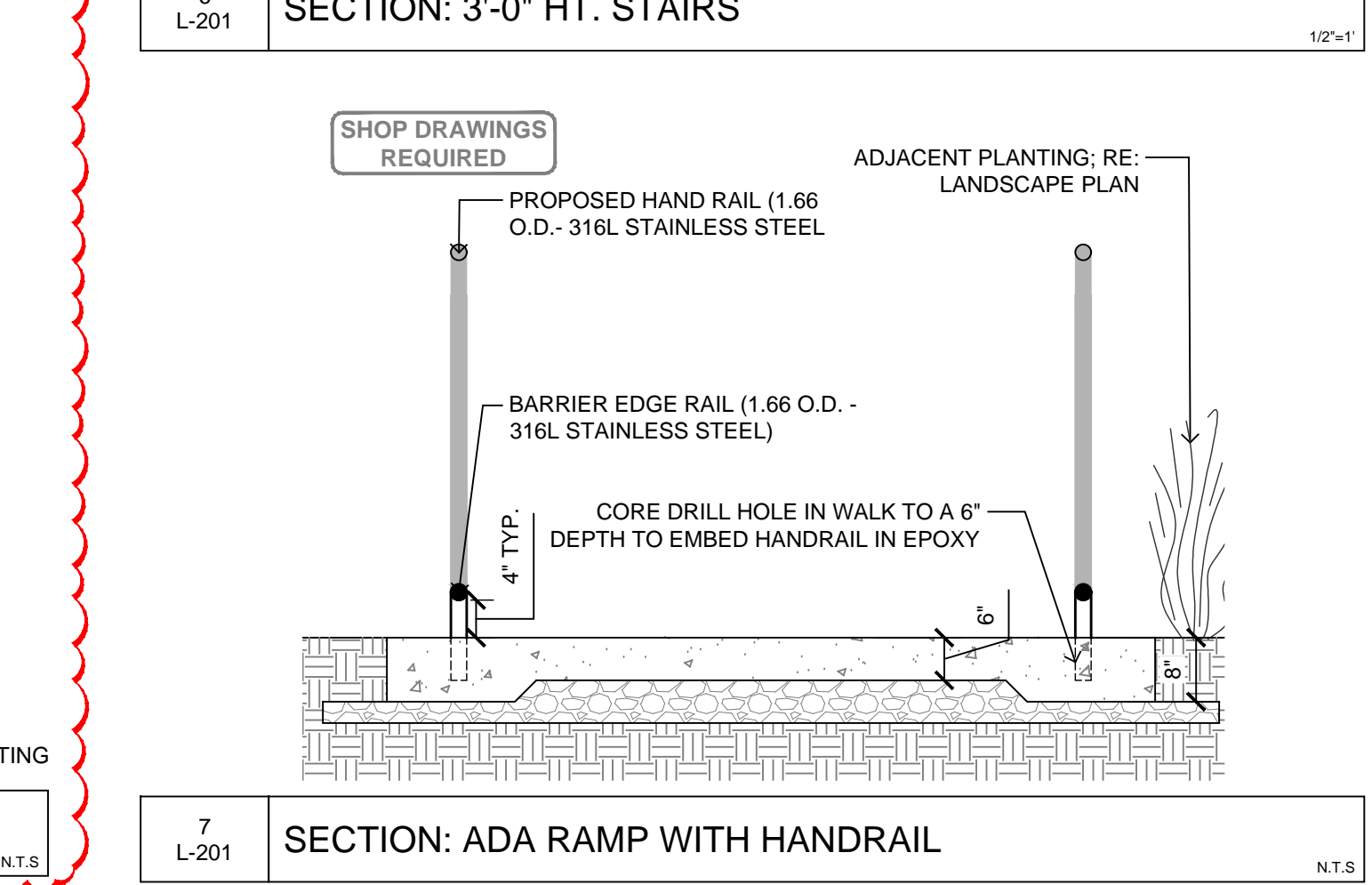
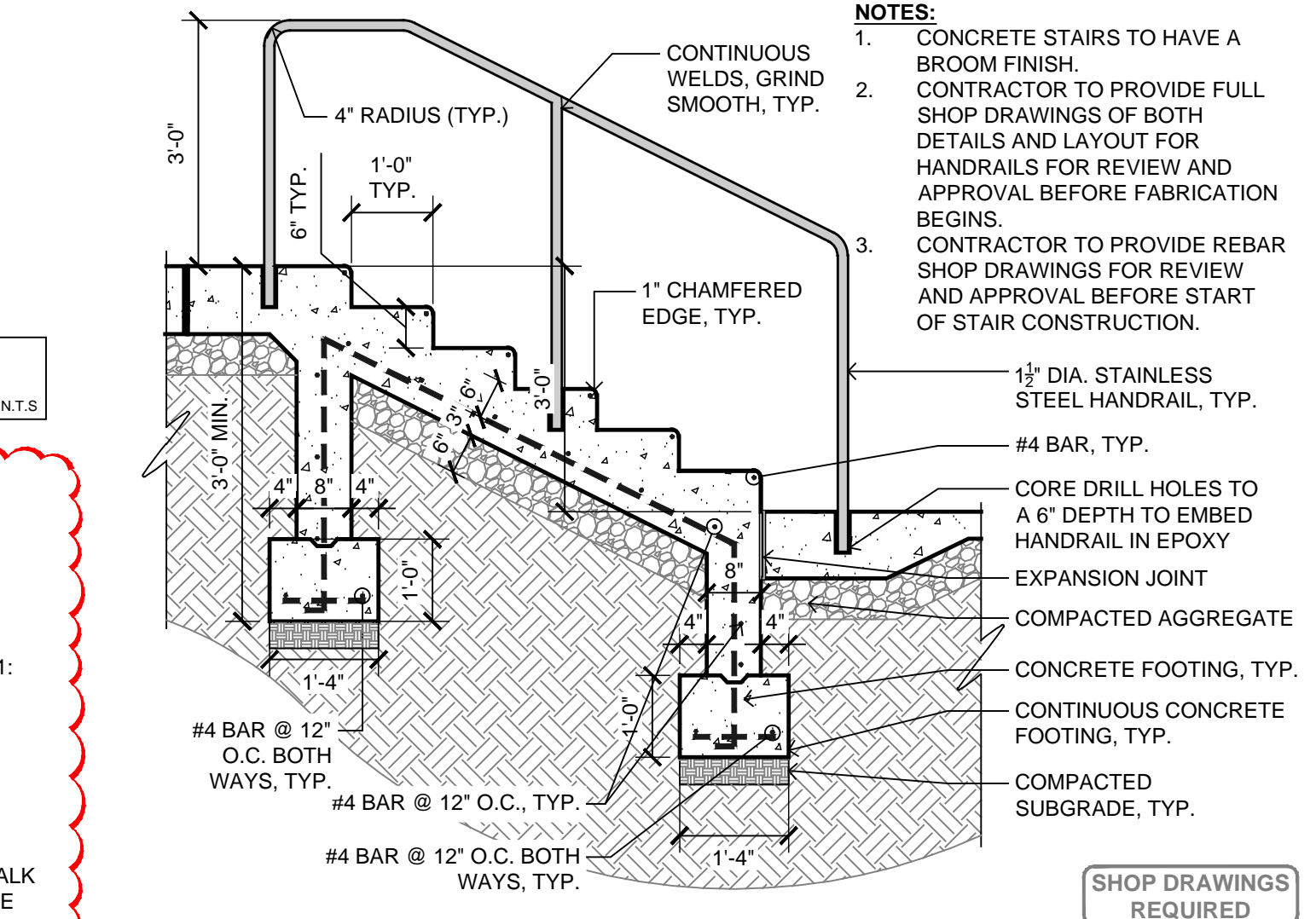
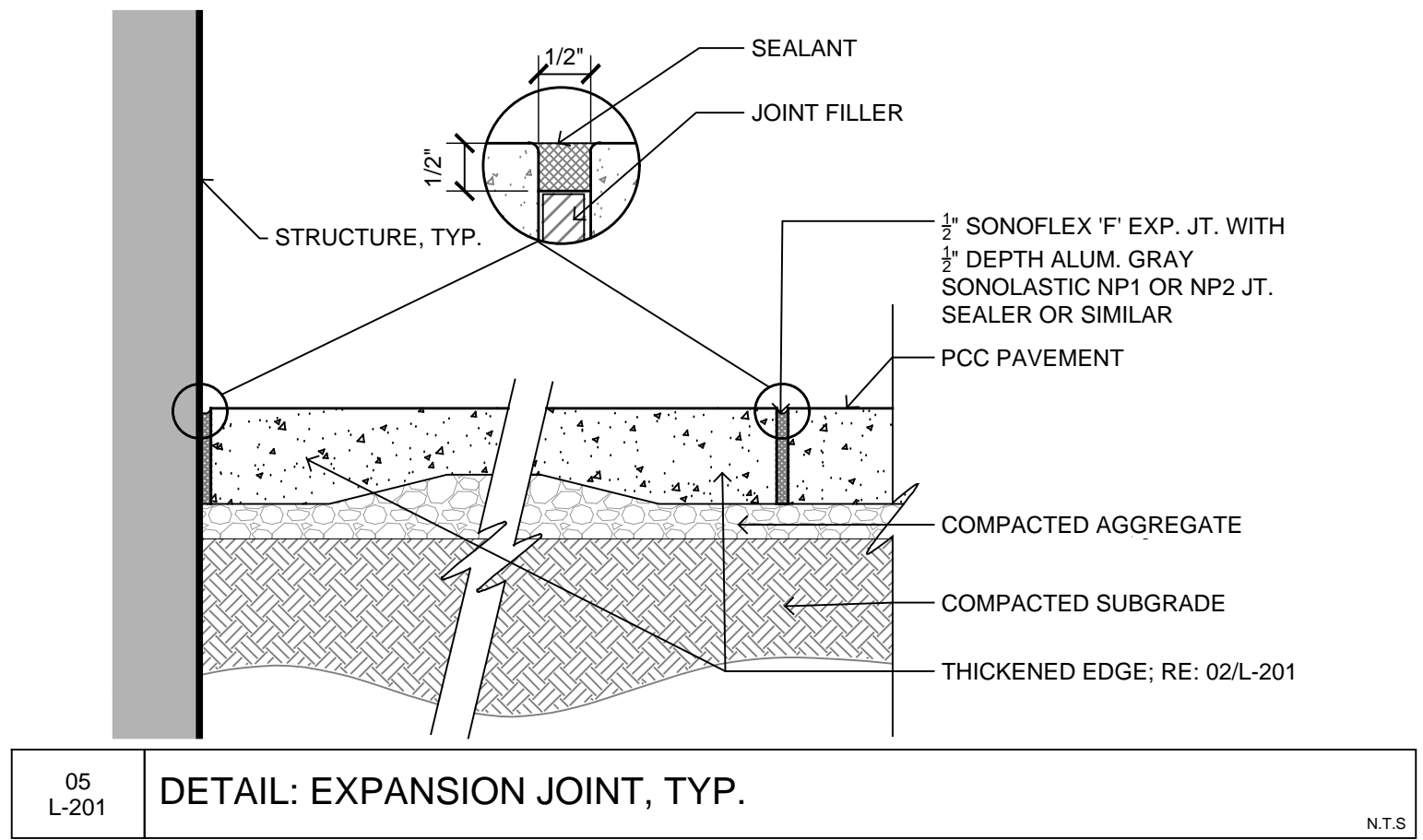
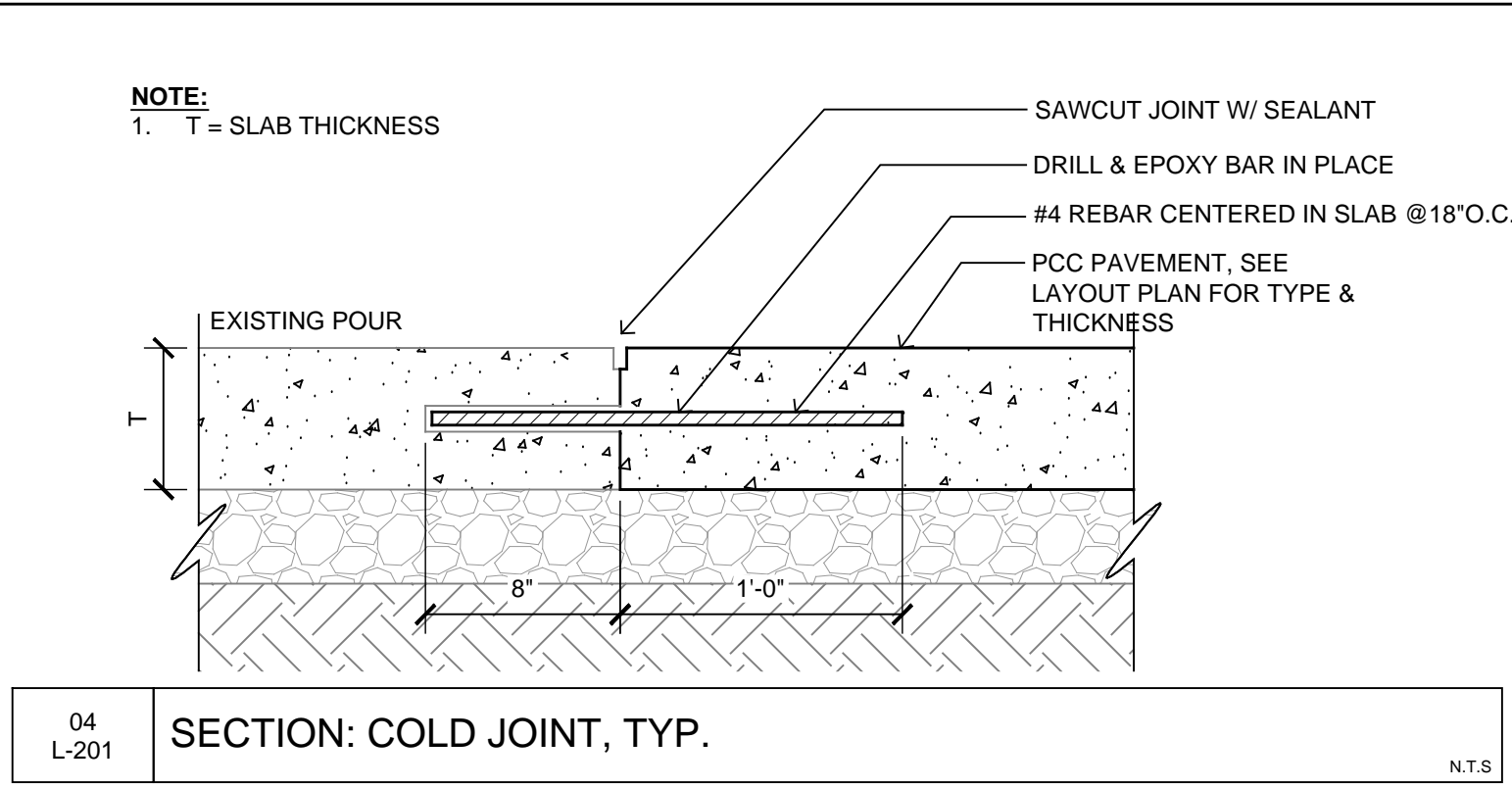
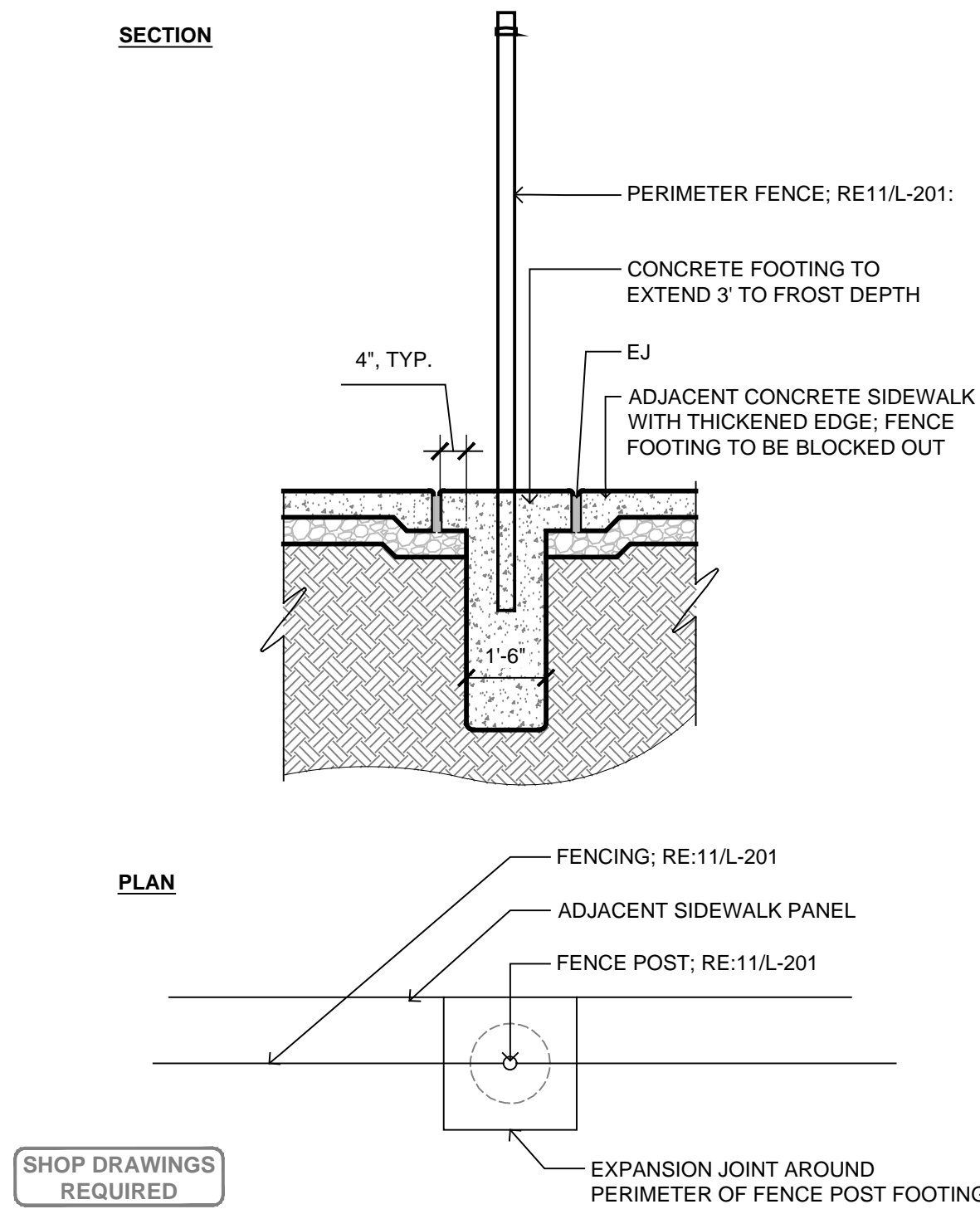
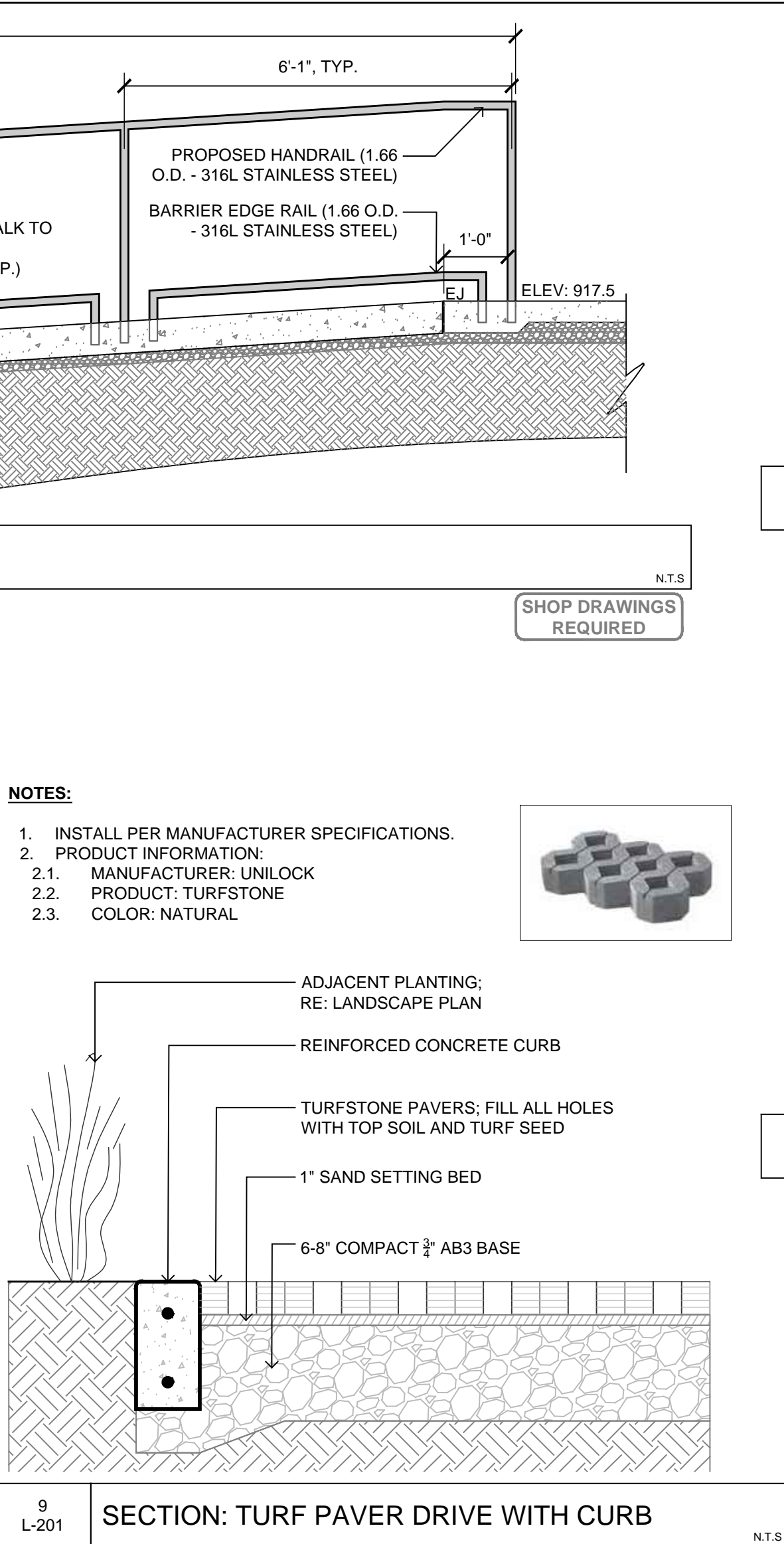
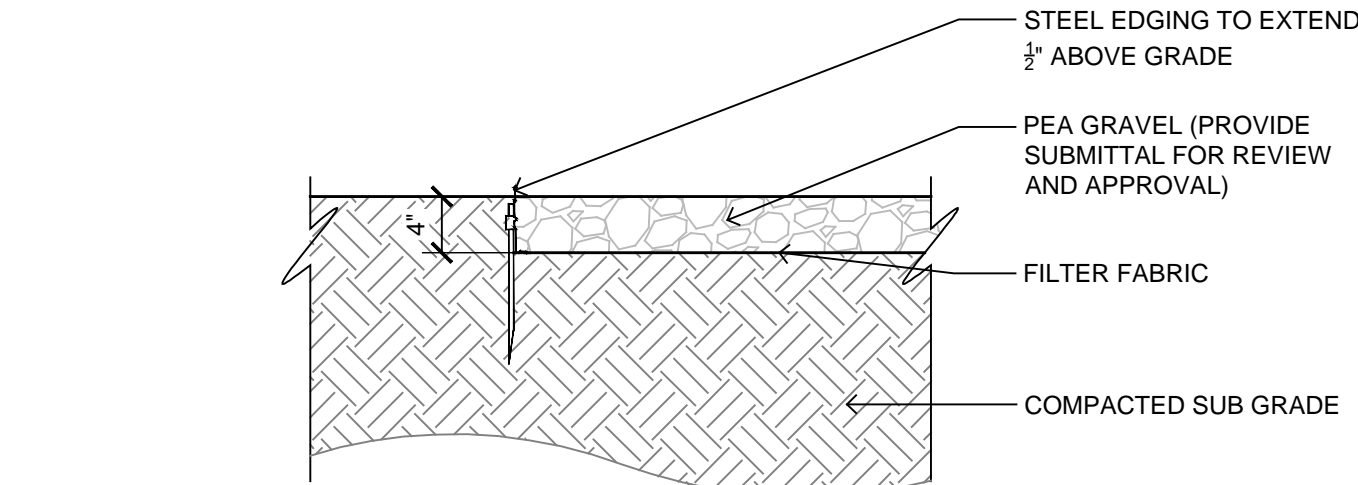
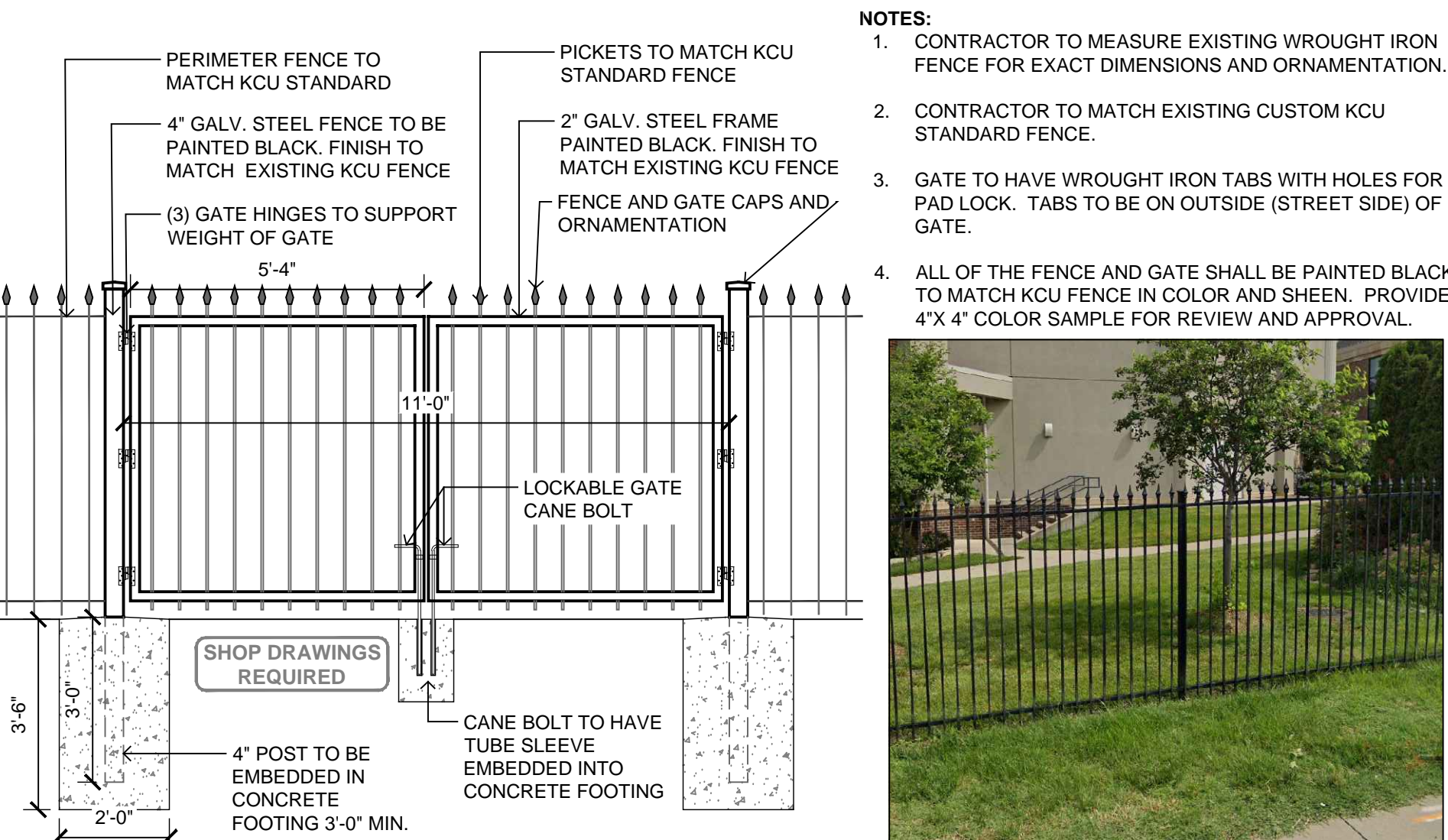
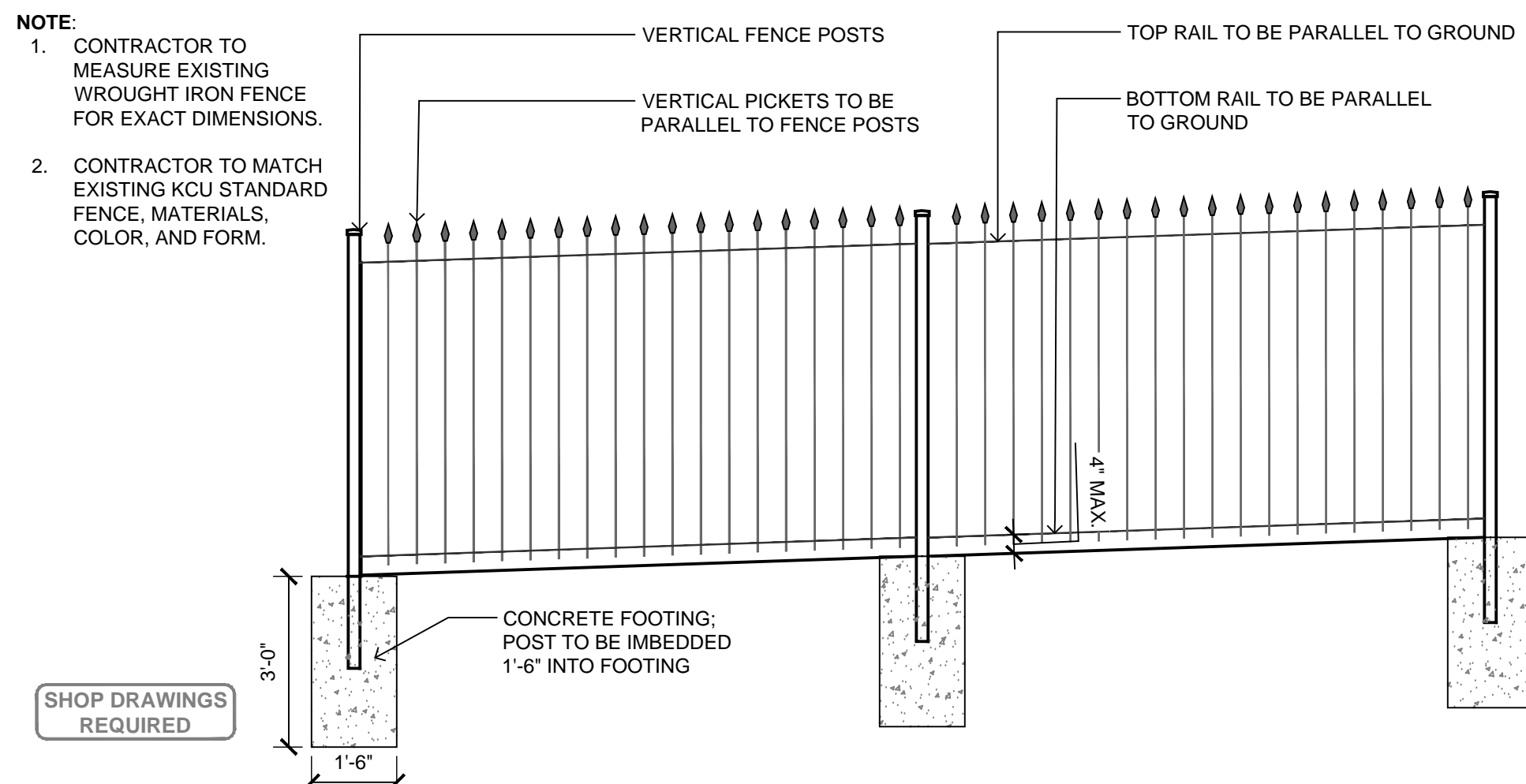
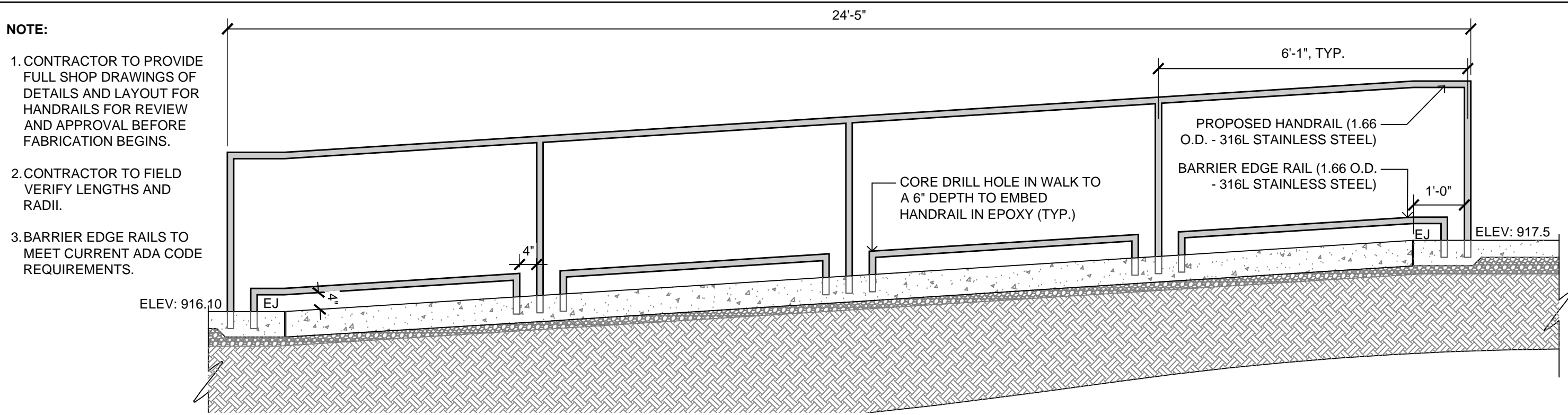
ISSUE FOR BID
FOR WSD USE:

GREEN INFRASTRUCTURE 1-2: PASEO GATEWAY/KCU THE PASEO AND INDEPENDENCE AVENUE

KANSAS CITY,
JACKSON COUNTY, MISSOURI

LAYOUT PLAN
ENLARGEMENT

DRAWN BY AH	CHECKED BY ME	DATE SUBMITTED 04/12/24	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO. DPS 1650 CCN 1659	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975		SHEET NUMBER L-108	SHEET 42 OF 52		



THE PROFESSIONAL WHOSE SIGNATURE AND PERSONAL SEAL APPEARS HEREON ASSUMES RESPONSIBILITY ONLY FOR WHAT APPEARS ON THIS PAGE, AND DISCLAIMS (PURSUANT TO SECTION 327.411 RSMO) ANY RESPONSIBILITY FOR ALL OTHER PLANS, SPECIFICATIONS, ESTIMATES, REPORTS, OR OTHER DOCUMENTS OR INSTRUMENTS NOT SEALED BY THE UNDERSIGNED PROFESSIONAL RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE PROJECT TO WHICH THIS PAGE REFERS.

PROFESSIONAL ENGINEER SEAL

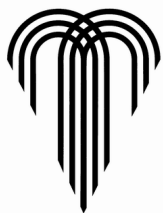
KANSAS CITY, MISSOURI, WATER SERVICES DEPARTMENT

GREEN INFRASTRUCTURE 1-2:
PASEO GATEWAY/KCU
THE PASEO AND INDEPENDENCE
AVENUE

KANSAS CITY,
JACKSON COUNTY, MISSOURI

SITE DETAILS

DRAWN BY AH	CHECKED BY ME	DATE SUBMITTED 04/12/24	RANGE 33W	TWP 50N	SEC 33
CONTRACTOR			DATE COMPLETED		
CONTRACT NO. DPS 1850 CCR 1850	CONTRACT DATE 09/18/2022	MAP NO.	WORK ORDER NO.	DRAWING NO. D-1116.06	
PROJECT NO. 81000975		SHEET NUMBER L-201		SHEET 44 OF 52	

KANSAS CITY
MISSOURI

Project Number _____

Project Title _____

Contractor _____

RFI Number _____ Date _____

From: _____

To: _____

Re: _____

Spec. Sec. Ref:	Paragraph:	Drawing Ref:	Detail:
-----------------	------------	--------------	---------

Signed: _____

Response:

☐ Attachments

Response From: _____ To: _____ Date Transmitted: _____ Date Rec'd: _____

Signed: _____ Signed: _____

Design Professional

Owner's Representative

Distribution: ☐ Owner

Owner

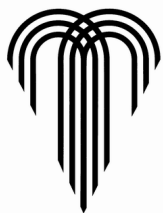
 Contractor

☐ Construction Manager

☐ Design Professional

☐ Consultant _____

☐ Other _____

KANSAS CITY
MISSOURI

Project Number _____

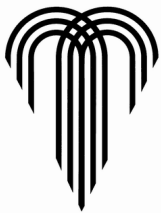
Project Title _____

CONTRACTOR _____

OWNER _____

[illegible]

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

SUPPLEMENTAL DESIGN INSTRUCTION

Project/Contract Number: _____

Project Title: _____

To Contractor _____

From: _____ SDI No _____ Issue Date: _____

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Price or Contract Times. Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Price or Contract Times.

Description:

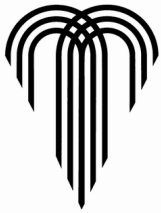
☐ Attachments (*List*)

(Signature) Design Professional

Date

- Distribution:
- ☐ Owner
 - ☐ Contractor
 - ☐ Construction Manager
 - ☐ Design Professional
 - ☐ Consultant _____
 - ☐ Other _____

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

REQUEST FOR PROPOSAL

Project Number _____

Project Title _____

To Contractor _____

From: _____ RFP No _____ Issue Date: _____

Please submit an itemized proposal for changes in the Contract Price and Contract Times for proposed modifications to the Contract Documents described herein. Submit proposal within _____ days, or notify the Owner in writing of the date on which you anticipate submitting your proposal.

This is NOT a Change Order, a Work Change Directive or a direction to proceed with the work described in the proposed modifications.

Description: _____

☐ Attachments _____

Prepared by Design Professional _____

Prepared by Construction Manager _____

REQUESTED by OWNER'S Representative _____

- Distribution: ☐ Owner
☐ Contractor
☐ Construction Manager
☐ Design Professional
☐ Consultant _____
☐ Other _____

KANSAS CITY
MISSOURI

REQUEST FOR PROPOSAL LOG

Project Number _____

Project Title _____

CONTRACTOR _____

OWNER _____

[illegible]

CITY OF FOUNTAINS
HEART OF THE NATIONKANSAS CITY
MISSOURI

CHANGE ORDER

Project Number/Contract Number _____

Project Title _____

Change Order No: _____ Date of Issuance: _____

Ordinance No: _____ Ordinance Effective Date: _____

Contract Notice To Proceed Date: _____

To CONTRACTOR: (Enter Contractors Company Name)

The Contract is changed as follows: _____

This Change Order constitutes compensation in full on behalf of the Contractor and its subcontractors and suppliers for all costs, including impact costs and extended general conditions, and markups directly and indirectly attributable to the Work changes ordered herein, for all delays related thereto and for performance of the changes within the time stated. Contractor hereby releases all claims for delay, interruption, extended general conditions, impact and cumulative impact claims for this Work.

[Note: Identify the specific attachments; example: "Attachment A, Additional Scope of Services."] Delete all notes before printing final

☐ See Attached Document(s) Flysheets needed before each attachment

A - Updated Certificate of Insurance

B-

C.D.E.....

[Note: If the CO does not change the Contract Price, use "Director of Water Services" instead of "Director of Finance"]

Not valid until signed by the Director of Finance.

The original Contract Price was	_____	\$0.00
Net change by previously authorized Change Orders	_____	\$0.00
The Contract Price prior to this Change Order was	_____	\$0.00
The Contract Price will be (<input type="checkbox"/> increased by) (<input type="checkbox"/> decreased by) (<input type="checkbox"/> unchanged)	_____	\$0.00
The new Contract Price including this Change Order will be	_____	\$0.00

[Note: If revised, establish and enter new dates. If unchanged, enter current contract dates.

If you are only changing the Final Completion date, add the following reference:

"The Contract Time for Final Completion will be . . ."]

The Contract Time will be (☐ increased by) (☐ decreased by) (☐ unchanged) _____ () calendar days

The date of Achievement of Full Operation as of the date of this Change Order therefore is _____ Enter Date

The date of Final Completion as of the date of this Change Order therefore is _____ Enter Date

Project No. _____ Project Title _____
 Change Order No. _____

I certify under penalty of law that the 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, and that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

[Note: Include any required additional signatures.]

DESIGN PROFESSIONAL: Name (Type Company Name)	By: (type Name) Title: (type Title)	Date:
CONTRACTOR: Name (Type Company Name)	By: (type Name) Title: (type Title)	Date:
CITY: KC Water	By Andy Shivley, P.E. Title: Deputy Director	Date:

Approved as to form: _____
 Assistant City Attorney

[Note: If this CO does not change the Contract Price, delete the cert. of funds by Finance Director but send signed copy to Finance.]

I certify there is a balance otherwise unencumbered to the credit of the appropriation to which the above amount is chargeable, and a cash balance otherwise unencumbered in the treasury to the credit of the fund from which payment is to be made, each sufficient to meet the above obligation.

By: _____
 Director of Finance _____ Date _____

Distribution: ☐ CITY
☐ CONTRACTOR
☐ DESIGN PROFESSIONAL

REMINDER: CONTRACTOR is responsible for considering the effect this Change Order may have on its ability to meet or exceed the D/M/WBE participation amounts in its Contractor Utilization Plan (CUP) as amended by any previously approved Request for Modification/Substitution. If CONTRACTOR will not be able to achieve the approved participation amounts in performing the work included within this Change Order, or if CONTRACTOR needs to retain the services of additional D/M/WBEs not previously listed in its CUP, CONTRACTOR is advised to submit a Request for Modification/Substitution.

CITY OF FOUNTAINS
HEART OF THE NATIONKANSAS CITY
MISSOURI

Project/ Contract Number _____

Project Title _____

No.: _____ Date of Issuance: _____

TO: **(CONTRACTOR)**

You are directed to proceed promptly with the following work:

Description:

Purpose of Work Change Directive:

Attachments: *(List documents supporting change)*

If the above work results on a change in the Contract Price or Contract Times, any request for a Change Order based thereon will involve one or more of the following methods of determining the effect of the change(s).

- Method of determining change in Contract Price:
- ☐ Unit Prices
- ☐ Lump Sum
- ☐ As Stipulated in General Conditions
- ☐ Other _____

- Method of determining change in Contract Times:
- ☐ CONTRACTOR's Records
- ☐ DESIGN PROFESSIONAL's Records
- ☐ City's Records
- ☐ Other _____

Maximum Not to Exceed Amount (increase or decrease):

\$ _____

If the change involves an increase, the estimated Amount is not to be exceeded without further authorization.

Not to Exceed Contract Times (increase or decrease):

Achievement of Full Operation: _____ days;

Final Completion: _____ days.

If the change involves an increase, the Not to Exceed Contract Times are not to be exceeded without further authorization.

I certify under penalty of law that the 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, and that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Recommended:

Recommended:

Recommended:

DESIGN PROFESSIONAL

CONTRACTOR

CITY

By (Authorized Signature)

By (Authorized Signature)

By (Authorized Signature)

____ Project Manager Initials

____ Smart Sewer Program Construction Manager Initials

Distribution:

- ☐ City
- ☐ Contractor
- ☐ Construction Manager

- ☐ Design Professional
- ☐ Consultant
- ☐ Other

SECTION 01000 – GENERAL PROJECT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section covers the general project requirements for all projects.

1.02 RELATED SECTIONS

- A. Section 00700 – General Conditions.
- B. Section 00800 – Supplementary Conditions.
- C. Section 01015 – Specific Project Requirements.
- D. Section 01020 – Record Documents.
- E. Section 01300 – Submittals.
- F. Section 01566 – Cleanup Operations.
- G. Section 01570 – Temporary Erosion Control.
- H. Section 01580 – Project Signs.
- I. Section 01581 – Public Communications.
- J. Section 02180 – Clearing and Grubbing.
- K. Section 02190 – Demolition and Disposal of Debris.
- L. Section 02200 – Earthwork.
- M. Section 02949 – Tree Protection, Removal and Replacement.

1.03 CODES AND STANDARDS

- A. By reference, as applicable for the Work being performed.

1.04 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Project Communications:
 - 1. Progress Meeting Minutes.
- C. Other:
 - 1. Description and location of offsite storage arrangements.
 - 2. Construction Site Plan.
 - 3. Safety Representative.

1.05 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Storage of materials and equipment shall conform to manufacturer's recommendations.
- B. Storage of equipment and material shall not interfere with public access and/or safety.
- C. All material shall be protected from weather. Gaskets shall be protected from exposure to sunlight.
- D. Offsite Storage:
 - 1. Offsite storage arrangements shall be approved by the City for all materials and equipment.

2. It is the Contractor's sole responsibility to provide adequate and satisfactory security and protection.
3. Offsite storage facilities shall be bonded and accessible to City.
- E. Preparation for Shipment:
 1. All materials and equipment incorporated into the project shall be suitably packaged to facilitate handling and protect against damage during transit and storage.
 2. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces, which are damaged prior to acceptance of materials and equipment, shall be repainted to the satisfaction of the City.
 3. Pipe and fitting linings shall be protected against damage.
 4. Each item, package, bundle of material, or piece of equipment shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

1.07 MATERIALS SELECTION AND ACQUISITION

- A. The Contractor shall not use materials or equipment removed from existing premises, except as specifically permitted by the Contract Documents. All products shall be new, never used before, unless otherwise specified.
- B. Provide interchangeable components of the same manufacturer, for similar removable components, such as: T-bolts, glands, gaskets, manhole rings and covers, etc.

1.08 CONSTRUCTION SITE PLAN

- A. Unless otherwise specified in Section 01015 – Specific Project Requirements, prior to the start of work, the Contractor shall submit a site plan showing the locations and dimensions of temporary facilities which include, but are not limited to, the following layouts and details:
 1. Equipment and material storage area (on-site and off-site).
 2. Access and haul routes.
 3. Avenues of ingress/egress in fenced areas.
 4. Details of the fence installation.
 5. Any areas which may have to be protected to prevent the tracking of mud.
 6. Indicate if a supplemental or other staging area is being utilized.
 7. Show locations of safety and construction fencing, job site trailer, construction entrances, trash dumpsters, temporary sanitary facilities and parking areas for project personnel.
 8. Indicate locations of concrete washout facilities.

1.09 EASEMENTS AND RIGHTS-OF-WAY

- A. The City will furnish the Site in accordance with Section 00700 - General Conditions. The Contractor shall confine construction operations to the immediate vicinity of the Site shown in the Contract Documents and shall use due care in placing construction tools, equipment, excavated materials, construction materials and supplies to cause the least possible damage to property and least possible interference with public traffic.

B. On Private Property:

1. The permanent easements are as noted in the Contract Documents. No additional temporary construction easements have been obtained, unless otherwise indicated in the Contract Documents. The Contractor shall set stakes to mark the boundaries of construction easements across each private property. The stakes shall be protected and maintained until completion of the Work. After cleanup has been completed in accordance with Section 01566 – Cleanup Operations, the Contractor shall remove all construction stakes.
2. The Contractor shall not enter any private property outside the designated construction easement boundaries without written permission from the owner of the property.
3. Should it become necessary to use or occupy the land beyond the limits of the Site (as defined by Section 00700 – General Conditions), the Contractor shall obtain a written agreement with each affected property owner and tenant. Each agreement shall clearly outline the terms for which the Contractor may utilize the property and shall be fully executed by the Contractor, the property owner and the tenant (when applicable).
4. Whenever the easement is occupied by crops which will be damaged by construction operations, the Contractor shall notify the property owner sufficiently in advance so that the crops may be removed before the Work is started. The Contractor is responsible for all damage to crops outside the easement and shall make satisfactory settlement for the damage directly with the property owner.
5. Where the Work impacts fields that are leveled for irrigation or terraced, the Contractor shall relevel irrigated fields and replace all terraces to their original or better condition and to the satisfaction of the property owner.

C. Crossing State Highways:

1. The City has obtained permission from the Missouri Department of Transportation (MoDOT) for the construction of the Work. The Contractor shall secure all necessary MoDOT permits and post bond as required for construction within the limits of the MoDOT right-of-way. All work within MoDOT right-of-way shall be in conformance with MoDOT regulations. The permit must be secured before any construction is started within MoDOT right-of-way.

1.10 MAIL BOXES

- A. The U.S. Post Office Department's regulations prohibit the delivery of mail to addresses where there are no mailboxes or where the mailboxes are not readily accessible because of construction excavation.
- B. The Contractor's execution of the Work shall not impede delivery of the mail. The Contractor shall ensure that all mail delivery to all mail boxes is uninterrupted. All excavated material, equipment, supplies shall be kept clear of mail boxes to allow normal access for mail delivery personnel and vehicles.
- C. When removal of a mail box is necessary to facilitate the Work, it shall be removed, stored and re-set to its original position and elevation. From the time a mail box is removed, it shall be re-set and the surrounding area stabilized and restored within 24 hours.

1.11 LINES AND GRADES

- A. All Work shall be done to the lines, grades and elevations indicated in the Contract Documents.
- B. Basic horizontal and vertical control points are provided in the Contract Documents. All additional survey, layout and measurement work shall be performed by the Contractor as a part of the Work.
- C. The Contractor shall provide an experienced instrument person, competent assistants and all instruments, tools, stakes and other materials required to complete the survey, layout and measurement work.
- D. The Contractor shall provide qualified personnel, materials and equipment (tools, stakes and other materials) as may be required for the following tasks needed in the Work:
 - 1. Establish or designate control points.
 - 2. Establish construction easement boundaries.
 - 3. Verify survey.
 - 4. Verify layout shown on the Contract Documents.
 - 5. Verify and document work performed by the Contractor.
 These efforts shall be included in the Contractor's bid price and performed at no additional cost to the City.
- E. The Contractor shall remove and reconstruct, at no additional cost to the City, any Work that was improperly installed or improperly located.
- F. See Section 01020 – Record Documents, paragraph SURVEY REQUIREMENTS for additional requirements.

1.12 CONNECTIONS TO EXISTING FACILITIES

- A. Unless otherwise specified or indicated, the Contractor shall make all necessary connections to existing facilities. This includes, but is not limited to, structures, drain lines, water utilities, sewer utilities, gas utilities, communications utilities and electric utilities. In each case, the Contractor shall receive permission from the City or the owning utility prior to undertaking a connection. The Contractor shall protect facilities against deleterious substances and damage.
- B. Connections to existing facilities that are in service shall be thoroughly planned in advance. All required equipment, material and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) to complete connections in the minimum time possible. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

1.13 UNFAVORABLE CONSTRUCTION CONDITIONS.

- A. During unfavorable weather, wet ground, or other unsuitable construction conditions, the Contractor shall confine operations to Work that will not be adversely affected by such conditions.
- B. No portion of the Work shall be constructed under conditions that would adversely affect the quality or efficiency thereof, unless special means or precautions are taken by the Contractor to perform the Work in a manner acceptable to the City.

1.14 UNDERGROUND FACILITIES AND ASSOCIATED RESTORATION

- A. As provided in Section 00700, paragraph 4.04 of the General Conditions, the Contractor shall perform all cutting and patching required for the Work and as may be necessary in connection with locating all underground facilities, installation of Work, uncovering Work for inspection or for the correction of defective Work.
- B. The Contractor shall perform all cutting and patching required for and in connection with the Work, including but not limited to the following:
 - 1. Removal of improperly timed Work.
 - 2. Removal of samples of installed materials for testing.
 - 3. Alteration of existing facilities.
 - 4. Installation of new Work.
- C. The Contractor shall provide all shoring, bracing, supports and protective devices necessary to safeguard all Work and existing facilities during cutting and patching operations. The Contractor shall not undertake any cutting or demolition that may affect the structural stability of the Work or existing facilities without City's approval.
- D. Materials shall be cut and removed as required to complete the Work. Materials shall be removed in a careful manner, with no damage to adjacent facilities or materials. The Contractor shall remove all excavated materials from the site that cannot be incorporated in the Work.
- E. All Work and existing facilities affected by cutting operations shall be restored with new materials, or with salvaged materials acceptable to City, to obtain a finished installation with strength, appearance and functional capacity required to match the existing area. If necessary, entire surfaces shall be patched and refinished.
- F. The Contractor, at no extra cost to the City, shall replace all surface features damaged, removed or so designated to be replaced.

1.15 ENVIRONMENTAL PROTECTION

- A. Laws and Regulations:
 - 1. The Contractor shall conform to all laws and regulations as required by Section 00700 – General Conditions, Article 6 – Contractor's Responsibilities.
- B. Storm Water Runoff:
 - 1. Storm Water Pollution Prevention Plan (SWPPP): As required by Section 00700 – General Conditions, Article 6 – Contractor's Responsibilities.
 - 2. Erosion Sediment Control: See Paragraph 1.25.
 - 3. The Contractor shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris and other substances resulting from construction activities. See paragraph 1.38.
 - 4. Dewatering: As required by Section 02200 – Earthwork.
 - 5. Concrete Washout Facilities: As required by Section 01566 – Cleanup Operations.
- C. Air Pollution:
 - 1. Burning: No open burning will be permitted.
 - 2. Dust Control: See paragraph 1.37.
- D. Other Construction Activities:
 - 1. Disposal of Demolition Material: As required by Section 02190 – Demolition.
 - 2. Disposal of Debris: Section 02180 – Clearing and Grubbing and Section 02200 – Earthwork.

3. Protection of Wetlands: As shown on the Drawings or as specified in Section 01015 – Specific Project Requirements.
4. Floodplains: As shown on the Drawings or as specified in Section 01015 – Specific Project Requirements.
5. Cleanup and Site Maintenance: As required by Section 01566 – Cleanup and Site Maintenance.

1.16 LICENSES, PERMITS, AND CERTIFICATES

- A. Requirements for licenses, permits and certificates are provided in Section 00700 – General Conditions, paragraph 6.09.
- B. Permitting exceptions (if any) are noted in Section 00800 – Supplementary Conditions.

1.17 APPLICABLE CODES

- A. Standard specifications of the Kansas City, Missouri Department of Public Works are, by reference, hereby made a part of this contract specifications. See Section 01015 – Specific Project Requirements for additional information.

1.18 REFERENCE STANDARDS

- A. See Section 00700 – General Conditions, paragraph 3.02 for references to standards and specifications of technical societies.

1.19 PRECONSTRUCTION CONFERENCE

- A. A Preconstruction Conference will be held in accordance with Article 2 of the General Conditions. The conference will be held at a mutually agreed time and location. The conference shall be attended by:
 1. Contractor and the project superintendent.
 2. Design Professional.
 3. Resident Project Representative.
 4. Representatives of City.
- B. Other participants as requested by the Contractor, City, or Design Professional; such as the following:
 1. Principal Subcontractors.
 2. Representative of principal suppliers and manufacturers as appropriate.
 3. Utility Company representatives.
 4. Governmental representatives as appropriate.
 5. The Contractor shall bring to the conference the Preliminary Schedules described in Article 2 of the General Conditions (Preliminary Project Schedule, Preliminary Schedule of Values, Preliminary Schedule of Shop Drawings and Samples) and other pertinent information.
- C. The purpose of the conference is to designate responsible personnel and to establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda shall include, but not limited to, the following:
 1. Contractor's Preliminary Schedules.
 2. Document Management.
 3. Processing Applications for Payment.
 4. Maintaining record documents and electronic data requirements.
 5. Critical Work sequencing.
 6. Field decisions and Change Orders.

- 7. Use of premises, field office, material storage areas, security, housekeeping, and City's needs.
- 8. Major equipment deliveries and priorities.
- 9. Contractor's assignment for Safety Representative.
- 10. Expectations and the Contractor's plan for Environmental Protection.
- D. City or Design Professional will preside at the conference, will arrange for keeping the minutes and will distribute the minutes to all persons in attendance.

1.20 PROGRESS MEETINGS

- A. The Contractor shall schedule and hold progress meetings at least monthly, at other times as requested by the City or as needed by the progress of the Work. The Contractor, City, Design Professional, and all Subcontractors active on the Site shall be represented at each meeting. The Contractor may, at their discretion, request attendance of their suppliers, manufacturers or other utilities.
- B. The Contractor shall preside at the meeting. Meeting minutes shall be prepared and distributed by the Contractor after review by the City or Design Professional. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling and resolve problems which may have developed on the project.

1.21 SAFETY REPRESENTATIVE

- A. In accordance with Section 00700 – General Conditions, Article 6 – Contractor's Responsibilities, the Contractor shall submit the name and complete contact information for the person designated as the Safety Representative for the Project.
- B. In accordance with Section 01300 – Submittals, This information shall be submitted prior to the Preconstruction Conference.
- C. If the Safety Representative changes during the Project, the Contractor shall designate a new person to fulfill the role and submit their name and complete contact information.

1.22 SITE ADMINISTRATION

- A. The Contractor is responsible for all areas of the site used by their personnel and all Subcontractors in the performance of the Work. The Contractor will exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to Owner or others. The Contractor has the right to exclude from the site all persons who have no purpose related to the Work or its inspection and may require all persons on the site to observe the same regulations as their personnel.

1.23 CLEAN-UP

- A. The Contractor shall conduct cleanup operations in accordance with Section 01566 – Project Cleanup.

1.24 FINAL ACCEPTANCE

- A. Final Acceptance of the Work shall be in accordance with Section 00700 – General Conditions, Article 14.

1.25 EROSION AND SEDIMENT CONTROL

- A. Work associated with erosion and sedimentation control shall be done in accordance with Section 01570 – Temporary Erosion and Sediment Control.

1.26 STREET LIGHTS

- A. Relocation or restoration of streetlights due to construction interference shall be included in the Contractor's Bid Price. No separate measurement and payment will be made. The Contractor shall notify and coordinate street light relocations with the Public Works Department:

Street Lights Division
Phone: (816) 513-9500.

1.27 PROJECT SIGNS

- A. Work associated with Project signs shall be done in accordance with Section 01580 – Project Signs.

1.28 RESTORATION

- A. The Contractor shall replace all surface material and shall restore all paving, curbs, gutters, sidewalks, driveways, shrubbery, fences, sod and all other features disturbed to a condition of equal to or better than before the work began, furnishing all material, labor and equipment incidental thereto.

1.29 WATER

- A. The City will furnish, without charge, all water necessary for the Work (i.e., filling, flushing, testing and disinfecting completed water lines). The Contractor shall make arrangements with the City for all water used.
- B. Use of the City's water facilities shall be at the direction of the Water Services Department so that water is not wasted and service to customers is not impaired.
- C. Any water furnished by the City must be obtained from an existing City main.
- D. The Contractor shall use a Reduced Pressure Zone (R.P.Z.) Backflow Preventer and meter when connected to the City's water system. The Contractor shall contact the Kansas City Fire Department (KCFD) at (816) 513-4645 to purchase a hydrant meter permit. After securing a hydrant meter permit from KCFD, the Contractor shall present the permit to the Consumer Services desk located at Water Services Department headquarters, 4800 E. 63rd Street, KCMO. The Contractor shall apply for and pay Consumer Services the refundable security deposit. If approved, the Contractor shall contact the Water Services Backflow Department at (816) 513-4797 to schedule the installation of the R.P.Z./Meter (hydrant meter). The Contractor shall provide the location of the hydrant where the R.P.Z./Meter is to be installed. The Contractor shall contact the Backflow Department to have the R.P.Z./Meter moved or returned to Water Services. Jetting and Vacuum trucks with approved backflow prevention devices or air gap separation are not required to utilize a R.P.Z. backflow preventer; however, a meter to track water usage shall be used at all the times. The Jetter/Vac Contractor shall contact the Water Services Backflow Department for issuance of the meter and pay the associated refundable security deposit. In all cases, the Contractor is solely responsible for any and all damage to the equipment issued by the Water Services Backflow Department. The cost to repair the damage or the cost of complete replacement of the unit shall be deducted from the security deposit.

- E. All costs for labor, material, equipment and services needed to obtain water for construction purposes shall be included in the Bid. No separate measurement or payment will be made to make connections.

1.30 OPERATION OF EXISTING VALVES

- A. The Contractor shall not operate any valves on the City's system without direct supervision from a Water Services Department representative.
- B. If the Contractor needs valves operated, the request shall be made at least forty-eight (48) hours in advance to Water Services for such operation, also giving notice to any affected customers/properties in accordance with the notification requirements outlined in Section 01581 – Public Communications.
- C. The hydrant branch valves may be operated in the presence of a Water Services Department representative with no official advance notification.
- D. All fire hydrants and water valves shall be kept free from obstruction and available for use at all times.

1.31 BARRICADES AND LIGHTS

- A. All streets, roads, highways and other public thoroughfares which are closed to traffic shall be protected by effective barricades and acceptable warning signs. Barricades shall be located per the approved traffic control plan and associated permit.
- B. All trenches and other excavations shall be covered and shall have suitable barricades, signs and lights to provide adequate protection to the public. Obstructions such as material piles and equipment shall be provided with similar warning signs and lights.
- C. All barricades and obstructions shall be illuminated with warning lights from sunset to sunrise. Material storage and execution of the Work on or alongside public streets and highways shall cause the minimum obstruction and inconvenience to the traveling public.
- D. All barricades, signs, lights and other protective devices shall be installed and maintained in conformity with applicable statutory requirements and as required by the authority having jurisdiction; such as, Work within railroad right-of-way, highway right-of-way, etc.

1.32 EXISTING FENCING

- A. All existing fences affected by the Work shall be maintained by the Contractor until completion of the Work. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner of the fence and the period the fence may be left relocated or dismantled has been agreed upon.
- B. Where fences must be maintained across the construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.
- C. On completion of the Work across any tract of land, the Contractor shall restore all fences to their original location and to their original or better condition.

1.33 SAFETY FENCING

- A. Provide fencing along the construction site at all open excavations and tunnels to control access by unauthorized people.

- B. The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 48 inches high and maximum mesh size of 2 inches, supported and tightly secured to steel posts located on maximum 10-foot centers, constructed at the approved location.
- C. Remove the fence from the work site upon completion of the Work.

1.34 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

- A. The Contractor shall protect, shore, brace, support, and maintain all underground pipes, conduits, drains and other underground construction uncovered or otherwise affected by the construction operations.
- B. All pavement, surfacing, driveways, curbs, gutters, sidewalks, buildings, utility poles, guy wires, fences, and all other features and structures affected by construction operations, together with all sod and shrubs in yards, parkways, medians and green spaces, shall be restored to their original condition, whether within or outside the right-of-way or easement. All replacements shall be made with new materials.
- C. Work associated with tree protection, removal and replacement shall be done in accordance with Section 02949 – Tree Protection, Removal and Replacement.

1.35 DAMAGE TO EXISTING PROPERTY

- A. The Contractor is solely responsible for any damage to existing features, structures, Work, materials, or equipment because of their operations and shall repair or replace any damaged features, structures, Work, materials, or equipment to the satisfaction of the City and at no additional cost to the City.
- B. The Contractor shall protect all existing structures and property from damage and shall provide bracing, shoring, or other work necessary for such protection.
- C. The Contractor is responsible for all damage to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, culverts, bridges, or other public or private property, which may be caused by transporting equipment, materials, or personnel to or from the Work. The Contractor shall make satisfactory and acceptable arrangements with the agency having jurisdiction over the damaged property concerning its repair or replacement.

1.36 NOISE CONTROL

- A. The Contractor shall conduct construction operations as described herein and in compliance with the City of Kansas City, Missouri Code of Ordinances, Chapter 46 – NOISE CONTROL.
- B. The Contractor shall take all reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices and operated in a manner to cause the least noise, consistent with the efficient performance of the Work.
- C. During construction activities on or adjacent to occupied buildings and when appropriate, the Contractor shall erect screens or barriers effective in reducing noise in the building and shall conduct their operations to avoid unnecessary noise which might interfere with the activities of the building occupants.

- D. All work including, but not limited to, excavation, demolition, alteration, or repair being performed in or adjacent to a residential area other than between the hours of 7:00 a.m. and 6:00 p.m. on weekdays, except in the case of urgent necessity in the interest of public safety, shall require a letter of permission from the Water Services Department of the City of Kansas City, Missouri.

1.37 DUST CONTROL

- A. The Contractor shall control dust in accordance with Section 01566 – Cleanup Operations, paragraph DUST CONTROL. The Contractor shall take all reasonable measures to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water or by the approved application of an approved chemical suppressant. When practicable, dusty materials in piles or in transit shall be covered to prevent blowing.
- B. Buildings or operating facilities which may be affected adversely by dust shall be adequately protected from dust. Existing or new machinery, motors, instrument panels, or similar equipment shall be protected by suitable dust screens. Proper ventilation shall be included with dust screens.

1.38 POLLUTION CONTROL

- A. The Contractor shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris or other substances resulting from the construction activities. No sanitary wastes will be permitted to enter any drain or watercourse other than sanitary sewers. No sediment, debris, or other substance will be permitted to enter sanitary sewers and all reasonable measures will be taken to prevent such materials from entering any drain or watercourse.

1.39 SECURITY

- A. The Contractor is solely responsible for security and protection of the site. This includes protecting all Work, materials, equipment, existing facilities and all temporary facilities against theft, vandals and access by unauthorized persons.
- B. No claim shall be made against the City by reason of an act of an employee or trespasser. The Contractor shall make good on all damage and theft of property resulting from the Contractor's failure to provide adequate security measures.

1.40 PARKING

- A. The Contractor shall provide and maintain suitable parking areas for the use of all City personnel, construction workers and others performing work or furnishing services in connection with the Project. Suitable parking is required to avoid the need for parking personal vehicles where they may interfere with traffic, City's operations, or construction activities.

1.41 PIPELINE MARKERS

- A. Pipeline markers as shown in Construction Detail Drawing No. 01000-1 shall be installed at the locations shown on the Drawings.
- B. Contractor shall field verify Stations and Locations for pipeline markers to comply with actual construction. The Contractor shall coordinate labeling with the City/Design Professional prior to fabricating the marker plates. The Contractor shall submit as required in Section 01300 – Submittals.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

Drawing No. 01000-1 on the following page.

INSERT PROJECT NAME

ENGRAVE IDENTIFICATION
APPROPRIATE OR AS
DIRECTED BY CITY/ DESIGN
PROFESSIONAL

INSERT DRAWING NUMBER

INSERT APPROPRIATE STATION

INSERT APPROPRIATE
COORDINATES

KANSAS CITY, MISSOURI
WATER SERVICES DEPARTMENT
PROJECT NAME CONTRACT NO.

D-XXXXX XX INCH (TYPE)

STATION XXX+XX, OFFSET 10', TAG FACES MAIN
N XXXXXXXX.XX E XXXXXXXX.XX

INSERT CONTRACT NUMBER

INSERT APPROPRIATE
SIZE OF MAIN AND
TYPE OF PIPE

ROUND STEEL END CAP
WELDED ENTIRELY AROUND
END 4" DIA SCHEDULE
40 STEEL PIPE

BRASS IDENTIFICATION
PLATE, 2"x 4"x 1/8" THICK.
ATTACH TO STEEL POST
W/4 RIVETS.

4' - 0"

FINISH GRADE

FORM TOP 4" OF
CONC ENCASEMENT

2' - 6"

6" CONC ENCASEMENT
AROUND PIPE

PAINT WITH 2 COATS OF GLOSS
ALKYD ENAMEL, LIGHT BLUE
UNLESS OTHERWISE INDICATED
BY THE ENGINEER

NOTES:

1. PIPELINE MARKERS AS SHOWN IN THIS DETAIL SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON THE DRAWINGS.

2. CONTRACTOR SHALL VERIFY STATIONS AND LOCATIONS FOR PIPELINE MARKERS TO COMPLY WITH ACTUAL CONSTRUCTION, AND SHALL COORDINATE LABELING WITH CITY/ DESIGN PROFESSIONAL PRIOR TO FABRICATING AND INSTALLING PIPELINE MARKERS. SUBMIT AS REQUIRED IN SECTION 01300-SUBMITTALS.

PIPELINE MARKER

WATER SERVICES
CITY OF KANSAS CITY, MISSOURI

DRAWING NO. 01000-1

DEVELOPED BY: TECHNICAL ADVISORY COMMITTEE

APPROVED BY: DATE: 9/02/2021

1
OF
1

END OF SECTION

SECTION 01015 – SPECIFIC PROJECT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section covers the modification of specifications for this Project. Any specification that is modified for this Project is listed in Part 3 of this Section by Division. If the Division or specification is not included in this Section, then the Project specification in the Division remains intact.

1.02 SPECIFICATION MODIFICATIONS

- A. In the event Section 01015 – Specific Project Requirements conflicts with other project specifications of Divisions 01 through 06; the requirements of this Section shall govern.

1.03 RELATED SECTIONS

- A. Section 00412 – Unit Prices
- B. Section 01000 – General Project Requirements.
- C. Section 01020 – Record Documents.
- D. Section 01300 – Submittals.
- E. Section 01320 – Construction Progress Documentation.
- F. Section 01322 – Photographic Documentation.
- G. Section 01500 – Temporary Facilities.
- H. Section 01570 – Temporary Erosion and Sediment Control.
- I. Section 01580 – Project Signs.
- J. Section 01581 – Public Communications.
- K. Section 02937 – Green Stormwater Infrastructure Site Activity Plan.
- L. Section 02938 – Green Stormwater Infrastructure Control and Protection.
- M. Section 02946 – Green Stormwater Infrastructure Aggregate Media.
- N. Section 02947 – Green Stormwater Infrastructure Growing Media and Soil Amendments.
- O. Section 02948 – Green Stormwater Infrastructure Media Liners.
- P. Section 02949 – Green Stormwater Infrastructure Tree Protection, Removal, and Replacement.
- Q. Section 02951 – Green Stormwater Infrastructure Plants.
- R. Section 02953 – Green Stormwater Infrastructure Non-Native Seeding and Sodding.
- S. Section 02955 – Green Stormwater Infrastructure Outlets.
- T. Section 02957 – Green Stormwater Infrastructure Establishment.

1.04 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.

1.05 INFORMATION PROVIDED BY THE CITY

- A. As provided in the Contract Documents.

1.06 DESCRIPTION OF PROJECT

- A. The work to be performed under these Contract Documents shall be consistent with Section 00700 - General Conditions in the construction, installation, and completion of all work required in connection with the **Green Infrastructure Project 1-2: Paseo Gateway/KCU** improvements in Kansas City, Jackson County, Missouri.
- B. The work to be performed under these Construction Contract Documents is generally described as follows:

The Green Infrastructure Project 1-2: Paseo Gateway/KCU, herein referred to as "Project", by the Water Services Department is an additional phase of the Independence & Paseo Intersection Improvements Project (Project Number 70142204) by the Parks & Recreation Department.

The Project is located northeast of the intersection of Independence Avenue and Paseo Boulevard and generally bound by Cliff Drive on the north, Independence Avenue on the south, Paseo Boulevard on the east, and the Kansas City University (KCU) campus on the west.

The Project includes construction of green infrastructure (extended wet detention basins) and instrumentation to manage the flow of stormwater within the green infrastructure with the infrastructure built-out for a future connection of the instrumentation to the City's SCADA system.

Because the project is an additional phase to the Independence & Paseo Intersection Improvements Project, the items to construct generally include fine grading, pond liner, native vegetation landscaping, instrumentation & controls, electrical power supply, retaining walls, storm & sanitary sewer relocation, and concrete flatwork.

1.07 CONTRACT DRAWINGS

- A. The Drawings on which the Form 00412 Adjustment Unit Prices and Contract are to be based are entitled **Green Infrastructure Project 1-2: Paseo Gateway/KCU**. The Drawings are to be supplemented by additional shop and dimension drawings of materials and equipment and other drawings where specified. The following drawings are included in the Drawings:

Drawing Number	Sheet Number	Title
C-000	1	Cover Sheet
C-001	2	General Notes
C-002	3	Existing Survey
C-003	4	Demolition Plan
C-004	5	Overall Grading Plan
C-005	6	Upper Pond Grading Plan
C-006	7	Alternate 1 Upper Pond Grading Plan
C-007	8	Lower Pond Grading Plan
C-008	9	Utility Plan
C-009	10	Storm Sewer Plan & Profile

C-010	11	Erosion Control Plan
C-011	12	Civil Details
C-012	13	Civil Details
C-013	14	Storm Sewer Details
C-014	15	Erosion Control Details
C-015	16	Erosion Control Details
C-016	17	Erosion Control Details
C-017	18	Drainage Area Map
C-018	19	Storm Sewer Calculations
C-019	20	Pond Drainage Area Map
C-020	21	Interim Cond. Drainage Area Map
C-021	22	Bike Path/Sidewalk Plan
E-001	23	Electrical Symbols & Notes
E-201	24	Overall Electric Plan
E-202	25	Enlarged Electrical Plans
E-301	26	One Line Diagram & Panel Schedule
E-401	27	Electrical Details
E-402	28	Electrical Details
EL-001	29	Lighting General Notes
EL-100	30	Site Lighting Plan
I&C-001	31	P&ID
I&C-002	32	Actuator Wiring Diagram
I&C-003	33	Instrument Installation Details
L-100	34	Site Plan Notes
L-101	35	Site Plan
L-102	36	Site Plan Enlargement
L-103	37	Site Plan Enlargement
L-104	38	Layout Plan Enlargement
L-105	39	Layout Plan Enlargement
L-106	40	Layout Plan Enlargement (Bid 1 – Alternate)
L-107	41	Layout Plan Enlargement
L-108	42	Site Plan Enlargement
L-200	43	Site Details Rock Sections
L-201	44	Site Details
L-202	45	Site Details Ped Bridge
L-203	46	Site Details Wood Dock - Alternate
L-300	47	Landscape Plan Notes
L-301	48	Landscape Plan
L-302	49	Landscape Plan Enlargement
L-303	50	Landscape Plan Enlargement
L-400	51	Landscape Details
L-500	52	Landscape Plan Rendering

1.08 MATERIALS FURNISHED BY THE CITY

A. This City will provide the following materials to be used for the Project:

1. Bentonite Clay Liner. The clay liner material will be stored on the project site in a Conex container (approximately 10-ft wide by 40-ft long) and the materials will be available to Contractor on site at the time of

construction notice-to-proceed. Contractor will be responsible for storage of material following construction notice-to-proceed

- B. All materials required to complete the Work in accordance with the Contract Documents shall be furnished, installed, and paid for by the Contractor.

1.09 SEQUENCE OF WORK

- A. Contractor shall deliver all required submittals including work sequence plan, shop drawings, sewer bypass plan, sewer abandonment plan, traffic control plan, and SWPPP.
- B. Contractor shall complete site activity plan. Of special note are special considerations for preventing sedimentation or clogging of the Green Infrastructure Installations. Phasing of work and Green Infrastructure installation should be such that Green Infrastructure, once installed, is protected from sedimentation or debris build-up.
- C. Contractor shall proceed with the work in the following general sequence for each segment of work.
 1. Where excavation is required, call 1-800-DIGRITE or 811 to confirm location of underground utilities in accordance with Missouri One Call System requirements.
 2. Complete and obtain all required permitting.
 3. Complete preconstruction photo documentation. Complete Pre-Construction Meeting
 4. Complete erosion and sediment control actions, as appropriate to the status of construction.
 5. Contractor shall design and install all traffic control measures according to requirements specified in the Manual for Uniform Traffic Control Devices. Traffic control shall include sidewalk closures at construction entrances and lane closures as required by construction disturbances.
 6. Contractor shall be responsible for establishing and maintaining erosion control BMP's prior to commencement of work, during work, and after land disturbance. The Contractor shall remove the erosion control BMP's after the permanent vegetation is established and pavement has been restored.
 7. Phase construction of upstream Green Infrastructure locations to avoid sedimentation of the completed Green Infrastructure.
 8. Remove sediment and debris from Green Infrastructure, if present, once green infrastructure is complete and all upstream areas are permanently stabilized.
 9. Complete and submit post construction photo documentation.
 10. Complete restoration and project closeout items.

1.10 UTILITY COORDINATION, LOCATION, AND POTHOLING

- A. The Work Plan shall include Contractor's plan to locate existing utilities.
- B. Contractor shall call the Missouri One Call System at 1-800-344-7483 prior to any excavation or potholing.

- C. Contractor shall be responsible for contacting and coordinating the location of all utilities including service lines with all utilities in the project area.
- D. Contractor shall pothole existing utilities and provide written notice to utility owners far enough in advance of the work to allow utilities to relocate if necessary. Notification shall be no less than 30 days prior to any Work. Report findings and any discrepancies to the Design Professional.
- E. Contractor shall coordinate any above or below ground utility bracing and/or relocation with the Utility owners. Any cost for bracing and/or relocating utilities shall be at no additional cost to the City.
- F. Contractor shall backfill all excavations and, if in roadway, an asphalt cap be installed within 24 hours of performing potholing work.
- G. Contractor shall organize and lead a coordination meeting with the affected utility companies.

1.11 OVERHEAD LIGHT POLES:

- A. Contractor shall coordinate with the City when working near or around light poles.
- B. If the Contractor hits or damages any light pole or its appurtenances they shall contact the City's on call contractor for repairs. The City's on call contractor for repair is Black and McDonald and can be reached in an emergency at 816-483-0257. Any costs associated with repairing damage shall be at no additional cost to the City.
- C. Contractor shall contact the City prior to any bracing, removal or relocation of any light pole both before and after work is completed. The Contractor shall submit relocation plans to the City to be reviewed prior to work being completed. The Contractor shall provide information on the length of time a light will be out of service prior to completing any of the aforementioned work. Any cost associated with bracing, removing, or relocating light poles will be at no additional cost to the City.
- D. Contractor shall coordinate with any telecommunications utility prior to relocating any light pole. Any costs associated with relocating telecommunication utilities shall be at no additional cost to the City.

1.12 SURVEYING:

- A. Contractor shall use the services of a Missouri Registered surveyor to perform the following tasks. All survey documents shall be delivered to the Owner in standard text file, electronic topographic survey files including contours at a one (1.0) foot contour interval in .dwg and .pdf formats. The horizontal control coordinates will be indicated in State Plane Coordinates conforming to NAD 1983/1987 Missouri coordinate system with conversion to ground plane coordinates with a combined adjustment factor for the project coordinate system. The vertical control shall conform to NAVD 1988.

- B. Construction Staking: Contractor shall perform their own construction staking. Staking shall be of sufficient detail for the Project to be constructed and shall be based on the survey used for the design.
- C. Results of potholing: The results of any potholing performed by the Contractor shall be provided to the Design Professional. The horizontal and vertical locations of the utilities or other features identified shall be provided to the Owner. The information provided to the Owner shall include the coordinates, dimensions, elevations and sizes of the utilities or other features found.
- D. Intersections: Contractor shall survey all existing street intersections, curb and gutter, fences, and other improvements that will require repair or replacement or that will be disturbed by construction activities, in sufficient detail, so that the intersections and features can be restored to existing conditions, elevations, and grades.
- E. Record Drawings: Contractor shall perform any surveying required to provide as built coordinates and elevations that may vary from the design documents.

1.13 STORM AND SANITARY SEWER CONNECTIONS:

- A. Not all services are shown in the Drawings.
- B. Verification of Connections: When connections to the existing combined, storm or sanitary system are encountered, the Contractor shall verify the service (sanitary or storm) and status (live or inactive). All connections or services shall be reconnected to the appropriate sanitary or storm sewer system.
- C. During construction, the Contractor may encounter sewers with unknown origins as a part of the existing combined system. When such connections are identified, the Contractor shall be responsible for identifying the upstream and downstream connections, and use (storm or sanitary service) and report those findings to the Design Professional. Methods used to determine use shall include dye testing, lateral launch cameras and push cameras. The Design Professional shall assist the Contractor in determining the action to be taken with the connections. The Contractor shall supply all time, materials, and equipment necessary to identify the unknown connections at no additional cost to the City.

1.14 EXISTING STRUCTURES AND YARD FEATURES

All fences, walls, sheds or other structures or appurtenances removed for construction purposes, and any existing yard feature or other item damaged by the Contractor shall be replaced or repaired to equal or better than pre-construction condition by the Contractor.

1.15 SODDING

Established lawns which are disturbed by project-related construction shall be restored with sod to original or better condition, unless otherwise specified by the Engineer, within three weeks of initial disturbance.

1.16 PERMITS AND DEGRADATION FEES

Contractor shall be responsible for all costs of permits and degradation fees pertaining to the scope of work in this contract. Public Works Department will require an excavation permit for each individual excavation and a degradation fee for each area of pavement disturbed within the street right-of-way, in addition to a traffic control permit if required.

1.17 CMAC PROVIDER

CMAC Provider” as referenced in Section 406900 and Drawing Numbers C-020, I&C-002, and I&C-003 shall be OptiRTC.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

3.01 DIVISION 1 – GENERAL REQUIREMENTS, SPECIFICATION MODIFICATIONS

A. Division 1 – General Requirements is modified as follows:

B. Section 01000 – General Project Requirements

1. No modifications

C. Section 01020 – Record Documents.

1. The Contractor shall not be responsible for developing final Conforming to Construction Drawings. The Contractor shall be required to maintain detailed records in the field to be provided to the Owner for preparation of Conforming to Construction Drawings. The Contractor shall provide documents in PDF format, clearly legible, summarizing the work completed.

D. Section 01300 – Submittals

1. No documents are to be submitted in hard copy format.

E. Section 01320 – Construction Progress Documentation

1. In accordance with Section 01320, paragraph 1.08, Contractor shall provide a Schedule Level that meets the minimum requirements of a Level 3 - Detail Schedule.
2. In accordance with Section 01320, paragraph 1.08, a Cost Correlation is not a requirement of the Project.
3. The Contractor shall prepare all schedules using either Primavera version P6 or higher or Microsoft Project. To expedite the monthly invoice review time, the Contractor shall submit an electronic monthly schedule via a workflow in the City’s electronic document control system to Owner, Engineer, and Resident Project Representative (RPR) for review prior to submitting the monthly invoice. The signed invoice, with approved schedule, shall be given to the RPR for

approval prior to Owner and Engineer approval via a separate workflow in the document control system.

F. Section 01322 – Photographic and Video Documentation

1. Pre-Construction Photographs will be required as part of the Project.
2. Post-Construction Photographs will be required as part of the Project.
3. Photographs and videos, as applicable, provided by the Contractor shall be submitted using the Document Control System in accordance with Section 01335.

G. Section 01500 – Temporary Facilities

1. Office: In accordance with paragraph 3.01 OFFICE, the Contractor will be allowed to use an assigned vehicle in lieu of a stationary office.
2. Field Office for Resident Project Representative: In accordance with paragraph 3.02 FIELD OFFICE FOR RESIDENT PROJECT REPRESENTATIVE, the Contractor is not required to provide a field office for the Resident Project Representative.

H. Section 01570 – Temporary Erosion Sediment Control

1. Erosion Control Plans: Preparation of Erosion Control Plans will be the responsibility of the Contractor. Because the Contractor is responsible for compliance with the SWPPP, the Contractor shall be responsible for reviewing and revising the plan as needed to assure permit compliance for all phases of the Work. The Contractor's Bid shall include all labor, materials and equipment needed.

I. Section 01580 – Project Signs

1. Printers: The following is a list of local businesses who have provided printing services for City project signs. Printing location shall be coordinated with the City/Design Professional.

- a. Almar Printing
7735 Wornall Road
Kansas City, MO 64114
Phone: (816) 523-4566
- b. Custom Color
14320 W. 101st Terrace
Lenexa, KS 66215
Phone: (913) 730-3100
- c. KC Blueprint Company
1804 Swift St.
North Kansas City, Missouri 64116
816-513-1048 Print Center
816-527-0900 Home Office

- d. Office Max
- e. City Hall Basement Print Center
414 E. 12th Street
Kansas City, MO 64106
Phone: (816) 513-1048

2. Number of Project Signs to be provided:

- a. Contractor shall provide one (1) Project sign.

J. Section 01581 – Public Communications

- 1. The Contractor will be required to attend one public meeting specified in Section 01581.
- 2. Contractor shall coordinate project schedule with Kansas City University and Amino Brothers Construction (contractor for KC Parks Roadway Project No. 70142204) and accommodate reasonable requests from regarding scheduling of the work.

K. Section 01700 – Traffic Control

- 1. Traffic Control Plans:
 - a. Contractor shall keep Kansas City University and Amino Brothers Construction (contractor for KC Parks Roadway Project No. 70142204) informed of the work schedule that would interfere with access to their facility or site. Notification shall be distributed at least 3 weeks in advance of work occurring near a facility.
 - b. Contractor shall coordinate as necessary travel routes for KCATA buses during lane closures.
 - c. Contractor shall comply with City of Kansas City Ordinance 211030 dated 12/9/2021. A copy of this ordinance is attached at the end of this section.

3.02 DIVISION 2 – SITEWORK, SPECIFICATION MODIFICATIONS

A. Division 2 modified as follows:

B. Section 02937 – Green Stormwater Infrastructure Site Activity Plan

- 1. Paragraph 3.02E. Delete “during the Establishment Period” and replace with “until all work is completed and recommended for Final Payment”.
- 2. Paragraph 3.06C. Delete “through the duration of the Establishment Period” and replace with “until all work is completed and recommended for Final Payment”

C. Section 02938 – Green Stormwater Infrastructure Control and Protection

1. Paragraph 3.06A. Delete “the entire upstream area is fully stabilized” and replace with “until all work is completed and recommended for Final Payment”.

D. Section 02946 – Green Stormwater Infrastructure Aggregate Media

1. Paragraph 3.06A. Delete “through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment” and replace with “until all work is completed and recommended for Final Payment”.
2. Paragraph 3.08A. Replace “duration of the Establishment Period” with “one (1) year after Achievement of Full Operation”
3. Delete Paragraph 3.08B.

E. Section 02947 – Green Stormwater Infrastructure Growing Media and Soil Amendments

1. Paragraph 3.06A. Delete “through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment” and replace with “until all work is completed and recommended for Final Payment”.
2. Paragraph 3.08B. Replace “duration of the Establishment Period” with “one (1) year after Achievement of Full Operation”.
3. Replace Paragraph 3.08C. with “If at any time during one (1) year after Achievement of Full Operation soil loss occurs, the Contractor shall replace the media and fully restore the green stormwater infrastructure facility and any damaged components as determined by the Design Professional, at no additional cost to the Owner.”

F. Section 02949 – Green Stormwater Infrastructure Tree Protection, Removal, and Replacement

1. Paragraph 3.06B. Delete “through the Establishment Period, as defined in Section 02957 Green Stormwater Infrastructure Establishment” and replace with “until all work is completed and recommended for Final Payment”.

G. Section 02951 – Green Stormwater Infrastructure Plants

1. Paragraph 3.06A. Delete “through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment” and replace with “until all work is completed and recommended for Final Payment”.
2. Paragraph 3.08A. Replace “duration of the Establishment Period” with “one (1) year after Achievement of Full Operation”
3. Replace Paragraph 3.08B. with “If at any time during one (1) year after Achievement of Full Operation the plantings die, the Contractor shall replace the Plants and fully restore the green stormwater infrastructure facility and any

damaged components as determined by the Design Professional, at no additional cost to the Owner.”

H. Section 02953 – Green Stormwater Infrastructure Non-Native Seeding and Sodding

1. Paragraph 3.06A. Delete “through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment” and replace with “until all work is completed and recommended for Final Payment”.
2. Paragraph 3.08A. Replace “duration of the Establishment Period” with “one (1) year after Achievement of Full Operation”
3. Replace Paragraph 3.08B. with “If at any time during one (1) year after Achievement of Full Operation the non-native seed does not establish to 80% by area or greater the 20% by area of the non-native sod dies, the Contractor shall replace the non-native seed and/or sod and fully restore the green stormwater infrastructure facility and any damaged components as determined by the Design Professional, at no additional cost to the Owner.”

I. Section 02955 – Green Stormwater Infrastructure Outlets

1. Paragraph 3.06A. Delete “through the Establishment Period, as defined in Section 02957 Green Stormwater Infrastructure Establishment,” and replace with “until all work is completed and recommended for Final Payment”.

J. Section 02957 – Green Stormwater Infrastructure Establishment

1. Delete Paragraphs 1.02A., 1.02B., and 1.02C. Measurement and Payment shall be defined per Section 01270.
2. Paragraph 3.06A. Delete “through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment” and replace with “until all work is completed and recommended for Final Payment”.
3. Delete Paragraph 3.07 Post-Construction Infiltration Testing.
4. Delete Paragraph 3.08A.

3.03 DIVISION 3 – CONCRETE, SPECIFICATION MODIFICATIONS

A. No Modifications

3.04 DIVISION 4 – MASONRY, SPECIFICATION MODIFICATIONS

A. Not used.

3.05 DIVISION 5 – METALS, SPECIFICATION MODIFICATIONS

A. No Modifications.

3.06 DIVISION 6 – WOODS AND PLASTICS, SPECIFICATION MODIFICATIONS

A. Not used.

3.07 DIVISION 7 – THERMAL AND MOISTURE PROTECTION, SPECIFICATION MODIFICATIONS

A. Not used.

3.08 DIVISION 8 – DOORS AND WINDOWS, SPECIFICATION MODIFICATIONS

A. Not used.

3.09 DIVISION 9 – FINISHES, SPECIFICATION MODIFICATIONS

A. Not used.

3.10 DIVISION 10 – SPECIALITIES, SPECIFICATION MODIFICATIONS

A. Not used.

3.11 DIVISION 11 – EQUIPMENT, SPECIFICATION MODIFICATIONS

A. Not used.

3.12 DIVISION 12 – FURNISHINGS, SPECIFICATION MODIFICATIONS

A. Not used.

3.13 DIVISION 13 – SPECIAL CONSTRUCTION, SPECIFICATION MODIFICATIONS

A. No Modifications.

3.14 DIVISION 14 – CONVEYANCE SYSTEMS, SPECIFICATION MODIFICATIONS

A. Not used.

3.15 DIVISION 15 – MECHANICAL/PLUMBING, SPECIFICATION
MODIFICATIONS

A. Not used.

3.16 DIVISION 16 – ELECTRICAL, SPECIFICATION MODIFICATIONS

A. No Modifications.

3.17 DIVISION 40 – PROCESS INTEGRATION

A. No Modifications.

END OF SECTION

SECTION 01020 – RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Contractor shall maintain, in a safe place at the Site, one updated record copy of all Drawings, Standards and Specifications, Addenda, Shop Drawings, Requests for Interpretation (RFIs), Requests for Proposal (RFPs), Work Change Directives (WCDs), Change Orders, other written interpretations or clarifications of the contract documents, survey information (including approved cut sheets) and all other documents relevant to the Work.
- B. All such documents shall be kept in order, good condition and shall be continuously updated to indicate all work installed and all changes made during construction.
- C. No work shall be allowed in the absence of these record documents.
- D. This document also outlines electronic data requirements and defines the survey requirements for the development of Field-Marked Drawings, As-Built Drawings and Conforming to Construction Drawings.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. Section 00700 – General Conditions.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01300 – Submittals.
- D. Section 01335 – Document Management.
- E. Section 02686 – CCTV Inspection.

1.04 CODES AND STANDARDS

- A. CAD Standards – United States National CAD Standards.

1.05 DEFINITIONS

- A. Drawings – As defined by Section 00700 – General Conditions.
- B. Approved for Construction Drawings – Any drawing or sketch that has been issued to the Contractor by the City for the purposes of constructing the Work. These include, but are not limited to, the following: Drawings, revisions to the Drawings, information issued as part of change orders and information issued as part of work change directives.
- C. Field-Marked Drawings (Red Line Markups) – A copy of the Approved for Construction Drawings that is maintained and updated daily by the Contractor during construction detailing all work completed and depicting all changes made to the Work during construction.
- D. As-Built Drawings – The completed Field-Marked Drawings that include the signed certification language from both the Contractor and Surveyor.
- E. Conforming to Construction Drawings – The Approved for Construction Drawings that have been revised to reflect the changes noted on the As-Built Drawings. For these drawings, the CAD files are updated and a new set of drawings is created.

- F. Record Drawings – All drawings used or developed as part of the Work. Record Drawings include, but are not limited to, the following: Approved for Construction Drawings, Field-Marked Drawings, As-Built Drawings and Conforming to Construction Drawings.
- G. Record Documents – As defined by this Section, Section 01015 and Section 00700 – General Conditions, Article 6 Contractor’s Responsibilities.

1.06 INFORMATION PROVIDED BY THE CITY

- A. The City will provide the Contractor a suitable copy of the Approved for Construction Drawings in an electronic/CAD format.

1.07 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Submittals include, but are not limited to, the following:
 - (a) All Record Documents – As required by this Section, Section 1015 and Section 00700 – General Conditions, Article 6, Contractor’s Responsibilities, paragraph Record Documents.
 - (b) Field-Marked Drawings.
 - (c) As-Built Drawings.
 - (d) Conforming to Construction Drawings.
 - (e) Other Record Documents as requested by the City.

1.08 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 SURVEY REQUIREMENTS

- A. All field books, notes, videotapes and other data developed by the Contractor in performing surveys required as part of the Work shall be available to the City for examination throughout the construction period. All such data shall be submitted to the City with the other documentation required for final acceptance of the Work.
- B. General Requirements:
 - (a) The Contractor shall provide survey grade information for the locations and elevations of the Work as described herein. Surveys shall be conducted by a Professional Land Surveyor, licensed in the State of Missouri (Surveyor).
 - (b) Vertical Datum – All elevations shall be indicated in North American Vertical Datum of 1988 (NAVD 88) in feet and decimals of a foot.
 - (c) Horizontal Control – Coordinates shall be referenced to the North American Datum of 1983 (NAD 83), State Plane Missouri West Zone FIPS 2403 US Feet coordinate system, Kansas City Metro Control. Statewide Missouri Geographical Reference System monuments, Project monuments and Certified Land corners shall be used as references to determine State Plane coordinates. All control monuments used in the survey work shall be listed with reference ties and shown on the Record Drawings.

C. Water Systems:

- (a) Fire Hydrant Assemblies – Provide survey point (location and elevation) at the top of the operating nut for each fire hydrant.
- (b) Fittings – Provide survey point (location and elevation) at the center of each fitting (i.e. bends, tees, valves, etc.). Survey shall be taken at the top of the fitting. Provide the elevation of finished grade or improvements at the top of the fitting.
- (c) Pipe Profile – Provide survey points (location and elevation) at the center point of all piping at a maximum spacing of 50 feet. Survey shall be taken on the top of the pipe. At the same location, provide the elevation of finished grade.
- (d) Valves, Valve Vaults, Meter pits and Other Structures – A survey is required to verify the location of all new valves, valve vaults, meter pits or other structures. The survey shall include, but is not limited to, the following:
 - (i) Location of the Structure – Provide coordinates for the center of the access cover.
 - (ii) Top Elevation – Provide the top elevation of the structure at the center of the access cover.

D. Wastewater Systems:

- (a) New Manholes – A survey is required to verify the location of all new manholes. The survey shall include, but is not limited to, the following:
 - (i) Location – Verify the “Locating Point” shown on the Approved for Construction Drawings or standard detail. Verify all coordinate data shown on the Approved for Construction Drawings. If no such information is provided, the Locating Point shall be the center of the manhole cover.
 - (ii) Top Elevation. – Provide the elevation of the top of the structure at the Locating Point.
 - (iii) Pipe Inverts – Provide the invert elevation and flow direction of all pipes that penetrate the structure (flowline in - FL IN) and exit the structure (flowline out - FL OUT).
 - (iv) Manhole Invert – Provide the elevation of the invert at the center of the manhole if different than the pipe inverts.
- (b) Existing Manholes – A survey is required to verify the location of all existing manholes that are modified as part of the Work. The survey shall include, but is not limited to, the following:
 - (i) Location of the Structure – Verify the “Locating Point” shown on the Approved for Construction Drawings or standard detail. Verify all coordinate data shown on the Approved for Construction Drawings. If no such information is provided, the Location Point shall be the center of the manhole cover.
 - (ii) Top Elevation – Provide the elevation of the top of the structure at the Locating Point.
 - (iii) Pipe Inverts – Provide the invert elevation and flow direction of all pipes that penetrate the structure (flowline in - FL IN) and exit the structure (flowline out - FL OUT).
 - (iv) Manhole Invert – Provide the elevation of the invert at the center of the manhole if different from the pipe inverts.

E. Storm Water and Green Infrastructure Systems:

- (a) A survey is required to verify the location of all new Green Infrastructure, Storm Water Structures, Junction Boxes, Manholes, Inlets and all other related structures. The survey shall include, but is not limited to, the following:

- (i) Location of the Structure – Verify the Locating Point shown on the Approved for Construction Drawings or standard detail. Verify all coordinate data shown on the Approved for Construction Drawings. The locating point for curb inlets is center of inside face of inlet wall. If no other locating information is provided for other structures, the Locating Point shall be the center of the access cover.
- (ii) Top Elevation – Provide the elevation of the top of the structure at the Locating Point.
- (iii) Pipe Inverts – Provide the invert elevation and flow direction of all pipes that penetrate the structure (flowline in - FL IN) and exit the structure (flowline out - FL OUT).
- (iv) Manhole or Structure Invert – Provide the elevation of the invert at the center of the manhole or structure if different than the pipe inverts.
- (b) Culvert:
 - (i) A survey is required to verify the location of new culverts. The survey shall include, but is not limited to, the following:
 - (ii) Location – The Locating Points shall be the center line of each culvert barrel at the upstream and downstream end of each. The location of each culvert barrel is to be provided.
 - (iii) Invert – Provide the upstream and downstream invert elevation of each culvert barrel.
- (c) Channels and Ditches:
 - (i) Profile – Provide survey points (location and elevation) at the upstream and downstream end of the channel and along the channel at a maximum 50-foot intervals and at all bends and changes in alignment.
 - (ii) Survey points shall be taken at finished grade at the centerline, toes of side slopes or walls and top elevation of the high flow channel on both sides of the channel. If water is present in the channel or ditch, provide water surface elevation on both sides of the channel.
- (d) Detention Areas:
 - (i) For any surface feature designed to detain or retain storm water runoff (i.e., detention basins, rain gardens, bio-retention cells, etc.) an as-built survey of the feature is required.
 - (ii) Enough survey points shall be taken to generate 1-foot contours of the detention or retention area and any containment berms.
 - (iii) Provide survey points (location and elevation) for both ends of weirs, all weir high and low points (if top of weir is not level) and other flow control structures, inlets and outlets.
 - (iv) Provide survey points (location and elevation) for both ends of weirs and all weir high and low points (if top of weir is not level) of the principle spillway structure.

3.02 FIELD-MARKED DRAWINGS

- A. The Contractor shall continuously maintain a set of Field-Marked Drawings which details all work completed and shows all changes or deviations made by the Contractor from the Approved for Construction Drawings. Where the Approved for Construction Drawings are not detailed and allow for flexibility during construction, the Contractor shall include the detailed information on how the Work was constructed. These adjustments shall include, but are not limited to, field adjustments and change orders.

- B. Field-Marked Drawings shall be prepared using survey grade information to show the horizontal and vertical location of the Work after completion of construction. Connection details may be sketched using field run measurements.
- C. Mark new information that is important to the City that is not shown on Drawings or Shop Drawings.
- D. Note related Change Order numbers where applicable.
- E. Include the following:
 - (a) Field changes of dimension and detail.
 - (b) Changes made by Change Order or other modifications.
 - (c) Details not on original Drawings.
 - (d) Horizontal and vertical location of all underground utilities and all other concealed elements that would complicate and make difficult/expensive to maintain the installed asset at a later date.
- F. Precision of Measurement:
 - (a) Where survey measurements are not required (sketching connection details) – elevations, stationing, distances and measurements shall be expressed to the nearest 0.10 foot.
 - (b) All other Work requires survey information – elevations, station, distances and measurements shall be expressed to the nearest 0.01 foot.
- G. Field changes or additions shall be designated in RED. Hard copy and electronic (PDF) deliverables shall be provided in color.
- H. Information shall be clearly distinguishable on hard copy mark-ups and in the electronic files.
- I. If the Contractor observes inaccurate information pertaining to existing conditions, the correct information shall be noted in the Field-Marked Drawings.
- J. The Contractor shall submit 30%, 60% and 90% check prints with the corresponding percent complete of work. The check prints shall be submitted with the Application for Payment. Failure to provide the check prints shall cause the Application for Payment to be returned to the Contractor.

3.03 AS-BUILT DRAWINGS

- A. Upon completion of the Work and before the Application for Final Payment, the Contractor shall prepare the As-Built Drawings by completing annotations to the Field-Marked Drawings and adding the required certification statements.
- B. Surveyor's Certification:
 - (a) Each drawing shall be modified to include a certification statement and signature block as described below.
 - (b) Every sheet of the Field-Marked Drawings must be reviewed, signed and sealed by a Professional Land Surveyor, licensed in the State of Missouri and must include the following statement on the title block inside the box marked "for WSD use" and near the Surveyor's professional license seal:

(i) Water Systems

Each sheet of these Record Drawings and attached Survey Cut Sheets for the Work have been reviewed and approved by the Professional Land Surveyor whose seal is affixed to this Record. The horizontal control, coordinates and elevations shown on these Records are accurate and are based on the Missouri Coordinate System of 1983, West Zone and NAVD88 datum, with the date of adjustment. These Records have been revised, as required in Section 01000, 1.20 of the Standards and

Specifications for Water Main Extensions and Relocations, under my personal supervision to show the true and accurate measurements of the work as it was actually constructed.

(ii) Wastewater, Storm Water and Green Infrastructure Systems

Each sheet of these Record Drawings and attached Survey Cut Sheets for the Work have been reviewed and approved by the Professional Land Surveyor whose seal is affixed to this Record. The horizontal control coordinates and elevations shown on these Records are accurate and are based on the Missouri Coordinate System of 1983, West Zone and NAVD88 Datum. These Records have been revised under my personal supervision to show the true and accurate measurements of the work as it was actually constructed.

C. Contractor's Certification:

- (a) Each drawing shall be modified to include a certification statement and signature block as described below.
- (b) The Contractor shall provide certification that the Field-Marked Drawings reflect the conditions that were constructed.
- (c) The Contractor shall review the Field-Marked Drawings and verify all information is accurate. The Contractor shall verify that all changes to the Work have been documented. The Contractor shall sign each sheet of the Record Drawings with the following certification(s):

(i) Water Systems

I hereby certify that this Record correctly depicts the Work constructed as to size, material, horizontal location, vertical location and finished grade as shown on the approved construction drawings or their revision. The Work was done in accordance with these Records and the current version of the Standards and Specifications for Water Main Extensions and Relocations.

Contractor: _____ Date: _____
 Name (print): _____ Title: _____
 Signature: _____

(ii) Wastewater, Storm Water and Green Infrastructure Systems

I hereby certify that this Record correctly depicts the Work constructed as to size, material, horizontal location, vertical location, grade of installed piping systems and finished grade as shown on the approved construction drawings or their revision. The Work was done in accordance with these Records.

Contractor: _____ Date: _____
 Name (print): _____ Title: _____
 Signature: _____

- D. Submittals – Submit As-Built Drawings in accordance with paragraph SUBMITTALS. As-Built and Conforming to Construction Drawings must be approved by the City before the Contractor submits the Application for Final Payment.

- E. Mark each document "AS-BUILT DRAWINGS" in neat, large print letters.
- F. The cover sheet of the project shall be included. The cover sheet shall include all required As-Built certifications and shall clearly show that the drawings are AS-BUILT.

3.04 CONFORMING TO CONSTRUCTION DRAWINGS

- A. The Contractor shall prepare Conforming to Construction Drawings as required by this Section and Section 01015 – Specific Project Requirements.
- B. Conforming to Construction Drawings shall be submitted and accepted by the City before the Contractor may submit the Application for Final Payment.
- C. The Contractor shall edit the CAD drawings to reflect the changes shown on the As-Built Drawings. All line work and text shall be revised and edited to accurately reflect the information provided in the As-Built Drawings. Line work shall be drawn to scale in the coordinate system and datum specified herein.
- D. Version – CAD drawings shall be developed and submitted in the latest version of AutoCAD® .dwg format or AutoCAD® Civil 3D. See Section 01015 – Specific Project Conditions for additional information regarding CAD formats and standards.
- E. CAD Standards – Comply with United States National CAD Standards.
- F. The cover sheet of the project shall be included. The cover sheet shall include all required as-built certifications and shall clearly show that the drawings are as-built.
- G. Conforming to Construction Drawings shall have a “CONFORMED TO CONSTRUCTION” label clearly and prominently shown on each sheet, preferably in the lower right-hand corner of the drawing.
- H. Conforming to Construction Drawings shall be labeled with the following information:
 - (a) Project Name.
 - (b) WSD Project Number.
 - (c) WSD Work Order Number.
 - (d) WSD Drawing Number.
 - (e) Date of publication.
- I. Submittals – Submit Conforming to Construction Drawings in accordance with paragraph SUBMITTALS.

3.05 OTHER RECORD DOCUMENTS

- A. As defined by Section 00700 – General Conditions, Article 6 – Contractor’s Responsibilities.
- B. Coordinates Table – Provide a Microsoft Excel spreadsheet that contains the coordinates of every asset installed or adjusted as part of the Work.
- C. Survey Cut Sheets.
- D. Television Inspection data files as specified in Section 02686 – CCTV Inspection.
- E. Other information as specified in Section 01015 – Specific Project Requirements.

3.06 DELIVERABLES AND SUBMITTALS

- A. Electronic Submittals:
 - (a) All electronic deliverables (drawings, coordinates table, etc...) shall be made through the approved document management system. See Section 01335 – Document Management.
- B. As-Built Drawings:
 - (a) One (1) hard copy on paper for review and approval.
 - (b) One (1) electronic copy in PDF format.

- (c) One (1) electronic copy in the latest version of AutoCAD® .dwg format.
- C. Conforming to Construction Drawings:
 - (a) One (1) signed, sealed and certified hard copy on Mylar or Vellum.
 - (b) One (1) signed, sealed and certified hard copy on paper.
 - (c) One (1) signed, sealed and certified electronic copy in PDF format.
 - (d) One (1) signed, sealed and certified electronic copy in the latest version of AutoCAD® .dwg format.
- D. Record Documents:
 - (a) Submit Record documents in accordance with Section 00700 – General Conditions, Article 14 – Payments to the Contractor and Completion.
 - (b) Submit other documents as required by paragraph 3.05 OTHER RECORD DOCUMENTS of this section.
 - (c) One (1) hard copy on paper.
 - (d) One (1) electronic copy in PDF format.
 - (e) As specified in other sections.
- E. Electronic (PDF) Documents:
 - (a) Documents shall be full scale.
 - (b) Markups shall be noted in RED.
 - (c) Minimum resolution shall be 600 dpi.

3.07 CORRECTIONS DURING THE WARRANTY PERIOD

- A. The Record Documents shall be an integral part of the work guaranteed by the Contractor's Performance and Maintenance Bond. If during the three-year maintenance period the City determines that further revisions or corrections are necessary to make the Record Documents accurate, the Contractor shall make or cause the revisions or corrections to be made at no additional cost to the City.

END OF SECTION

SECTION 01210 – ALLOWANCES

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including SECTION 00700-GENERAL CONDITIONS and SECTION 00800 – SUPPLEMENTARY CONDITIONS and other Specification Sections, apply to this section.
- B. Form 00413 Allowance Form.
- C. Form 01210.01 Allowance Authorization.

1.2 SUMMARY

- A. This section includes administrative and procedural requirements governing allowances.
- B. The allowance is miscellaneous items not otherwise identified for repair and/or replacement on the Contract Drawings or Specifications.
- C. Funds will be drawn from the allowance by issuance of Form 01210.01 Allowance Authorization.
- D. At Project closeout, unused amounts remaining in the allowance will be credited to the Owner by Change Order.

1.3 PROPOSALS

- A. At Owner's request, the Contractor shall prepare a written proposal with cost breakdown for each proposed work assignment under the allowance. Include recommendations that are relevant to performing the work.
- B. Contractor shall not proceed with allowance work until Owner issues an Allowance Authorization.

1.4 PREPARATION

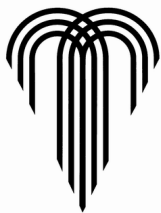
- A. Contractor shall complete each authorized item in accordance with the standard specification within the Project Manual.
- B. Contractor shall coordinate with Water Services Engineer and Resident Inspector prior and obtain written approval prior to using the allowance.

1.5 SCHEDULE OF ALLOWANCES

- A. To complete miscellaneous Work not specifically identified in the Contract Documents.

End of Section.

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

ALLOWANCE AUTHORIZATION

Project/Contract Number: _____

Project Title: _____

To: _____

Re: _____

Authorization Number: _____

From: _____

Date: _____

Contract For: _____

You are authorized to perform the following item(s) of work and to adjust the Allowance Sum accordingly:

This is NOT a CHANGE ORDER and does NOT INCREASE OR DECREASE the CONTRACT AMOUNT.

Original Allowance	\$ _____
Allowance Expenditures prior to this Authorization	\$ _____
Allowance Balance prior to this Authorization	\$ _____
Allowance will be [<input type="checkbox"/> increased] [<input type="checkbox"/> decreased] by this Authorization	\$ _____
New Allowance Balance	\$ _____

APPROVAL RECOMMENDED

CITY APPROVAL

Design Professional _____ Date _____

City's Representative _____ Date _____

CONTRACTOR ACCEPTANCE

Construction Manager _____ Date _____

Contractor _____ Date _____

Project Manager _____ Date _____

☐ Attachments:

Distribution: ☐ City
☐ Contractor
☐ Construction Manager
☐ Design Professional
☐ Consultant
☐ Other

SECTION 01270 – ADJUSTMENT UNIT PRICE AND MEASUREMENT PROCEDURES

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This section describes the method by which construction of this project shall be measured and paid in accordance with Form 00412 Adjustment Unit Prices. Should there be any conflicts between payment described in individual specification sections and this section, payment shall be made in accordance with this section. Any work shown on the Construction Contract Documents or described in the Specifications that is not specifically covered by the bid items shall be considered subsidiary and costs included in other items of Work.
- B. The Base Bid and Bid Alternate 1 shall be as calculated on Form 00412 Adjustment Unit Prices. The Base Bid and Bid Alternate 1 or any combination thereof may be selected for construction at the Owner's discretion.
- C. The Bid includes all profit, overhead, markups, labor, equipment, materials, incidental or ancillary work, permits, coordination, traffic control, submittals, mobilization, bonds, insurance, acceptance testing, cleanup, demobilization, closeout and other costs required to provide a complete functioning project that satisfies the project specifications, unless specifically noted or excluded by subsequent in these specifications.
- D. Form 00412 includes a listing of Adjustment Unit Price items and Adjustment Unit Price costs. The final Contract Price shall be adjusted according to the final measured, used, or installed quantities based on the Line Items unit prices. Measurement shall be as approved by the Owner.
- E. Include as part of each Line Item Adjustment Unit Price in PART 2 – ADJUSTMENT UNIT PRICES ITEMS all costs associated with miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.
- F. As part of each Adjustment Unit Price Line Items in PART 2 – ADJUSTMENT UNIT PRICES ITEMS, the unit price on 00412 Adjustment Unit Prices Bid Form includes all costs associated with permits, traffic control, bypass pumping, preliminary cleaning including heavy cleaning as necessary and CCTV, demolition, excavation, bedding, backfill, ancillary devices, locating manholes including those below grade, verifying manhole depths, restoration, fence removal and replacement, landscaping, removing and replacing retaining walls 4-feet and less in height unless otherwise called out with a greater height, tree removal and replacement, street restoration, curb replacement, sidewalk replacement, driveway restoration, ADA ramp construction, sign removal and replacement, utility pole bracing or relocating, irrigation system replacement, abandoned utility removal, and abandoned railroad rail removal required to complete installation.

- G. Contractor shall protect in place all utilities and adjacent infrastructure (including but not limited to subgrade, backfill, streets, driveways, sidewalks, ADA ramps, etc.) by whatever means necessary and at the Contractor's cost. No additional payment will be made for repair of public or private utilities or adjacent infrastructure that are damaged or collapse during construction activities, regardless of the means and methods for protecting in place. If a utility is in direct conflict with the Work and requires relocation, Contractor shall give the utility company reasonable advanced notice and provide such plans as the company may reasonably require to perform the relocation.
- H. Contractor shall be responsible to complete field investigations to determine if service laterals within the area of Work are active and to only install new service connections and/or reinstate active laterals. If inactive laterals are installed or reinstated, Contractor shall install a Cured-in-Place Pipe Sectional Point Repair at no additional cost to the Owner.
- I. References in this specification to Line Items and Unit Prices (costs) are to Form 00412 Adjustment Unit Prices and to the Sewer Main and Lateral Rehabilitation Schedule and Manhole Rehabilitation Schedule on the Contract Drawings. Reference herein to the "Rehabilitation Schedule" refers to these two schedules.
- J. The Owner may add or delete any quantity of Work to the project by Work Change Directive at the prices listed on Form 00412 Adjustment Unit Prices, per 00800 Supplementary Conditions SC-11.04 C.

PART 2 – ADJUSTMENT UNIT PRICE ITEMS

2.01 EROSION & SEDIMENT CONTROL (LINE ITEM 1)

- A. This section refers to the erosion and sediment control measures depicted on the Erosion Control Plan, including silt fence, construction entrance, concrete wash out and storm sewer inlet protection.
- B. This item includes erosion and sediment control required initially, during construction, and during the landscape establishment period.
- C. Erosion & Sediment Control: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for "Erosion & Sediment Control" as listed in the Bid Form – Unit Prices.

2.02 REMOVAL OF STORM SEWER SYSTEM (LINE ITEM 2)

- A. This section refers to storm sewer pipe and storm sewer structures located along the west and north sides of the Student Center on the Kansas City University campus. These items are being demolished so that the line can be lowered in the same alignment.
- B. Removal of Storm Sewer System: Measured to the nearest 1 linear foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Removal of Storm Sewer System” as listed on the Bid Form – Unit Prices.

2.03 REMOVAL OF SIDEWALK (LINE ITEM 3)

- A. This section refers to sidewalk that needs to be removed for the construction of the concrete retaining wall along the north side of the site. The sidewalk will need to be replaced after construction of the retaining wall.
- B. Removal of Sidewalk: Measured to the nearest 1 square foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Removal of Sidewalk” as listed on the Bid Form – Unit Prices.

2.04 GRADING (FINE GRADING) (LINE ITEM 4)

- A. This section refers to cut and fill on the site required to finish the pond, for installing the proposed features, and for constructing the proposed grades indicated in the Grading Drawings.
- B. Grading (Fine Grading): Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for “Grading (Fine Grading)” as listed in the Bid Form – Unit Prices.

2.05 TRASH RACKS (LINE ITEM 5)

- A. This section refers to trash racks added to the existing flared end sections on the Upper and Lower Ponds outlet pipes. The trash racks are intended to prevent large debris from clogging the outlet pipes and from entering the control structures.
- B. Trash Racks: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Trash Racks” as listed on the Bid Form – Unit Prices.

2.06 ADJUST STORM SEWER STRUCTURE TOP (LINE ITEM 6)

- A. This section refers to two existing storm sewer junction boxes located in the northeast area of the site and the existing outlet structure for the Upper Pond.
- B. The existing top section shall be removed and replaced with a new precast section.
- C. Adjust Storm Sewer Structure Top: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Adjust Storm Sewer Structure Top” as listed on the Bid Form – Unit Prices.

2.07 12” PVC STORM SEWER PIPE (LINE ITEM 7)

- A. This section refers to storm sewer pipe to be placed to the west and north of the Student Center on the Kansas City University campus for the storm sewer line that will be lowered in the same alignment.
- B. 12" PVC Storm Sewer Pipe: Measured to the nearest 1 linear foot, complete in place and acceptable, shall be paid for at the contract unit price bid for "12" PVC Storm Sewer Pipe" as listed in the Bid Form – Unit Prices.

2.08 24" NYLOPLAST DRAIN BASIN W/ STANDARD GRATE (LINE ITEM 8)

- A. This section refers to the Nyloplast storm sewer basins for the storm sewer system being lowered along the west and north side of the Student Center on the Kansas City University campus.
- B. 24" Nyloplast Drain Basin w/ Standard Grate: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for "24" Nyloplast Drain Basin w/ Standard Grate" as listed on the Bid Form – Unit Prices.

2.09 CMAC VALVES AND CONTROLS (LINE ITEM 9)

- A. This section refers to the butterfly valves, actuators, and controls to be added to the existing pond outlet control structures for the Upper and Lower ponds. This equipment will provide automated control to lower the pond water level in advance of a storm so that the pond can be utilized for stormwater retention.
- B. CMAC Valves and Controls: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for "CMAC Valves and Controls" as listed in the Bid Form – Unit Prices.

2.10 ELECTRICAL POWER TO VALVES AND CONTROLS (LINE ITEM 10)

- A. This section refers to the electrical equipment, panel, cable, conduits, etc. included on the Electrical drawings needed for power distribution from the existing transformer located east of the site next to Independence Ave., through the control panel, to the CMAC gates, actuators, and controls; and the Waterfall/Recirculation Pumps.
- B. Electrical Power to Gate and Controls: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for "Electrical Power to Gate and Controls" as listed in the Bid Form – Unit Prices.

2.11 FIBER OPTIC CONNECTION (LINE ITEM 11)

- A. This section refers to the fiber equipment, panel, cable, conduits, etc. included on the Electrical drawings needed to provide communications from an existing fiber box located at the SE corner of The Paseo and Cliff Dr. to the service panel and from the service panel to the equipment located in the Upper and Lower Pond control structures.
- B. Fiber Optic Connection: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for “Fiber Optic Connection” as listed in the Bid Form – Unit Prices.

2.12 WATERFALL/RECIRCULATION PUMPS (LINE ITEM 12)

- A. This section refers to the pumps that will recirculate water from the Lower Pond to the Upper Pond to create a waterfall over the weir located between the two ponds. This recirculation/waterfall will provide aeration and will help keep the pond from becoming stagnant. The pumps are in a vault at the north end of the Lower Pond.
- B. For measurement and payment information, refer to Specification 330513 Waterfall/Recirculation Pumps, Strainer Baskets, Piping and Vault; Section 3.7; Item A.

2.13 WATERFALL/RECIRCULATION STRAINER BASKETS (LINE ITEM 13)

- A. This section refers to the strainer baskets, located in the pump vault, used to protect the pumps from being fouled by debris. The strainer baskets are in a vault at the north end of the Lower Pond.
- B. For measurement and payment information, refer to Specification 330513 Waterfall/Recirculation Pumps, Strainer Baskets, Piping and Vault; Section 3.7; Item B.

2.14 WATERFALL/RECIRCULATION 6’x6’ PRECAST CONCRETE PUMP VAULT (LINE ITEM 14)

- A. This section refers to the precast concrete vault located at the north end of the Lower Pond which houses the waterfall/recirculation pumps and strainer baskets.
- B. For measurement and payment information, refer to Specification 330513 Waterfall/Recirculation Pumps, Strainer Baskets, Piping and Vault; Section 3.7; Item C.

2.15 WATERFALL/RECIRCULATION 6” PVC INTAKE PIPE (LINE ITEM 15)

- A. This section refers to the two 6” intake pipes that provide a gravity feed into the strainer baskets and waterfall/recirculation pumps in the precast concrete vault located at the north end of the Lower Pond.
- B. For measurement and payment information, refer to Specification 330513 Waterfall/Recirculation Pumps, Strainer Baskets, Piping and Vault; Section 3.7; Item D.

2.16 WATERFALL/RECIRCULATION 3" FLEXIBLE PVC DISCHARGE PIPE (LINE ITEM 16)

- A. This section refers to the two 3" discharge pipes that convey lower pond water from the waterfall/recirculation pumps in the precast concrete vault located at the north end of the Lower Pond to the south end of the Upper Pond.
- B. For measurement and payment information, refer to Specification 330513 Waterfall/Recirculation Pumps, Strainer Baskets, Piping and Vault; Section 3.7; Item E.

2.17 BRIDGE ABUTMENTS (LINE ITEM 17)

- A. This section refers to concrete bridge abutments, identical but mirrored at both ends of the pedestrian bridge located along the north end of the Upper Pond.
- B. The unit price shall include all concrete, rebar, expansion joint material, anchor bolts, bearing plate and aggregate necessary to prepare the subgrade and construct the bridge abutment and the approach slab. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. Bridge Abutments: Measured per each bridge abutment, complete in place and acceptable, shall be paid for at the contract unit price bid for "Bridge Abutments" as listed on the Bid Form – Unit Prices.

2.18 CONCRETE RETAINING WALL (LINE ITEM 18)

- A. This section refers to the concrete retaining wall that extends along the majority of the west side of the west sidewalks and also some shorter portions located along the east side of the west sidewalk to the west of the Lower Pond.
- B. The unit price shall include all concrete, rebar, dowels and waterstop necessary to prepare the subgrade and construct the wall including the footing. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. Concrete Retaining Wall: Measured to the nearest 0.1 cubic yards, complete in place and acceptable, shall be paid for at the contract unit price bid for "Concrete Retaining Wall" as listed on the Bid Form – Unit Prices.

2.19 TURNDOWN SIDEWALK CURB (LINE ITEM 19)

- A. This section refers to the turndown sidewalk curbs that extends along the sidewalks in areas where the distance between the top of sidewalk and the adjacent grade is two feet or less.
- B. The unit price shall include all concrete, rebar, and dowels necessary to prepare the subgrade and construct the turndown sidewalk curb and the full width of sidewalk adjacent to the turndown. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.

- C. Turndown Sidewalk Curb: Measured to the nearest 0.1 cubic yards, complete in place and acceptable, shall be paid for at the contract unit price bid for “Turndown Sidewalk Curb” as listed in the Bid Form – Unit Prices.

2.20 RIP RAP (LINE ITEM 20)

- A. This section refers to additional rip rap added to some of the storm sewer outlets in the pond and to the outlet of the weir between the Upper and Lower Ponds. This section also refers to the removal, storing, and replacement of existing rip rap at the storm sewer outlets and inlets in the pond.
- B. Rip Rap: Measured to the nearest 0.1 cubic yards, complete in place and acceptable, shall be paid for at the contract unit price bid for “Rip Rap” as listed on the Bid Form – Unit Prices.

2.21 IMPERMEABLE CLAY LINER (MATERIAL PROVIDED BY CITY) (LINE ITEM 21)

- A. This section refers to a bentonite clay liner to be installed in the Upper and Lower Ponds over the entire surface of the bottom, up to the Normal Water Level.
- B. The Owner is providing the bentonite material; therefore, only the cost for installation of the liner shall be included in the Unit Price. Installation cost includes cut in the ponds to get to the liner elevation and fill to bring the grade above the liner back to finished elevation.
- C. Impermeable Clay Liner: Measured to the nearest 0.1 square yards, complete in place and acceptable, shall be paid for at the contract unit price bid for “Impermeable Clay Liner” as listed in the Bid Form – Unit Prices.

2.22 PASEO GATEWAY BIKE PATH (LINE ITEM 22)

- A. This section refers to the concrete bike path on the west side of the site. This section also refers to the gravel base and compacted subgrade under the bike path as detailed in the plan sheet documents. This section includes reinforced concrete with welded wire fabric as detailed in KCMO Parks Standard Detail “SC”.
- B. Paseo Gateway Bike Path: Measured to the nearest 0.1 square feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Paseo Gateway Bike Path” as listed on the Bid Form – Unit Prices.

2.23 PASEO GATEWAY SIDEWALK (LINE ITEM 23)

- A. This section refers to the concrete bike path on the west side of the site. This section also refers to the gravel base and compacted subgrade under the sidewalk as detailed in the plan sheet documents. This section includes reinforced concrete with welded wire fabric as detailed in KCMO Parks Standard Detail “SC”.
- B. Paseo Gateway Sidewalk: Measured to the nearest 0.1 square feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Paseo Gateway Sidewalk” as listed on the Bid Form – Unit Prices.

2.24 CONCRETE MAINTENANCE PATH (LINE ITEM 24)

- A. This section refers to the concrete walks throughout the project site.
- B. Concrete Maintenance Path: Measured to the nearest 0.1 square feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Concrete Maintenance Path” as listed on the Bid Form – Unit Prices.

2.25 CONCRETE SIDEWALK (LINE ITEM 25)

- A. This section refers to the concrete sidewalk throughout the project site.
- B. Concrete Sidewalk: Measured to the nearest 0.1 square feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Concrete Sidewalk” as listed on the Bid Form – Unit Prices.

2.26 STAIRS WITH HANDRAILS (LINE ITEM 26)

- A. This section refers to the concrete stairs with handrails northeast of the Lower Pond.
- B. The unit price shall include all concrete, rebar, dowels and handrail necessary to prepare the subgrade and construct the staircase including the footing. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. Stairs with Handrails: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Stairs with Handrails” as listed in the Bid Form – Unit Prices.

2.27 ADA RAMP WITH GUARD RAILS (LINE ITEM 27)

- A. This section refers to the concrete ADA ramp with guard rails on the west side of the pedestrian bridge.
- B. The unit price shall include all concrete, rebar, dowels and handrail necessary to construct the ADA Ramp. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. ADA Ramp with Guard Rails: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for “ADA Ramp with Guard Rails” as listed in the Bid Form – Unit Prices.

2.28 PEDESTRIAN BRIDGE (EXCLUDES FOOTINGS) (LINE ITEM 28)

- A. This section refers to the pedestrian bridge on the upper side of the existing weir wall. Footings are part of the Bridge Abutments, a separate line item.
- B. The unit price shall include all materials necessary to construct the pedestrian bridge. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work necessary to complete the item.
- C. Pedestrian Bridge: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for “Pedestrian Bridge (excludes footings)” as listed in the Bid Form – Unit Prices.

2.29 BRIDGE EXTENDED GUARD RAIL + FOOTING (LINE ITEM 29)

- A. This section refers to the bridge guard rails on both sides of the pedestrian bridge along the existing weir wall. Footings are included as part of this line item.
- B. Bridge Extended Guard Rail + Footing: Measured is for each guard rail side, complete in place and acceptable, shall be paid for at the contract unit price bid for “Bridge Extended Guard Rail + Footing” as listed in the Bid Form – Unit Prices.

2.30 GRASSPAVE (LINE ITEM 30)

- A. This section refers to the grasspave area near the southeast corner of the site.
- B. Grasspave: Measured to the nearest 0.1 square feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Grasspave” as listed in the Bid Form – Unit Prices.

2.31 DECORATIVE FENCE (LINE ITEM 31)

- A. This section refers to decorative fence around the perimeter of the project site that connects to the KCU Sign on the south and existing campus fence on the north. This includes footings and all elements to match the KCU Standard.
- B. Decorative Fence: Measured to the nearest 0.1 linear feet, complete in place and acceptable, shall be paid for at the contract unit price bid for “Decorative Fence” as listed in the Bid Form – Unit Prices.

2.32 DECORATIVE GATE (DOUBLE LEAF) (LINE ITEM 32)

- A. This section refers to the decorative gate with footings and associated drop pins for a complete operating gate system, located at the maintenance access drive in the southwest corner of the project site.
- B. Decorative Gate (Double Leaf): Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Decorative Gate (Double Leaf)” as listed in the Bid Form – Unit Prices.

2.33 WEIR WALL STAINLESS STEEL WIER (LINE ITEM 33)

- A. This section refers to the stainless steel weir at the existing weir wall.
- B. Weir Wall Stainless Steel Wier: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Weir Wall Stainless Steel Weir” as listed in the Bid Form – Unit Prices.

2.34 LIMESTONE RETAINING WALL SLABS (LINE ITEM 34)

- A. This section refers to the Limestone retaining wall slabs throughout the project site. This includes the stacked limestone and associated base materials.
- B. Limestone Retaining Wall Slabs: Measured to the nearest 0.1 ton, complete in place and acceptable, shall be paid for at the contract unit price bid for “Limestone Retaining Wall Slabs” as listed in the Bid Form – Unit Prices.

2.35 PEA GRAVEL INFILL AT LIMESTONE WALL EDGE ALONG WALK (LINE ITEM 35)

- A. This section refers to the pea gravel used to infill the voids between the limestone slabs, electrical panel locations, and the curving walk. Pea gravel to infill the voids along the walk at this specific wall edge. This pea gravel will also be on the west side of the site around the electrical boxes.
- B. Pea Gravel Infill At Limestone Wall Edge: Measured to the nearest 0.1 ton, complete in place and acceptable, shall be paid for at the contract unit price bid for “Pea Gravel Infill at Limestone Wall Edge Along Walk” as listed in the Bid Form – Unit Prices.

2.36 OVERSTORY TREES (LINE ITEM 36)

- A. This section refers to the overstory trees through the project site.
- B. Overstory Tree: Measured per each tree, complete in place and acceptable, shall be paid for at the contract unit price bid for “Overstory Tree” as listed in the Bid Form – Unit Prices.

2.37 UNDERSTORY TREES (LINE ITEM 37)

- A. This section refers to the understory trees through the project site.
- B. Understory Tree: Measured per each tree, complete in place and acceptable, shall be paid for at the contract unit price bid for “Understory Tree” as listed in the Bid Form – Unit Prices.

2.38 PERENNIALS AND GRASSES – QT SIZE (LINE ITEM 38)

- A. This section refers to the perennials and grasses at quart size at 18” on center throughout the project site. Weed fabric is included in this line item.
- B. Perennials and Grasses: Measured per each quart size plant, complete in place and acceptable, shall be paid for at the contract unit price bid for “Perennials and Grasses – QT Size” as listed in the Bid Form – Unit Prices.

2.39 SUBMERGED PERENNIALS AND GRASSES – PLUG SIZE (LINE ITEM 39)

- A. This section refers to the submerged perennials and grasses at the waters edge at each pond. Weed fabric is included in this line item.
- B. Submerged Perennials and Grasses – Plug Size: Measured per each plug plant, complete in place and acceptable, shall be paid for at the contract unit price bid for “Submerged Perennials and Grasses – Plug Size” as listed in the Bid Form – Unit Prices.

2.40 MULCH (LINE ITEM 40)

- A. This section refers to the mulch throughout the project site in planting beds.
- B. Mulch: Measured to the nearest 0.1 cubic yard, complete in place and acceptable, shall be paid for at the contract unit price bid for “Mulch” as listed in the Bid Form – Unit Prices.

2.41 TURF (LINE ITEM 41)

- A. This section refers to the turn (sod) on the east side of the project and where turf areas need to be re-sodded due to site disturbance.
- B. Turf: Measured to the nearest 0.1 square yards, complete in place and acceptable, shall be paid for at the contract unit price bid for “Turf” as listed in the Bid Form – Unit Prices.

2.42 IRRIGATION (LINE ITEM 42)

- A. This section refers to the irrigation system for the project site as per the performance specifications.
- B. Irrigation: Measured to the nearest 0.1 square feet of irrigated area, complete in place and acceptable, shall be paid for at the contract unit price bid for “Irrigation” as listed in the Bid Form – Unit Prices.

2.43 PLANTING SOIL (LINE ITEM 43)

- A. This section refers to the planting soil throughout the project site.
- B. Planting Soil: Measured to the nearest 0.1 cubic yards, complete in place and acceptable, shall be paid for at the contract unit price bid for “Planting Soil” as listed in the Bid Form – Unit Prices.

2.44 COBBLE STONE – 4”-10” (LINE ITEM 44)

- A. This section refers to the 4” – 10” size cobble stone at the upper and lower pond adjacent to the weir wall.
- B. Cobble Stone – 4”-10” Size: Measured to the nearest 0.1 ton, complete in place and acceptable, shall be paid for at the contract unit price bid for “Cobble Stone (4”-10” Gray Cobble)” as listed in the Bid Form – Unit Prices.

2.45 WEIR WALL VENEER (LINE ITEM 45)

- A. This section refers to the weir wall limestone veneer on the existing weir wall. This section also refers to the weir wall cap on the weir wall.
- B. Weir Wall Veneer: Measured to the nearest 0.1 square face foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Weir Wall Veneer” as listed in the Bid Form – Unit Prices.

2.46 WEIR WALL CAP (LINE ITEM 46)

- C. This section refers to the weir wall cap on the existing weir wall.
- D. Weir Wall Cap: Measured to the nearest 0.1 lineal foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Weir Wall Cap” as listed in the Bid Form – Unit Prices.

2.47 LANDSCAPE EDGING (LINE ITEM 47)

- A. This section refers to the landscape edging at the electric boxes and along the turn adjacent to the landscape bed on the east side of the site.
- B. Landscape Edging: Measured to the nearest 0.1 lineal foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Landscape Edging” as listed in the Bid Form – Unit Prices.

2.48 CONCRETE LIGHT POLE BASES (LINE ITEM 48)

- A. This section refers to the light pole foundations for all LS1 and LS2 light fixtures. Reference plans for exact requirements. The light fixtures themselves are part of a separate bid item.
- B. Concrete Light Pole Bases: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Concrete Light pole Bases” as listed in the Bid Form – Unit Prices.

2.49 LS2 PEDESTRIAN POLE - HESS (LINE ITEM 49)

- A. This section refers to the lighting fixtures Type LS2 and all associated parts. Concrete light pole bases are part of a separate bid item.
- B. LS2 Pedestrian Pole: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “LS2 Pedestrian Pole” as listed in the Bid Form – Unit Prices.

2.50 TRENCHING AND BACKFILLING (LINE ITEM 50)

- A. This section refers to the trenching and backfilling for all electrical feeds to lighting fixtures.
- B. Trenching and Backfilling: Measured to the nearest 0.1 lineal foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “Trenching and Backfilling” as listed in the Bid Form – Unit Prices.

2.51 #10 THHN/THWN COPPER CONDUCTORS (LINE ITEM 51)

- A. This section refers to the electrical wiring to all the lighting fixtures. Conduit shall be included in a separate bid item.
 - B. #10 THHN/THWN Copper Conductors: Measured to the nearest 0.1 lineal foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “#10 THHN/THWN Copper Conductors” as listed in the Bid Form – Unit Prices.
- 2.52 1” PVC SCHEDULE 40 CONDUIT (LINE ITEM 52)
- A. This section refers to the conduit for the electrical wiring to all the lighting fixtures. Wiring shall be included in a separate bit item.
 - B. 1” PVC Schedule 40 Conduit: Measured to the nearest 0.1 lineal foot, complete in place and acceptable, shall be paid for at the contract unit price bid for “1” PVC Schedule 40 Conduit” as listed in the Bid Form – Unit Prices.

PART 3 – LUMP SUM ITEMS

3.01 ALLOWANCE (LINE ITEM 53)

- A. All additional work requested by the Owner that is not specifically stated in the construction contract documents shall be paid as part of this item. Contractor's maximum upper limit for compensation includes a total allowance amount of \$200,000.00 not yet authorized by Owner that may be required throughout the course of the work. This allowance amount shall not be utilized unless specifically authorized in writing by the Owner to perform additional work. Additional work shall not be performed, nor is the Contractor approved to utilize any of the allowance amount, unless the Owner provides written authorization to Contractor that includes the scope of the work to be performed and a maximum billing limit for compensation that has been mutually agreed upon.

3.02 MOBILIZATION (LINE ITEM 54)

- A. Mobilization is a lump sum item and shall not exceed 3.5% of the calculated Adjustment Unit Price Extension Subtotal on Form 00412.
- B. This item shall be paid with the first Application for Payment.

3.03 BONDS AND INSURANCE (LINE ITEM 55)

- A. Bonds and insurance is a lump sum item and shall not exceed 1.5% of the Adjustment Unit Price Extension Subtotal on Form 00412, Table A plus any accepted items in Table B.
- B. This item shall be paid with the first Application for Payment.

3.04 FINAL COMPLETION, DEMOBILIZATION, RECORD DRAWINGS AND CLOSE-OUT (LINE ITEM 56)

- A. Shall be a lump sum item. There is no limit on the maximum value of this lump sum item.
- B. Regardless of the lump sum price, this item shall be included in the Schedule of Values at a minimum price amount shown on Form 00412.
- C. This item shall be paid after submittal of Record Drawings and CITY approval of the Record Drawing submittal.

PART 4 – BID ALTERNATE 1 ITEMS

4.01 SOUTHERN STAIRCASE + HANDRAILS (LINE ITEM 57)

- A. This section refers to the concrete sidewalk and stairs with handrails southeast of the Upper Pond.
- B. The unit price shall include all concrete, rebar, dowels and handrail necessary to prepare the subgrade and construct the sidewalk and staircase including the footing. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. Southern Staircase with Handrails: Measured per each, complete in place and acceptable, shall be paid for at the contract unit price bid for “Southern Staircase with Handrails” as listed in the Bid Form – Unit Prices.

4.02 LIMESTONE OUTCROPPINGS AT UPPER POND WATERS EDGE (LINE ITEM 58)

- A. This section refers to the limestone blocks installed in the Upper Pond water edge as indicated on the drawings.
- B. The unit price item shall include limestone blocks and work necessary install and place the blocks. Such payment and price shall constitute full compensation for all the labor materials, equipment, and for the performance of all related work.
- C. Limestone Outcroppings at Upper Pond Water Edge measured per ton complete in place and acceptable, shall be paid for the contract unit price bid for “Limestone Outcroppings at Upper Pond Water Edge” as listed on the Bid Form – Unit Prices.

4.03 DOCK FOUNDATION PIERS (LINE ITEM 59)

- A. This section refers to the 12-concrete pier/footing foundations used to support the dock located on the east side of the Lower Pond.
- B. The unit price shall include all concrete, rebar, and subgrade preparation to construct all dock concrete piers, including the footings, for all the concrete piers, indicated in the construction documents, to support the dock. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. Dock Concrete Piers: Measured to the nearest 0.1 cubic yards, complete in place and acceptable, shall be paid for at the contract unit price bid for “Dock Concrete Piers” as listed on the Bid Form – Unit Prices.

4.04 LOWER POND DOCK (EXCLUDES PIERS) (LINE ITEM 60)

- A. This section refers to the dock at the Lower Pond on the east side. Piers are part of the Dock Concrete Piers, a separate line item.
- B. The unit price shall include all materials necessary to construct the dock with the exception of the dock piers. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work necessary to complete the item.
- C. Lower Pond Dock: Measured as a lump sum, complete in place and acceptable, shall be paid for at the contract unit price bid for “Pedestrian Bridge (excludes footings)” as listed in the Bid Form – Unit Prices.

4.05 TURNDOWN SIDEWALK CURB (LINE ITEM 61)

- A. This section refers to the turndown sidewalk curbs that extends along the sidewalks in areas where the distance between the top of sidewalk and the adjacent grade is two feet or less. This includes only the turndown sidewalk curb at the dock at the Lower Pond on the east side.
- B. The unit price shall include all concrete, rebar, and dowels necessary to prepare the subgrade and construct the turndown sidewalk curb and the full width of sidewalk adjacent to the turndown. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.

4.06 LIMESTONE RETAINING WALL SLABS (LINE ITEM 62)

- A. This section refers to the Limestone retaining wall slabs adjacent to the turn down sidewalk at the dock at the Lower Pond on the east side. This includes stacked limestone and associated base materials.
- B. Limestone Retaining Wall Slabs: Measured to the nearest 0.1 ton, complete in place and acceptable, shall be paid for at the contract unit price bid for “Limestone Retaining Wall Slabs” as listed in the Bid Form – Unit Prices.

End of Section.



APPLICATION FOR PAYMENT

Project Number _____

Project Title _____

Final Payment⁵ ☐

CONTRACTOR _____

Address _____

Application Number²: _____

Date: _____

Ordinance/Resolution Number: _____

Effective: _____

PO Number _____

Vendor Number _____

Application for Work Accomplished from _____ to _____

Original Contract Price	[1]	\$	-
Net by Change Orders _____ through _____	[2]	\$	-
Current Contract Price (1+2)	[3]	\$	-
Completed Work	[4]	\$	-
Disputed Amounts ³ [-]	[4a]	\$	-
Stored Material ⁴	[5]	\$	-
Disputed Amounts ³ [-]	[5a]	\$	-
Total Completed and Stored to Date (4+5)	[6]	\$	-
Previous Payments	[7]	\$	-
Previous Retainage	[8]	\$	-
Total Previous Applications (7+8)	[9]	\$	-
Amount This Application (6-9)	[10]	\$	-
Less Retainage This Application (5%)	[-] [11]	\$	-
Release of Retainage	[12]	\$	-
Total Due This Application (10-11+12)	[13]	\$	-
Liquidated Damages			
Completion of Work	[14]	\$	-
Prevailing Wage ⁷	[15]	\$	-
MBE/WBE Program ⁷	[16]	\$	-
Workforce Program ⁷	[17]	\$	-
Total Amount Due Contractor (13 - 14 through 17)	[18]	\$	-

Accompanying Documentation: ^{1, 2, 3, 4, 5, & 6} and any other information as necessary.

NOTE: Initial all figures on this Application and on the Schedule of Values that are changed to correct errors or conform to the amount recommended. Attach explanation of changes that have been made.

CONTRACTOR's Certification:

The undersigned CONTRACTOR certifies that (a) all previous progress payments received from OWNER on account of Work done under this Contract have been applied on account to discharge CONTRACTOR's legitimate obligations incurred in connection with Work covered by all prior Applications for Payment; (b) at time of payment, title of all Work, materials and equipment incorporated into said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to OWNER indemnifying OWNER against any such Lien, security interest or encumbrance); and (c) all Work covered by this Application for Payment is in accordance with the Contract Documents and not defective; and (d) all manufactured goods or commodities used or supplied for this Project are in compliance with Kansas City's Buy America ordinance.

By _____
 Contractor Authorized Representative (Print) Signature

Date _____

State of)
)SS
 County of)

Subscribed and Sworn to before me this _____ day of _____, _____.

My commission expires:

Notary Public: _____

DESIGN PROFESSIONAL's Recommendation of Payment:

In accordance with the Contract Documents, based on on-Site observations and the data comprising this application, the DESIGN PROFESSIONAL recommends to the OWNER that to the best of the DESIGN PROFESSIONAL's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the CONTRACTOR is entitled to payment of the Amount above listed in this application.

_____ Name of firm (Print)	_____ DESIGN PROFESSIONAL (Print)	_____ (Signature)
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Date: _____

Construction/Program Manager's Recommendation of Payment: (if applicable)

In accordance with the Contract Documents, based on on-Site observations and the data comprising this application, the Construction/Program Manager recommends to the OWNER that to the best of the Construction/Program Manager's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the CONTRACTOR is entitled to payment of the Amount above listed in this application.

_____ Construction/Program Manager firm (Print)	_____ Authorized Representative (Print)	_____ (Signature)
----------------------------------------------------	--------------------------------------------	----------------------

Date: _____

City's Representative's Agreement with Recommendation of Payment

_____ City's Representative(print)	_____ (Signature)	_____ (Date)
---------------------------------------	----------------------	-----------------

City's Approval

The amount previously recommended is approved for payment.

_____ Director or Designee (Print)	_____ (Signature)	_____ (Date)
---------------------------------------	----------------------	-----------------

¹See General Conditions Article 14.02 A and B

²Proof of tax compliance if 1st payment and if Contract amount exceeds \$150,000.00

³Schedule of Values—Denote any amounts currently disputed in this application. Attach additional dispute documentation if required.

⁴If requesting payment for stored materials, see General Conditions Article 14.02 A.1

⁵If final payment, current proof of tax compliance if Contract is longer than 1 year and amount exceeds \$150,000.00.

⁶Per General Conditions Sec. 14.02 attach a copy of the most recent 00485.01 M/WBE Monthly Utilization Report, 00485.02 Project Workforce Monthly Report and 00485.03 Company-Wide Workforce Monthly Report CONTRACTOR has submitted to the City's CREO KC Department

⁷Applicable only if final payment

REMINDER: CONTRACTOR is responsible for meeting or exceeding the the D/M/WBE participation amounts in its Contractor Utilization Plan (CUP) as amended by any previously approved Request for Modification/Substitution. Any Change Orders or amendments modifying the amount CONTRACTOR is to be compensated will have correspondingly impacted the amount of compensation due D/M/WBEs for purposes of meeting or exceeding the Bidder/Proposer participation. CONTRACTOR is again reminded to consider the effect of any Change Order or amendment, and to submit a Request for Modification/Substitution if appropriate.

Distribution:	Owner Contractor Construction Manager	Project Manager Design Professional _____ _____
---------------	---------------------------------------------	----------------------------------------------------------

Project Number _____

Project Title _____

HRD APPROVED CUP		
MBE	WBE	DBE
\$0.00	\$0.00	\$0.00
%	%	%

[illegible]

CITY OF FOUNTAINS
HEART OF THE NATIONKANSAS CITY
MISSOURI

City Of Kansas City, Missouri

Certified Payroll Report Instructions

GENERAL INSTRUCTIONS:

Each space on the attached Certified Payroll Report requiring information is numbered. The numbers below correspond to those spaces. When completing the Certified Payroll Report, insert the required information in each space. The Certified Payroll Report **must be complete, clear and legible** and be accompanied by a completed Payroll Certification including **original signature**. All payrolls are to be submitted within two (2) weeks after the ending date of the payroll week.

The payroll form is available on line.

INSTRUCTION FOR PAYROLL SHEETS

1. **PAYROLL NUMBER:** Insert the number of the payroll. Payrolls start with number 1 (one) for the first week of work by each contractor or subcontractor. The numbers are then continuous until the last payroll. During weeks when no work takes place a payroll for that week showing no work is to be turned in. Revised payrolls must be designated with a letter "R" following the number. Check (✓) the box by the word "FINAL" after the number to indicate that no further work will be done by the contractor or subcontractor.
2. **WEEK ENDING:** On each sheet, insert the date of the last day of this payroll.
3. **SHEET OF:** On each sheet, insert the number of each sheet and the total number of sheets submitted.
4. **GRANT AGENCY PROJECT NO:** Insert the Grant Agency Project Grant Number if this is a grant funded project.
5. **CONTRACTOR:** Insert the contractor's company name and address.
6. **SUBCONTRACTOR:** If this is a payroll for a subcontractor, insert subcontractor's name and address. For the remainder of these instructions, the word "contractor" shall apply to both contractor and subcontractor.
7. **DEPARTMENT PROJECT or CONTRACT NO:** Insert Department's Project or Contract Number.
8. **LOCATION:** Insert location of work, including address, and county.
9. **DESCRIPTION:** Insert name of the project or contract from the Agreement.
10. **FEDERAL I.D. NUMBER:** Insert the contractor (10a) and subcontractor's (10b) Federal I.D. Number.
11. **EMPLOYEE NAME:** Insert employee's full legal name and complete home address. Make sure to include Apartment #'s and zip code.

12. **SOCIAL SECURITY NO.:** Insert employee's social security number (xxx-xx-xxxx).
13. **DATE:** Insert date for each day of the payroll week for each employee (mm/dd/yyyy).
14. **REGULAR HOURS*:** Insert the regular hours worked each day.
15. **OVERTIME HOURS*:** Insert the overtime hours worked each day.
16. **DOUBLE OVERTIME HOURS*:** Insert the double overtime hours worked each day.

***Note:** Numbers 14, 15, and 16: Make sure these **hours are equal to or greater than the hours turned in on the "Daily Labor Force Report" form**. Refer to the wage order for applicable overtime schedule.

If allowed by occupational title's applicable overtime rate, Contractor may make a permanent schedule transfer to an eight (8) or ten (10) hour day work week. **Advance written notification to and approval from the Owner's Representative is required.**

If allowed by the occupational title's applicable overtime rate, any change in the work week schedule due to inclement weather **must** be documented on the certified payroll.

17. **TOTAL HOURS:** Insert total of *regular hours* worked for the week on this project. (The total hours will calculate automatically if you are using the electronic form.)
18. **TOTAL HOURS:** Insert total of *overtime hours* worked for the week on this project. (The total hours will calculate automatically if you are using the electronic form.)
19. **TOTAL HOURS:** Insert total of *double overtime* hours worked for the week on this project. (The total hours will calculate automatically if you are using the electronic form.)
20. **TOTAL FRINGE HOURS:** Insert total Fringe Hours (by adding the amounts in 17, 18, and 19). (The total hours will calculate automatically if you are using the electronic form.)
21. **BASE RATE*:** Insert basic hourly rate of pay. Check the contract's "Annual Wage Order" or the "Federal General Wage Decision" section for basic hourly rate.
22. **OVERTIME RATE*:** Insert overtime rate of pay. Check the contract's "Annual Wage Order" or the "Federal General Wage Decision" section for the overtime rate.
23. **DOUBLE OVERTIME RATE*:** Insert double overtime rate of pay. Check the contract's "Annual Wage Order" or the "Federal General Wage Decision" section for the double overtime rate.
24. **FRINGE RATE*:** Insert fringe benefit rate for this project. Check the contract's "Annual Wage Order" or the "Federal General Wage Decision" section for the fringe benefit rate.

***Note:** *The total of the basic hourly rate plus the fringe benefit rate must be equal to or greater than the total of the basic hourly rate plus the fringe benefit rate found in the contract's "Annual Wage Order" or the "Federal General Wage Decision" section. If the contract contains both of the above, the higher rate will prevail.*

25. **TOTAL:** Multiply the amounts in 17 by 21 and insert here. (The total hours will calculate automatically if you are using the electronic form.)

26. **TOTAL:** Multiply the amounts in 18 by 22 and insert here. (The total hours will calculate automatically if you are using the electronic form.)
27. **TOTAL:** Multiple the amounts in 19 by 23 and insert here. (The total hours will calculate automatically if you are using the electronic form.)
28. **TOTAL:** Multiply the amounts in 20 by 24 and insert here. (The total hours will calculate automatically if you are using the electronic form.)
29. Check (✓) the box (□) for the “*APPROVED PLAN*”, “*EMPLOYEE*”, or both indicating the Plan or manner in which the fringe benefit is paid. If fringe benefit is paid to both a Plan and the employee, then insert each amount that is paid to the Plan and/or the employee. If paid to a Plan, list the name(s) of Plan Programs on Payroll Certification page.

***Note:** 29a plus 29b **must equal** 28.

30. **OCCUPATIONAL TITLE/CLASSIFICATION:** Insert occupational title/classification of worker for each employee. Examples: Carpenter, laborer, electrician.
31. **GROUP:** Insert the group if, applicable for the occupational title/classification. Example: Operating Engineers Group I, II, III, IV or V.
32. **SKILL GROUP:** Insert skill group, if applicable. Example: general laborer, skilled laborer, first semi-skilled, second semi-skilled etc. or any of the listings under the federal classification such as painters.
33. **HOURS:** Insert total hours worked for all jobs for each employee during each payroll period.
34. **GROSS EARNINGS:** Insert employee’s gross earnings for each payroll period.
35. **FEDERAL:** Insert the amount of the deduction from each employee’s check stub.
36. **FICA:** Insert the amount of the deduction from each employee’s check stub.
37. **STATE:** Insert the amount of the deduction from each employee’s check stub.
38. **LOCAL E-TAX:** Insert the amount of the deduction from each employee’s check stub.
39. **MISCELLANEOUS:** Insert the amount of the deduction from each employee’s check stub.
40. **NET PAY:** Insert the employee’s net pay for each week.
41. **EARNINGS FOR THIS JOB:** Add the amounts in 25, 26, 27, and 29b and insert here.

***Note:** If fringe benefit is paid to Approved Plan, do not add the amount in 29a to this total.

42. **KANSAS CITY EARNINGS TAX THIS JOB:** Insert Kansas City Earnings tax deducted from employee’s check for this job.

Steps 11 through 42 are to be repeated for each employee working on the project site, or for the same employee working any additional Occupational Title/Classification.



CERTIFIED PAYROLL REPORT

Bid #2

Project Number:

Project Title:

Payroll Number: ①

☐ Final

CONTRACTOR: ⑤		SUBCONTRACTOR: ⑥		GRANT AGENCY PROJECT NO.: ④													
ADDRESS:		ADDRESS:		DEPT PROJECT OR CONTRACT NO.: ⑦													
CITY, STATE ZIP:		CITY, STATE ZIP:		LOCATION: ⑧													
FEDERAL I.D. NUMBER: ⑩a		FEDERAL I.D. NUMBER: ⑩b		DESCRIPTION: ⑨													
EMPLOYEE NAME: ⑪	First Name	Last Name	DATE: ⑬	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL		
ADDRESS:			REG. HRS. ⑭								⑰ 0.00	\$ ⑲ 21	-		\$ ⑲ 25		
CITY, STATE ZIP:			O.T. HRS. ⑮								⑱ 0.00		\$ ⑲ 22	-	\$ ⑲ 26		
SOCIAL SECURITY NO.: ⑫			D.O.T. HRS. ⑯								⑲ 0.00		\$ ⑲ 23	-	\$ ⑲ 27		
OCCUPATIONAL TITLE / CLASSIFICATION: ⑩			TOTAL FRINGE HOURS ⑳ 0.00											\$ ⑲ 24	-	\$ ⑲ 28	
GROUP: ⑩			SKILL GROUP: ⑩											FRINGE PAID TO: ⑲		<input type="checkbox"/> APPROVED PLAN ⑲a <input type="checkbox"/> EMPLOYEE ⑲b	
WEEK ALL JOBS:	HOURS:	GROSS EARNINGS:	FEDERAL:	FICA:	STATE:	LOCAL E-TAX:	MISC:	NET PAY:	EARNINGS FOR THIS JOB:		\$ ⑲ 41		KANSAS CITY EARNINGS TAX THIS JOB		\$ ⑲ 42		
⑬	⑬	\$ ⑬ 34	\$ ⑬ 35	\$ ⑬ 36	\$ ⑬ 37	\$ ⑬ 38	\$ ⑬ 39	\$ ⑬ 40									
EMPLOYEE NAME:	First Name	Last Name	DATE:	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL		
ADDRESS:			REG. HRS.								0.00	\$ -			\$ -		
CITY, STATE ZIP:			O.T. HRS.								0.00		\$ -		\$ -		
SOCIAL SECURITY NO.:			D.O.T. HRS.								0.00		\$ -		\$ -		
OCCUPATIONAL TITLE / CLASSIFICATION:			TOTAL FRINGE HOURS											\$ -		\$ -	
GROUP:			SKILL GROUP:											FRINGE PAID TO:		<input type="checkbox"/> APPROVED PLAN <input type="checkbox"/> EMPLOYEE	
WEEK ALL JOBS:	HOURS:	GROSS EARNINGS:	FEDERAL:	FICA:	STATE:	LOCAL E-TAX:	MISC:	NET PAY:	EARNINGS FOR THIS JOB:		\$ -		KANSAS CITY EARNINGS TAX THIS JOB		\$ -		
		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -									
EMPLOYEE NAME:	First Name	Last Name	DATE:	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL		
ADDRESS:			REG. HRS.								0.00	\$ -			\$ -		
CITY, STATE ZIP:			O.T. HRS.								0.00		\$ -		\$ -		
SOCIAL SECURITY NO.:			D.O.T. HRS.								0.00		\$ -		\$ -		
OCCUPATIONAL TITLE / CLASSIFICATION:			TOTAL FRINGE HOURS											\$ -		\$ -	
GROUP:			SKILL GROUP:											FRINGE PAID TO:		<input type="checkbox"/> APPROVED PLAN <input type="checkbox"/> EMPLOYEE	
WEEK ALL JOBS:	HOURS:	GROSS EARNINGS:	FEDERAL:	FICA:	STATE:	LOCAL E-TAX:	MISC:	NET PAY:	EARNINGS FOR THIS JOB:		\$ -		KANSAS CITY EARNINGS TAX THIS JOB		\$ -		
		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -									
EMPLOYEE NAME:	First Name	Last Name	DATE:	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL		
ADDRESS:			REG. HRS.								0.00	\$ -			\$ -		
CITY, STATE ZIP:			O.T. HRS.								0.00		\$ -		\$ -		
SOCIAL SECURITY NO.:			D.O.T. HRS.								0.00		\$ -		\$ -		
OCCUPATIONAL TITLE / CLASSIFICATION:			TOTAL FRINGE HOURS											\$ -		\$ -	
GROUP:			SKILL GROUP:											FRINGE PAID TO:		<input type="checkbox"/> APPROVED PLAN <input type="checkbox"/> EMPLOYEE	
WEEK ALL JOBS:	HOURS:	GROSS EARNINGS:	FEDERAL:	FICA:	STATE:	LOCAL E-TAX:	MISC:	NET PAY:	EARNINGS FOR THIS JOB:		\$ -		KANSAS CITY EARNINGS TAX THIS JOB		\$ -		
		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -									
EMPLOYEE NAME:	First Name	Last Name	DATE:	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL		
ADDRESS:			REG. HRS.								0.00	\$ -			\$ -		
CITY, STATE ZIP:			O.T. HRS.								0.00		\$ -		\$ -		
SOCIAL SECURITY NO.:			D.O.T. HRS.								0.00		\$ -		\$ -		
OCCUPATIONAL TITLE / CLASSIFICATION:			TOTAL FRINGE HOURS											\$ -		\$ -	
GROUP:			SKILL GROUP:											FRINGE PAID TO:		<input type="checkbox"/> APPROVED PLAN <input type="checkbox"/> EMPLOYEE	
WEEK ALL JOBS:	HOURS:	GROSS EARNINGS:	FEDERAL:	FICA:	STATE:	LOCAL E-TAX:	MISC:	NET PAY:	EARNINGS FOR THIS JOB:		\$ -		KANSAS CITY EARNINGS TAX THIS JOB		\$ -		
		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -									



CERTIFIED PAYROLL REPORT

Project Number: _____

Project Title: _____

Payroll Number: _____

Final

WEEK ENDING:		SHEET		of		GRANT AGENCY PROJECT NO.:								
CONTRACTOR:		SUBCONTRACTOR:				DEPT PROJECT OR CONTRACT NO.:								
ADDRESS:		ADDRESS:				LOCATION:								
CITY, STATE ZIP:		CITY, STATE ZIP:				DESCRIPTION:								
FEDERAL I.D. NUMBER:		FEDERAL I.D. NUMBER:												
EMPLOYEE NAME:	First Name Last Name	DATE:	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS.	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL
ADDRESS:		REG. HRS.								0.00	\$ -			\$ -
CITY, STATE ZIP:		O.T. HRS.								0.00		\$ -		\$ -
SOCIAL SECURITY NO.:		D.O.T. HRS.								0.00		\$ -		\$ -
OCCUPATIONAL TITLE / CLASSIFICATION:						TOTAL FRINGE HOURS		0.00				\$ -		\$ -
												FRINGE PAID TO:	APPROVED PLAN EMPLOYEE	\$ -
		GROUP:				SKILL GROUP:								\$ -
WEEK ALL JOBS:	HOURS:	GROSS EARNINGS:	FEDERAL:	FICA:	STATE:	LOCAL E-TAX:	MISC:	NET PAY:	EARNINGS FOR THIS JOB:	\$ -		KANSAS CITY EARNINGS TAX THIS JOB	\$ -	\$ -
		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -						
EMPLOYEE NAME:	First Name Last Name	DATE:	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS.	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL
ADDRESS:		REG. HRS.								0.00	\$ -			\$ -
CITY, STATE ZIP:		O.T. HRS.								0.00		\$ -		\$ -
SOCIAL SECURITY NO.:		D.O.T. HRS.								0.00		\$ -		\$ -
OCCUPATIONAL TITLE / CLASSIFICATION:						TOTAL FRINGE HOURS		0.00				\$ -		\$ -
												FRINGE PAID TO:	APPROVED PLAN EMPLOYEE	\$ -
		GROUP:				SKILL GROUP:								\$ -
WEEK ALL JOBS:	HOURS:	GROSS EARNINGS:	FEDERAL:	FICA:	STATE:	LOCAL E-TAX:	MISC:	NET PAY:	EARNINGS FOR THIS JOB:	\$ -		KANSAS CITY EARNINGS TAX THIS JOB	\$ -	\$ -
		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -						
EMPLOYEE NAME:	First Name Last Name	DATE:	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS.	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL
ADDRESS:		REG. HRS.								0.00	\$ -			\$ -
CITY, STATE ZIP:		O.T. HRS.								0.00		\$ -		\$ -
SOCIAL SECURITY NO.:		D.O.T. HRS.								0.00		\$ -		\$ -
OCCUPATIONAL TITLE / CLASSIFICATION:						TOTAL FRINGE HOURS		0.00				\$ -		\$ -
												FRINGE PAID TO:	APPROVED PLAN EMPLOYEE	\$ -
		GROUP:				SKILL GROUP:								\$ -
WEEK ALL JOBS:	HOURS:	GROSS EARNINGS:	FEDERAL:	FICA:	STATE:	LOCAL E-TAX:	MISC:	NET PAY:	EARNINGS FOR THIS JOB:	\$ -		KANSAS CITY EARNINGS TAX THIS JOB	\$ -	\$ -
		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -						
EMPLOYEE NAME:	First Name Last Name	DATE:	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS.	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL
ADDRESS:		REG. HRS.								0.00	\$ -			\$ -
CITY, STATE ZIP:		O.T. HRS.								0.00		\$ -		\$ -
SOCIAL SECURITY NO.:		D.O.T. HRS.								0.00		\$ -		\$ -
OCCUPATIONAL TITLE / CLASSIFICATION:						TOTAL FRINGE HOURS		0.00				\$ -		\$ -
												FRINGE PAID TO:	APPROVED PLAN EMPLOYEE	\$ -
		GROUP:				SKILL GROUP:								\$ -
WEEK ALL JOBS:	HOURS:	GROSS EARNINGS:	FEDERAL:	FICA:	STATE:	LOCAL E-TAX:	MISC:	NET PAY:	EARNINGS FOR THIS JOB:	\$ -		KANSAS CITY EARNINGS TAX THIS JOB	\$ -	\$ -
		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -						

Date _____

I, _____, _____
(Name of Signatory Party) (Title)
do hereby state:

(1) That I pay or supervise the payment of the persons employed by
(Contractor or subcontractor) _____
on the (Building or work) _____: that during the
payroll period commencing on the _____ day of _____, 20____, and ending
the _____ day of _____, 20____, all said persons employed on said project
have been paid the full weekly wages earned, that no rebates have been or
will be made either directly or indirectly to or on behalf of said (Contractor or
subcontractor) _____ from
the full weekly wages earned by any person and that no deductions have
been made either directly or indirectly from the full wages earned by any
person, other than permissible deductions as defined in Regulations, Part 3
(29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland
Act, as amended (48 Stat. 948.63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40
U.S.C. 276c), and described below:

(2) That any payrolls otherwise required under this contract to be submitted
for the above period are correct and complete; that the wage rates for
laborers or mechanics contained herein are not less than the applicable
wage rates contained in any wage determination incorporated into this
contract; that the classifications set forth herein for each laborer or mechanic
conform to the work he performed.

(3) That any apprentices employed in the above period are duly registered in
a bona fide apprenticeship program registered with a State apprenticeship
agency recognized by the Bureau of Apprenticeship and Training, United
States Department of Labor, or if no such recognized agency exists in a
State, are registered with the Bureau of Apprenticeship and Training, United
States Department of Labor.

(4) That:

(a) WHERE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS,
OR PROGRAMS

☐ In addition to the basic hourly wage rates paid to each laborer or
mechanic listed in the above referenced payroll, consisting of _____ pages,
payments of fringe benefits as listed in the contract have been or will be

made to appropriate programs for the benefit of such employees, exceptions
noted in 4 (c) below.

(b) WHERE BENEFITS ARE PAID IN CASH

☐ Each laborer or mechanic listed in the above referenced payroll,
consisting of _____ pages, has been paid, as indicated on the payroll, in an
amount not less than the sum of the basic hourly wage rate plus the amount
of the required fringe benefits as listed in the contract, except as noted in
Section 4 (c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION
REMARKS	

NAME AND TITLE	SIGNATURE
The willful falsification of any of the above statements may subject the contractor or subcontractor to civil or criminal prosecution. See Section 1001 of Title 18 Section 231 of Title 31 of the United States Code.	

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project Number 81000975 Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

From Contractor _____ To _____ Date _____

Spec. No.	Section Title		Firm, Address (Check box if Supplier)	Phone, FAX and e-mail	Contact

☐ Attachments:

Signed by: _____ Date _____

Distribution: ☐ Owner ☐ Contractor ☐ Construction Manager ☐ Design Professional ☐ Consultant ☐ Other



KANSAS CITY
MISSOURI

DAILY LABOR FORCE REPORT

Project Number 81000975 Day Date

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

Contractor _____

Subcontractor _____

Weather: (Indicate if weather prevented work and why) _____

Shift: (circle) 5–8 hr Days 4–10 hr Days Other _____

* This report *MUST be completed and turned in* for EACH DAY until FINAL COMPLETION.

[illegible]

I CERTIFY THAT ALL OF THE INFORMATION PROVIDED ABOVE IS TRUE AND COMPLETE.

Contractor/Subcontractor Representative:

Complete Name: (print) _____ Title: (print) _____

Signature: _____

Page ____ of ____

Distribution: ☐ City Department ☐ Contractor ☐ Subcontractor ☐ Other

**CERTIFICATE OF ACHIEVEMENT OF FULL OPERATION**Project/Contract Number 81000975/1689Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

CONTRACT FOR: _____

CONTRACTOR: _____

DATE OF ISSUANCE: _____

PROJECT OR DESIGNATED PORTION SHALL INCLUDE:

The Work performed under this Smart Sewer Program Contract has been reviewed and found, to the Design Professional's, Project Manager's, and Construction Manager's best knowledge, information, and belief, to have achieved a state of full operation. Achievement of full operation is the state where completion of construction and installation of equipment or infrastructure such that the equipment or infrastructure has been placed into full operation and is expected to both function and perform as designed. The date of Achievement of full operation of this Project is hereby established as _____. This is also the date the work can be utilized for the purposes for which it is intended and is ready for the City's continuous use. The correction period required by the Contract Documents shall commence on this date, except as stated below.

A list of items to be completed or corrected before final payment is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

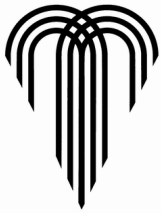
CONTRACTOR BY _____ DATE __________
DESIGN PROFESSIONAL BY _____ DATE _____

The Contractor will complete or correct the Work on the list of items attached hereto within _____ days from the above date of Achievement of Full Operation.

SMART SEWER PROJECT MANAGER BY _____ DATE __________
SMART SEWER CONSTRUCTION MANAGER BY _____ DATE __________
SMART SEWER OFFICER BY _____ DATE _____**Distribution:**

- ☐ Smart Sewer Officer
- ☐ Smart Sewer Division Head
- ☐ Contractor
- ☐ Construction Manager
- ☐ Design Professional
- ☐ Consultant _____
- ☐ Other _____

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

PUNCH LIST

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

CONTRACTOR _____

From _____ Site Visit Date _____

The following items require the attention of the CONTRACTOR for completion or correction. This list may not be all-inclusive, and the failure to include any items on this list does not alter the responsibility of the CONTRACTOR to complete all Work in accordance with the Contract Documents.

Item No.	Location (Area)	Description	Correction/ Completion Date	Verification Check
-------------	--------------------	-------------	-----------------------------------	-----------------------

☐ Attachments _____

Signed by: _____ Date: _____

DESIGN PROFESSIONAL (Firm/In House)

Distribution: ☐ OWNER
☐ CONTRACTOR
☐ DESIGN PROFESSIONAL
☐ Consultant _____
☐ Other _____

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

CONTRACTOR AFFIDAVIT FOR FINAL PAYMENT

Project Number _____

Project Title _____

STATE OF _____)
)SS
COUNTY OF _____)

The Undersigned, _____ of lawful
(Name)

age, being first duly sworn, states under oath as follows:

1. I am the _____ of _____ who is the general
(Title) (CONTRACTOR)
CONTRACTOR for the CITY on Project No. _____ and Project Title _____.

2. All payrolls, material bills, use of equipment and other indebtedness connected with the Work for this Project have been paid and all Claims of whatever nature have been satisfied, as required by the Contract.

3 (✓) _____ Prevailing wage does not apply; or

(✓) _____ All provisions and requirements set forth in Chapter 290, Section 290.210 through and including 290.340, Missouri Revised Statutes, pertaining to the payment of wages to workmen employed on public works projects have been fully satisfied and there has been no exception to the full and complete compliance with these provisions and requirements and the Annual Wage Order contained in the Contract in carrying out the Contract and Work. CONTRACTOR has fully complied with the requirements of the prevailing wage law as required in the Contract and has attached affidavits from all Subcontractors on this Project, regardless of tier, affirming compliance with the prevailing wage law as stipulated in the Contract.

4. I hereby certify that (a) at project completion and pursuant to contractor's final request for payment, contractor achieved (____%) Minority Business Enterprise (MBE) participation and (____%) Women Business Enterprise (WBE) participation on this contract, and (b) listed herein are the names of all certified M/WBE subcontractors, regardless of tier, with whom I, or my subcontractors contracted.

1. Name of MBE/WBE Firm _____
Address _____
Telephone Number (____) _____
IRS Number _____
Area/Scope*of Work _____
Subcontract Final Amount _____

2. Name of MBE/WBE Firm _____
Address _____
Telephone Number (____) _____
IRS Number _____
Area/Scope*of Work _____
Subcontract Final Amount _____

List additional subcontractors, if any, on a similar form and attach to the bid.

Supplier** Final Amount: _____

*Reference to specification sections or bid item number.

- (✓) _____ Met or exceeded the Contract utilization goals; or
 (✓) _____ Failed to meet the Contract utilization goals (attach waiver, substitution or modification); or
 (✓) _____ No goals applied to this Project.

5. CONTRACTOR certifies that each Subcontractor has received full payment for its respective work in connection with the Contract.

6. If applicable, I hereby certify that (1) at project completion and pursuant to contractor's final request for payment, contractor achieved, company-wide, at least ten percent (10%) minority workforce participation and two percent (2%) women workforce participation and (2) a true and accurate copy of my final project workforce monthly report is attached. **NOTE: This paragraph is only applicable if you completed a construction contract that was estimated by the City, prior to solicitation, as requiring more than 800 construction labor hours and costing in excess of \$300,000.00. If applicable you MUST attach copies of your final monthly workforce reports.**

7. This affidavit is made in behalf of the CONTRACTOR for the purpose of securing from Kansas City, Missouri, the certification of completion of the Project and receiving payment therefore.

8. If the Contract amount exceeded \$150,000, CONTRACTOR has submitted proof of compliance with the City tax ordinances administered by the City's Commissioner of Revenue and has on file proof of tax compliance from all Subcontractors. If the Contract term exceeded one (1) year, CONTRACTOR has provided proof of compliance with the City tax ordinances administered by the City's Commissioner of Revenue prior to receiving final payment and has on file proof of tax compliance from all Subcontractors prior to the Subcontractor receiving final payment from CONTRACTOR.

CONTRACTOR _____

By _____
 (Authorized Signature)

Title _____

On this _____ day of _____, _____, before me
 appeared _____, to me personally known to be the
 _____ of the _____,

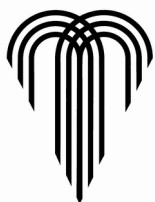
and who executed the foregoing instrument and acknowledged that (s)he executed the same on behalf of

_____ as its free act and deed.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal on the day and year first above written.

My commission expires:

 Notary Public



SUBCONTRACTOR AFFIDAVIT FOR FINAL PAYMENT

Project Number _____

Project Title _____

STATE OF MISSOURI)

) ss:

COUNTY OF _____)

After being duly sworn the person whose name and signature appears below hereby states under penalty of perjury that:

1. I am the duly authorized officer of the business indicated below (hereinafter Subcontractor) and I make this affidavit on behalf of Subcontractor in accordance with the requirements set forth in Section 290.290, RSMo.

Subcontractor has completed all of the Work required under the terms and conditions of a subcontract as follows:

Subcontract with: _____, Contractor

Work Performed: _____

Total Dollar Amount of Subcontract and all Change Orders: \$ _____

City Certified ☐ MBE ☐ WBE ☐ DBE ☐ NA

List certifications: _____

2. Subcontractor fully complied with the provisions and requirements of the Missouri Prevailing Wage Law set forth in Sections 290.210, RSMo through 290.340, RSMo.

Business Entity Type:

- () Missouri Corporation
() Foreign Corporation
() Fictitious Name Corporation
() Sole Proprietor
() Limited Liability Company
() Partnership
() Joint Venture
() Other (Specify) _____

Subcontractor's Legal Name and Address

Phone No. _____

Fax: _____

E:mail: _____

Federal ID No. _____

I hereby certify that I have the authority to execute this affidavit on behalf of Subcontractor.

By: _____

(Signature)

(Print Name)

(Title)

(Date)

NOTARY

Subscribed and sworn to before me this _____ day of _____, 20_____.

My Commission Expires: _____ By _____

Print Name

Title

SECTION 01300 – SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section provides for the submittals required by the City prior to the start of work and, as required, for the duration of the Work.
- B. All submittals shall be clearly identified by reference to a specification section and/or detail drawing. Submittals shall be clear and legible and shall include sufficient presentation of the data.
- C. No portion of the work requiring a shop drawing, product data or sample shall be started nor shall any materials be fabricated or installed prior to the completion of the submittal process described herein. Fabrication performed, materials purchased or on-site construction accomplished prior to completing the submittal process as defined herein shall be at the Contractor's sole risk. The City shall not be liable for any expense or delay to complete the submittal process.

1.02 RELATED SECTIONS

- A. Section 00700 – General Requirements:
 - 1. Article 2, paragraph 2.07.B.1 – Preliminary Project Schedule.
 - 2. Article 2, paragraph 2.07.B.2 – Preliminary Schedule of Shop Drawings.
 - 3. Article 2, paragraph 2.07.B.3 – Preliminary Schedule of Values.
 - 4. Article 6, paragraph 6.04 – Progress Schedule.
 - 5. Article 6, paragraph 6.05 – Recovery Schedule.
 - 6. Article 6, paragraph 6.06 – Substitute and “Or-Equal” Items.
 - 7. Article 6, paragraph 6.15 – Safety Representative.
 - 8. Article 6, paragraph 6.18 – Shop Drawings and Samples.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01335 – Document Management.

1.03 GENERAL INFORMATION

- A. Definitions:
 - 1. Shop Drawings, product data and Samples are technical Submittals prepared by the Contractor, Subcontractor, manufacturer or Supplier and submitted by Contractor to the City/Design Professional for review and comment as a basis of the use of Equipment and Materials proposed for incorporation in the Work or needed to describe installation, operation, maintenance or technical properties, as specified in each Division of the Specifications:
 - (a) Shop Drawings include custom-prepared data of all types including drawings, diagrams, performance curves, material schedules, templates, instructions and similar information.
 - (b) Product data includes standard printed information on materials, products and systems; not custom-prepared for this Project, other than the designation of selections from available choices.
 - (c) Samples include both fabricated and physical examples of materials, products and Work; both as complete units and as smaller portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis. Mock-ups are a special form of Samples which are too large to be handled in the specified manner for transmittal of Sample Submittals.

2. Informational Submittals are those technical reports, administrative Submittals, certificates and guarantees not defined as Shop Drawings, product data or Samples:
 - (a) Technical reports include laboratory reports, tests, technical procedures, technical records and Contractor's design analysis.
 - (b) Administrative Submittals are those nontechnical Submittals required by the Contract Documents or deemed necessary for administrative records. These Submittals include maintenance agreements, bonds, project photographs, physical work records, statements of applicability, copies of industry standards, project record data, schedules, security/protection/safety data and similar type Submittals.
 - (c) Certificates and guarantees are those Submittals on Equipment and Materials where a written certificate or guarantee from the manufacturer or Supplier is required in the Contract Documents.
- B. Quality Requirements:
1. The Contractor shall submit Shop Drawings and Samples in accordance with Section 00700, paragraph 6.18.C Submittal Procedures.
 2. Submittals such as Shop Drawings and product data shall be of suitable quality for legibility and reproduction purposes. Every line, character and letter shall be clearly legible. Drawings shall be useable for further reproduction to yield legible hard copies.
 3. Documents submitted to the City/Design Professional that do not meet "NO EXCEPTIONS NOTED" to the specified requirements shall be subject to rejection by the City/Design Professional and upon request by the City/Design Professional, the Contractor shall resubmit documents. Submittals shall be corrected, retraced, redrawn or replaced, as may be necessary, to meet the "NO EXCEPTIONS NOTED" requirements. Contractor's failure to initially satisfy Submittal requirements will not relieve the Contractor from meeting the required schedule for Submittals.
 4. All submittals by subcontractors shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time to prevent delays.
 5. The Contractor shall check all subcontractors' submittals regarding measurements, sizes, materials and details to determine and verify that they meet the requirements of the Contract Documents. Submittals found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.
 6. Certificates of Compliance – Where indicated in these specifications, each submittal shall include a certificate of compliance prepared by the manufacturer or Supplier of the submitted data, certifying that the item covered complies with Contract Documents. The certificate of compliance shall be a separate document and shall include identification of all deviations, if any, from the Contract Documents.
- C. Submittal Completeness:
1. The Contractor shall accept full responsibility for the completeness of each submission. When an item consists of components from several sources, the Contractor's initial submittal on the item shall include all components.
 2. Submittals shall be complete with respect to dimensions, design criteria, materials of construction and other information specified to enable the City/Design Professional to review the information effectively.
 3. Where standard drawings are furnished which cover several variations of the general class of Equipment, each drawing shall be annotated to indicate exactly which parts of the drawing apply to the Equipment being furnished. Use hatch marks to indicate variations that do not apply to the Submittal. The use of "highlighting markers" will not be an acceptable means of annotating Submittals. Annotation shall also include proper identification of the Submittal permanently attached to the drawing.

4. Reproductions or copies of Contract Drawings or portions thereof will not be accepted as complete fabrication or erection drawings. The Contractor may use a reproduction of Contract Drawings for erection drawings to indicate information on erection or to identify detail drawing references. Whenever the Drawings are revised to show this additional Contractor information, the Design Professional's title block shall be replaced with Contractor's title block and the Design Professional's professional seal shall be removed from the drawing. The Contractor shall revise these erection drawings, as needed, for subsequent Design Professional revisions to the Contract Drawings.
- D. Form of Submittals:
1. Submittals and other Project documents shall be transmitted in electronic format and non-electronic format as specified.
 2. Electronic Format:
 - (a) Transmit Submittals and Project documents utilizing:
 - (i) Adobe ".pdf" files created directly from native electronic format or City-approved equal file type and format.
 - (ii) Electronic submittal ".pdf" files are not to be combined files or collections of files/drawings. Each drawing document must stand alone.
 - (iii) Each file will be right reading and oriented the same for all consecutive resubmissions.
 - (iv) For any given Submittal, the filename and format shall be consistent for initial submission and subsequent revisions of the same. Use consistent naming convention throughout. Reference to revision or dates shall not be included in a filename.
 - (v) Submittals not meeting the above criteria are subject to rejection.
 - (b) Provide Project Record Documents, equipment instruction books and operating and maintenance manuals and any other documents, as required, in a file type and format approved by City.
 3. Non-electronic Format:
 - (a) Selected Submittals may be provided in paper (hard copy), as well, only with advance approval of the City and using procedures specified herein.
 - (b) Equipment instruction books and operating manuals shall be provided in hardcopies in addition to the specified electronic format.
 - (c) See also Section 01015 – Specific Project Requirements for a list of Submittals that are to be submitted in hard copy format.
- E. Transmittal of Submittals:
1. All submittals, regardless of origin, shall be stamped with the approval of the Contractor and identified with the name and number of this Contract, Contractor's name, references to applicable specification paragraphs and Contract Drawings and version of the submittal. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number and date shall be indicated on all drawings and other descriptive data. The Contractor's stamp of approval is a representation to the City and Design Professional that the Contractor accepts full responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data, and the Contractor has reviewed and coordinated each submittal with the requirements of the Work and the Contract Documents.

2. Electronic Submittals – The Contractor shall utilize the City’s document management system as specified in Section 01335- Document Management for managing, tracking and storing documents associated with the Project. If an internet-based document management system is to be used, additional requirements are provided in Section 01335- Document Management and Section 01015 – Specific Project Requirements. The Contractor shall comply with the file protocols and procedures for the document management system.
 3. Non-electronic Submittals – Paper (hard copy) submittals shall be delivered in accordance with Section 01015 – Specific Project Requirements and as specified herein.
- F. Submittals Required for the Preconstruction Conference:
1. Following are the minimum required submittals to be provided by the Contractor at the pre-construction conference:
 - (a) General Requirements:
 - (i) Preliminary Project Schedule.
 - (ii) Preliminary Schedule of Shop Drawings.
 - (iii) Preliminary Schedule of Values.
 - (iv) Listing of Subcontractors.
 - (v) Project Sign Request.
 - (vi) Project letters to be used during the Work.
 - (vii) Safety Representative.
 - (b) Project Specific Requirements can be found in Section 01015 – Specific Project Requirements.
 - (c) Document Management can be found in Section 01335 – Document Management.

1.04 SHOP DRAWINGS AND SAMPLES

- A. Shop Drawings:
1. Shop Drawings and engineering data covering all equipment and fabricated and building materials which will become a permanent part of the Work under this Contract shall be submitted to the City/Design Professional for review as specified herein. The data shall include drawings, descriptive information, sufficient detail to show the kind, size, arrangement and operation of component materials and devices; the external connections, anchorages and supports required; performance characteristics; and dimensions needed for installation and correlation with other materials and equipment.
 2. All deviations from the Contract Documents shall be identified on each submittal and shall be tabulated in the Contractor’s letter of transmittal. Such submittals shall, as pertinent to the deviation, indicate essential details of all changes proposed by the Contractor (including modifications to other facilities that may be a result of the deviation) and all required piping and wiring diagrams.
- B. Product Data:
1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the Work.

2. If applicable, submittals for equipment shall include a listing of all installations where identical or similar equipment has been installed and been in operations for a period of at least one year.
 3. Certificates are statements printed on the manufacturer's or supplier's letterhead and signed by responsible officials of manufacturer of product, system or material. Certifications shall provide a clear statement that the product, system or material meets the specified requirements of Contract Documents. All certificates shall be dated after the Effective Date of the contract and shall clearly indicate the project name and project number.
- C. Samples:
1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of work to be used by the City/Design Professional for independent inspection and testing, as applicable to the Work.
- D. Instruction Books and Operating and Manuals:
1. Contractor shall submit all Operation and Maintenance Data and Manuals as required by the Operation and Maintenance Data Specification in electronic and non-electronic form.
 2. The Requirements of this specification also applies to the submittal and review of the Operation and Maintenance Data and Manuals.
 3. In addition to electronic Submittals specified, non-electronic (hard copy) Equipment instruction books and operating manuals prepared by the manufacturer shall include the following:
 - (a) Index and tabs.
 - (b) Instructions for installation, start-up, operation, inspection, maintenance, parts lists and recommended spare parts and data sheets showing model numbers.
 - (c) Applicable drawings.
 - (d) Warranties and guarantees.
 - (e) Address of nearest manufacturer-authorized service facility.
 - (f) All additional data specified.
 4. Information listed above shall be bound into hard-back binders of three-ring type. Sheet size shall be 8-1/2 x 11. Binder color shall be black. Capacity shall be a minimum of 1-1/2 inches, but sufficient to contain and use sheets with ease. Provide the following accessories:
 - (a) Label holder.
 - (b) Business card holder.
 - (c) Sheet lifters.
 - (d) Horizontal pockets.
 5. The following information shall be imprinted, inserted or affixed by label on the binder front cover:
 - (a) City's Name and Department name.
 - (b) City's facility or plant name.
 - (c) Equipment item name.
 - (d) Volume number (if applicable).
 - (e) Contract number.
 - (f) Manufacturer's name and address.
 6. The following information shall be imprinted, inserted or affixed by label on the binder spine:
 - (a) Equipment item name.

- (b) City's Name and Department.
- (c) City's facility or plant name.
- (d) Manufacturer's name.
- (e) Contract number.
- (f) Volume number (if applicable).

7. Submit mockup of cover and spine for the City/Design Professional's review.

E. Survey Data:

- 1. All field books, notes, videotapes and other data developed by Contractor in performing surveys required as part of the Work shall be available to City/Design Professional for examination throughout the construction period.
- 2. All such data shall be submitted to the City/Design Professional with the other documentation required for final acceptance of the Work.

1.05 CITY/DESIGN PROFESSIONAL'S REVIEW OF DRAWINGS AND DATA

- A. The City/Design Professional's review of drawings and data submitted by Contractor will cover only general compliance with the Construction Contract Documents. The City/Design Professional's review does not indicate a thorough review of all dimensions, quantities and details of the material, equipment, device or item shown. The City/Design Professional's review shall not relieve Contractor of Contractor's responsibility for errors, omissions or deviations in the drawings and data, nor of sole responsibility for compliance with the Construction Contract Documents.
- B. The City/Design Professional's submittal review period shall be 21 consecutive calendar days in length and shall commence on the first calendar day immediately following the date of arrival of the submittal or resubmittal in the City/Design Professional's office. The time required to mail the submittal or resubmittal back to Contractor shall not be considered a part of the submittal review period. Submittals shall be returned to the Contractor under one of the following assignments:
 - 1. "NO EXCEPTIONS NOTED" is assigned when there are no notations or comments on the submittal. When returned, the Contractor may release the equipment and/or material for manufacture.
 - 2. "EXCEPTIONS NOTED" is assigned when a confirmation of the notations and comments is not required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.
 - 3. "RETURNED FOR CORRECTION" is assigned when the submittal does not meet the intent of the Construction Contract Documents. The Contractor must resubmit the document revised to bring the submittal into compliance with Contract Documents. "RETURNED FOR CORRECTION" is also assigned when notations and comments are extensive enough to require a resubmittal of the package.
 - 4. "NOT ACCEPTABLE" is assigned when the submittal does not meet the intent of the Construction Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into compliance with Contract Documents. It may be necessary to resubmit using a different manufacturer/vendor to meet the Construction Contract Documents. "NOT ACCEPTABLE" is also assigned when the notations and comments are extensive enough to require a resubmittal of the package.
- C. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the City/Design Professional at least seven working days prior to release for manufacture.

D. Resubmittal of Drawings and Data:

1. The Contractor shall accept full responsibility for the completeness of each resubmittal. The Contractor shall verify that all corrected data and additional information previously requested by the City/Design Professional are provided on the resubmittal. When corrected copies are resubmitted, the Contractor shall in writing direct specific attention to all revisions and shall list separately any revisions made other than those called for by the City/Design Professional on previous submissions.
2. Requirements specified for initial submittals shall also apply to resubmittals. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.) to indicate the sequence of the resubmittal.
3. Resubmittals shall be made within thirty (30) days of the date of the letter returning the submittal to be modified or corrected; unless, within 14 days, the Contractor submits an acceptable request for an extension of the stipulated period, listing the reasons the resubmittal cannot be completed within the specified time.
4. Any need for more than one resubmission or any other delay in obtaining the City/Design Professional's review of submittals, will not entitle the Contractor to an extension of the Contract Times, unless: the delay of the Work is directly caused by a change in the Work authorized by a Change Order or by failure of the City/Design Professional to review the submittals within the submittal review period specified herein.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used

END OF SECTION

SECTION 01320 – CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the construction process beginning with the Notice of Intent to Contract and continuing through completion of the Work performed and Construction Contract close out.
- B. The Contractor shall furnish all labor, materials, equipment and incidentals as necessary to comply with these requirements including but not limited to the following and as required herein:
 - 1. Preliminary Project Schedule.
 - 2. Project Baseline Schedule.
 - 3. Progress Schedule.
 - 4. Recovery Schedules.
 - 5. Submittals Schedule.
 - 6. Daily Labor Force reports.
 - 7. Material location reports.
 - 8. Field condition reports.
 - 9. Special reports.
 - 10. Photographic Documentation.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood this specification may be modified by appropriate items in Section 01015 – Specific Project Requirements.

1.03 RELATED SECTIONS

- A. Drawings and general provisions of the Contract; including General and Supplementary Conditions, all applicable Division 01 Sections, and all applicable Division Sections; apply to this Section.
- B. Section 00700 – General Requirements:
 - 1. Article 2, paragraph 2.07.B.1 – Preliminary Project Schedule.
 - 2. Article 2, paragraph 2.07.B.2 – Preliminary Schedule of Shop Drawings.
 - 3. Article 2, paragraph 2.08.A – Acceptable Schedule.
 - 4. Article 2, paragraph 2.08.B – Project Baseline Schedule.
 - 5. Article 6, paragraph 6.04 – Progress Schedule.
 - 6. Article 6, paragraph 6.05 – Recovery Schedule.
- C. Section 01000 – General Project Requirements.
- D. Section 01015 – Specific Project Requirements.
- E. Section 01322 – Photographic Documentation.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Association of Cost Engineers (AACE):
 - 1. Comply with recommended practices.

1.05 SUBMITTALS

- A. Scheduler Qualifications – For firms and persons preparing schedules, submit qualifications as required by Table 1 to demonstrate their capabilities and experience. Include lists of completed projects with the following information:
 1. Project name.
 2. Project location.
 3. Name and address of engineer, architect or contractor for which schedules were prepared.
 4. Name and address of client.
 5. Other information and pertinent.
- B. Preliminary Schedule of Shop Drawings – Arrange the following information in a tabular format:
 1. Scheduled date for each first submittal.
 2. Specification Section number and title.
 3. Submittal category (action or informational).
 4. Name of subcontractor.
 5. Description of the Work covered.
 6. Scheduled date for City's final approval.
- C. Standard Schedule Format – Layout for all schedules and reports shall follow the standard format in the following order, activity ID, activity name, original duration, remaining duration, percent complete, start, finish, late start, late finish, total float, baseline variance, predecessor, successor, and resource ID.
- D. Preliminary Project Schedule – Submit in native electronic format and *PDF format. PDF sheet size shall sufficiently large enough to legibly show entire schedule for entire construction period.
- E. Baseline Project Schedule – Submit in native electronic format and *PDF format. PDF sheet size shall sufficiently large enough to legibly show entire schedule for entire construction period.
- F. Progress Schedules – Submit in native electronic format and *PDF format. PDF sheet size shall sufficiently large enough to legibly show entire schedule for entire construction period.
- G. CPM Reports – Submit concurrent with Preliminary, Baseline, and Progress Schedules.
- H. Activity Report – Submit concurrent with each Progress Schedule a list of all activities sorted by activity number and early start date, or actual start date, if known.
- I. Logic Report – Submit concurrent with each Progress Schedule a list of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
- J. Total Float Report – Submit concurrent with each Progress Schedule a list of all activities sorted in ascending order of total float.
- K. Daily Labor Force Reports – Submit concurrent with each Progress Schedule.
- L. Material Location Reports – Submit concurrent with each Progress Schedule.
- M. Field Conditions Reports – Submit concurrent with each Progress Schedule.
- N. Special Reports – Submit special reports within one day of an occurrence.
- O. Daily Construction Reports – Submit at weekly intervals.

1.06 DEFINITIONS

- A. Activity:
 - 1. A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 2. Critical activities are activities on the critical path. They must start and finish on the planned start and finish times.
 - 3. Predecessor activity is an activity that must start or complete before a given activity can be started. No negative lag is allowed.
 - 4. Successor activity is an activity that can not start until the predecessor activity allows it. No negative lag is allowed.
- B. CPM (Critical Path Method) – A schedule network analysis technique used to determine the amount of scheduling flexibility (the amount of float) on various logical network paths in the project schedule network, and to determine the minimum total project duration. Start and finish dates are calculated by means of a forward pass, using a specified start date. Late start and finish dates are calculated by means of a backward pass, starting from a specified completion date, which sometimes is the project early finish date determined during the forward pass.
- C. Critical Path – Generally, but not always, the sequence of schedule activities determining the duration of the project. Generally, it is the longest path through the project. However, a critical path can end, as an example, on a schedule milestone that is in the middle of the schedule model and that has a finish-on-or-before imposed date schedule constraint.
- D. Event – The starting or ending point of an activity.
- E. Float – The measure of leeway in starting and completing an activity. Float time is not for the exclusive use or benefit of either City or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Fragnet – A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- G. Gantt Chart – A graphic display of schedule-related information. In the typical Gantt chart, schedule activities or work breakdown structure components are listed down the left side of the chart, dates are shown across the top and activity durations are shown as date-placed horizontal bars. Also known as a Bar chart.
- H. Lag – An offset or delay from an activity to its successor. It is based on the calendar of the successor activity.
- I. Major Area – A significant construction element.
- J. Major Procurement – As discussed in Section 00700, paragraph 2.07.B.1, Major Procurement shall further defined as any materials that fall within the critical path and/or have a lead time of 30 days or greater.
- K. Milestone – A key or critical point in time for reference or measurement.
- L. Network Diagram – A graphic diagram of a network schedule, showing activities and activity relationships.
- M. Schedule Level – A project team specified rule for the relative granularity of schedule activities in an overall schedule model. Following are the descriptions and levels of detail for each schedule level:

1. Level 1 - Project Summary Schedule – This is a summary level schedule that highlights major project activities, milestones and key deliverables.
 2. Level 2 - Project Phase Summary Schedule – This is a more extensive summary level schedule that includes all information from the Level 1 schedule and breaks down the project into major components by area or phase.
 3. Level 3 - Detail Schedule – This level will show detail plans to accomplish. Procurement, Construction, Testing and Start-up. Such schedules will have logical relationships integrated between the activities and organized in such a manner to create a Critical Path and facilitate critical path analysis. It will include all milestones and major elements and will be used to support monthly progress reporting.
 4. Level 4 - Detailed Schedule by Work Package – This level will include detailed information by each work package and display all activities to be accomplished by the workforce with durations of 7 or more calendar days.
 5. Level 5 - Detailed Schedule by Task – This level of detail will support the short-term planning for the field, normally for those activities of less than 1-week duration. It is used for workforce supervisors to plan and coordinate work at the detail level.
- N. WBS (Work Breakdown Structure) – A deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of the project work. The WBS is decomposed into work packages. The deliverable orientation of the hierarchy includes both internal and external deliverables. See also Schedule Levels.
- O. Work Package – A deliverable or project work component at the lowest level of each branch of the WBS. The work package includes the schedule activities and schedule milestones required to complete the work package deliverable or project work component.
- P. Schedule of Monthly Payments – Estimated monthly progress payments based on Baseline Schedule and Schedule of Values for each Month for the duration of the project.

1.07 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities including the scheduling and reporting of separate Contractors performing construction activities related to project.
- B. Coordinate Progress Schedules with the Schedule of Values, to estimate a Schedule of Monthly Payments, list of subcontractors, Preliminary Schedule of Shop Drawings and Samples, progress reports, Application for Payment, and other required schedules and reports.
- C. Secure time commitments for performing critical elements of the Work from parties involved. Time commitments should be captured within the schedule.

1.08 SCHEDULE LEVEL

- A. The Schedule Level (see paragraph 1.06M) to be used for this project shall be as specified in Section 01015 – Specific Project Requirements.

- B. If a Recovery Schedule is deemed necessary by the City in accordance with Section 00700 – General Conditions, it shall be developed as a Schedule Level 5 regardless of the requirements listed in Section 01015 – Specific Project Requirements.

1.09 SCHEDULING SOFTWARE

- A. Prepare schedules using the latest version of Primavera version P6 or higher or Microsoft Project. See Section 01015 – Specific Project for additional or specific software requirements.

1.10 PRELIMINARY SCHEDULE OF SHOP DRAWINGS AND SAMPLES

- A. Preparation – Provide a schedule of submittals arranged in chronological order by date required by the construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery as set forth in the Contract Documents, when establishing dates.
- B. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, the estimated Schedule of Monthly Payments, and Progress Schedules.
- C. Include Shop Drawing and Sample Submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
- D. At Contractor's option, show submittals on the Preliminary Progress Schedule, instead of tabulating them separately.

1.11 SCHEDULE REQUIREMENTS

- A. Requirements According to Schedule Level – Contractor shall provide the following information based in the Schedule Level defined in Section 01015 – Specific Project Requirements. An “X” indicates that the requirement is applicable to the Schedule Level.

Table 1. Schedule Requirements

Item	Requirement	Schedule Level				
		1	2	3	4	5
Procedures	Comply with procedures contained the American Association of Cost Engineers (AACE) recommended practices.	X	X	X	X	X
Time Frame	Extend project schedule from date established for the Notice to Proceed to the date of Final Completion.	X	X	X	X	X
Contract Times	Contract Times shall not be changed unless specifically authorized by Change Order.	X	X	X	X	X
Activities	Treat separate major areas as a separate numbered activity for each principal element of the Work. (WBS)	X	X	X	X	X
Activity Duration	Define activities so none is longer than 20 days, unless specifically allowed by City	X	X	X	X	X
Milestones	Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.	X	X	X	X	X

Table 1. Schedule Requirements

Item	Requirement	Schedule Level				
		1	2	3	4	5
Computer Software	Prepare schedules using the latest version of Primavera version P6 or higher or Microsoft Project. Refer to Section 01015 for project specific requirements.		X	X	X	X
Scheduler's Qualifications	Submit scheduler's qualifications for review and approval			X	X	X
Submittal Review Time	Include review and re-submittal times for review of Shop Drawings and Samples. Each item listed in the Preliminary Schedule of Shop Drawings and Samples shall be included in the schedule.			X	X	X
Procurement Activities	Include separate activities for the procurement process of long-lead and major items that require a cycle of more than 30 days or fall within the critical path. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.			X	X	X
Startup and Testing Time	Include not less than two days for startup and testing.			X	X	X
Constraints	Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.		X	X	X	X
Phasing	Arrange list of activities on schedule by phase.		X	X	X	X
Work by City	Include a separate activity for each area of the Work performed by City.		X	X	X	X
Products Ordered in Advance	Include a separate activity for each product. Delivery dates indicated stipulate the earliest possible delivery date.		X	X	X	X
City-Furnished Products	Include a separate activity for each product. Delivery dates indicated stipulate the earliest possible delivery date.		X	X	X	X
Work Restrictions	Show the effect of the following items on the schedule: <ul style="list-style-type: none"> • Coordination with existing construction. • Limitations of continued occupancies. • Uninterruptible services. • Partial utilization before Substantial Completion. • Use of premises restrictions. • Provisions for future construction. • Seasonal variations. • Environmental control. 			X	X	X
Work Stages	Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following: <ul style="list-style-type: none"> • Subcontract awards. • Submittals. • Purchases. • Fabrication. • Sample testing. • Deliveries. • Installation. • Tests and inspections. 			X	X	X

Table 1. Schedule Requirements

Item	Requirement	Schedule Level				
		1	2	3	4	5
	<ul style="list-style-type: none"> Adjusting. Curing. Startup and placement into final use. 					
Area Separations	<p>Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities:</p> <ul style="list-style-type: none"> Contractor Mobilization* Procurement – Divided by Long Lead and Short Lead Completion of civil work Completion of structural work Completion of mechanical installation Completion of electrical installation Partial Utilization Substantial Completion* Achievement of Full Operations* Punch List and Final Corrections* Final Completion* <p>*Required element, all others to be used as applicable based on project scope.</p>			X	X	X
Contract Modifications	For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragments to demonstrate the effect of the proposed change on the overall project schedule.		X	X	X	X
Work under More than One Contract or Subcontract.	Include a separate activity for each contract or subcontract.			X	X	X
Detailed by Work Package	Include detailed information by each work package and display all activities to be accomplished by the workforce with durations of 7 or more calendar days				X	X
Detail by Task	Include detail by task to support the short-term planning for the field, normally for those activities of less than 1-week duration.					X

B. Cost Correlation:

- Requirement to provide a Cost Correlation shall be as indicated in Section 01015 – Specific Project Requirements.
- At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.

1.12 PRELIMINARY AND BASELINE PROJECT SCHEDULES

- Indicate each significant construction activity separately. Identify each Monday of each week with a continuous vertical line. Outline significant construction activities for the first 60 days of construction. Include skeleton diagram for the remainder of the Work.
- Preliminary Network Diagram – Outline significant construction activities for the project. To be submitted with the Preliminary Progress Schedule.

1.13 PROGRESS SCHEDULES

- A. General – Prepare Progress Schedules using a CPM network analysis diagram.
- B. CPM Schedule Preparation – Prepare a list of all activities required to complete the Work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths:
 1. Activities – Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - (a) Preparation and processing of submittals.
 - (b) Purchase of materials.
 - (c) Delivery of materials and equipment.
 - (d) Fabrication.
 - (e) Installation.
 2. Processing – Process data to produce output data or a computer-drawn, time scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 3. Format – Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges:
 - (a) Sub-networks on separate sheets are permissible for activities clearly off the critical path. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
 - (b) Establish procedures for monitoring and updating CPM schedule and for reporting progress monthly. Coordinate procedures with progress meeting and payment request dates.
 - (c) Use "one calendar day" as the unit of time.
 4. Initial Issue of Schedule – Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
 - (a) Contractor or subcontractor and the Work or activity.
 - (b) Description of activity.
 - (c) Principle events of activity.
 - (d) Immediate preceding and succeeding activities.
 - (e) Early and late start dates.
 - (f) Early and late finish dates.
 - (g) Activity duration in days.
 - (h) Total float or slack time.
 - (i) Average size of workforce.
 5. Schedule Updating – Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
 - (a) Identification of activities that have changed added or deleted.
 - (b) Changes in logic ties.
 - (c) Changes in early and late start dates.
 - (d) Changes in early and late finish dates.
 - (e) Changes in activity durations in days.
 - (f) Changes in the critical path.
 - (g) Changes in total float or slack time.
 - (h) Changes in the Contract Time.

6. Value Summaries – Prepare two cumulative value lists, sorted by finish dates:
 - (a) In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
 - (b) In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
 - (c) In subsequent issues of both lists, substitute actual finish dates for activities completed as of last date.
 - (d) Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - (e) In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - (f) Submit value summary printouts one week before each regularly scheduled progress meeting.
- C. Reports:
 1. Daily Labor Force Reports – Prepare a daily labor force report recording the following information concerning events at Project site:
 - (a) List of subcontractors at Project site.
 - (b) List of separate contractors at Project site.
 - (c) List of all the Contractor's and subcontractor's personnel showing hours worked in labor class at Project site.
 2. Material Location Reports – At monthly intervals, prepare a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
 3. Field Condition Reports – Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit electronically and directly to City with a request for information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Special Reports:
 1. General – Submit special reports within one day of an occurrence.
 2. Reporting Unusual Events – When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events; persons participating; response by Contractor's personnel; evaluation of results or effects; and similar pertinent information. Advise City in advance when these events are known or predictable.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 PROGRESS SCHEDULES

- A. Updates – At monthly intervals, update schedule to reflect actual construction progress and activities. Progress Schedule should be provided for review and approval prior to monthly pay request. Progress Schedules will be reviewed and discussed at regularly scheduled progress meetings. Contractor shall bring printed copies of CPM Schedule:
 - 1. Revise schedule immediately after an activity revision has been recognized or made at the direction by the City. Issue updated schedule concurrently with the report of each such progress meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate actual completion percentage for each activity.
 - 4. Post copies in Project meeting rooms and temporary field offices.

END OF SECTION

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

DAILY FIELD OBSERVATION REPORT

Project Number _____

Project Title _____

Contractor _____

Report Number _____ Date _____ Time _____

Weather

☐ Clear ☐ Snow
☐ Overcast ☐ Foggy
☐ Rain ☐ Cold

☐ Warm
☐ Hot
☐ Temperature Range _____

Site Conditions

☐ Clear ☐ Dusty
☐ Muddy ☐ _____
☐ Temperature Range _____

Day

☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐ _____

Persons Contacted:

Work Observed:

Items Discussed:

Materials Delivered:

Requested Revisions or Interpretations:

Nonconforming Work Reported This Date To Contractor:

Remarks:

☐ Attachments

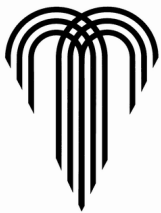
Signed by:

Date:

Distribution:

- ☐ Owner
- ☐ Contractor
- ☐ Construction Manager
- ☐ Design Professional
- ☐ Consultant _____
- ☐ Other _____

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

PERIODIC FIELD OBSERVATION REPORT

Project Number _____

Project Title _____

Contractor _____

Report Number _____ Date _____ Time _____

Weather

- ☐ Clear ☐ Snow
☐ Overcast ☐ Foggy
☐ Rain ☐ Cold

- ☐ Warm
☐ Hot
☐ Temperature Range _____

Site Conditions

- ☐ Clear ☐ Dusty
☐ Muddy ☐ _____
☐ Temperature Range _____

Day

- ☐ Monday ☐ Thursday
☐ Tuesday ☐ Friday
☐ Wednesday ☐ _____

Persons Contacted:

Work Observed:

Items Discussed:

Remarks:

☐ Attachments

Signed by:

Date:

Distribution:

- ☐ Owner
☐ Contractor
☐ Construction Manager
☐ Design Professional
☐ Consultant _____
☐ Other _____

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

WEEKLY REPORT OF WORKING DAYS

Project Number _____

Project Title _____

Contractor _____

Report Number _____ Week Ending: _____

DATE:	WORKING DAY	REMARKS			
TOTAL THIS WEEK		PREVIOUSLY	TOTAL TO DATE	WORKING DAYS IN CONTRACT	REMAINING OR OVERTIME

Signed by OWNER'S REPRESENTATIVE _____ Date: _____

Signed by CONTRACTOR _____ Date: _____

Distribution: ☐ OWNER ☐ CONTRACTOR ☐ Construction Manager ☐ Design Professional ☐ Consultant ☐ Other

SECTION 01322 – PHOTOGRAPHIC AND VIDEO DOCUMENTATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section outlines the requirements for photographic and video documentation. The Contractor is solely responsible for the development of an overall plan to fully document Site conditions and the progress of the Work.
- B. The Contractor shall hire a professional photographer to provide the services and deliverables described herein.
- C. This section does not include work associated with internal closed-circuit television (CCTV) inspections of sewer gravity pipes. See Section 02686 – CCTV Inspection of Sewer Mains.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated in the contract documents.

1.03 RELATED SECTIONS

- A. Section 00700 – General Conditions.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01300 – Submittals.
- D. Section 01320 – Construction Progress Documentation.
- E. Section 01335 – Document Management.
- F. Section 02686 – CCTV Inspection of Sewer Mains.

1.04 DEFINITIONS

- A. Pre-Construction Video: A video taken to document Site conditions prior to the start of construction.
- B. Pre-Construction Photographs: Photographs taken to document Site conditions prior to the start of construction. All Pre-Construction Photographs shall be digital, indexed on an interactive map and shown on a View Location Map.
- C. Construction Progress Photographs: Digital photographs taken to document the progress of construction.
- D. Construction Activity Photographs: Digital photographs taken to document specific construction activities.
- E. Post-Construction Photographs: Digital photographs taken after final restoration to document the finished condition of the Site.
- F. Affidavit of Authenticity: The photographer's signed and notarized affidavit, attesting to the production of the original photographs, videos and their authenticity.

1.05 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Other required Submittals:
 - 1. Photographer's Qualifications: Submit for review and approval the qualification information demonstrating the photographer meets the requirements of paragraph 1.06 of this Section.
 - 2. Phasing Plan: If applicable, submit for review and approval a phasing plan for Pre-Construction Photographs and Videos.

3. Pre-Construction Photographs: Submit for review and approval digital pre-construction photographs with an interactive index map, Photograph Navigation System (see paragraph 2.05 of this Section) and affidavit of authenticity.
4. Pre-Construction Video: Submit for review and approval a pre-construction video with a Video Navigation System (see paragraph 2.05 of this Section) and affidavit of authenticity (see paragraph 1.04 of this Section).
5. Construction Progress Photographs: On a monthly basis, submit digital construction photographs, interactive index map and affidavit of authenticity.
6. Construction Activity Photographs: On a monthly basis, submit digital activity photographs (if different than progress photographs), interactive index map and affidavit of authenticity.
7. Post-Construction Photographs/Video: Submit for review and approval digital post-construction photographs or video, interactive index map and affidavit of authenticity.

1.06 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. General Quality: Photographs and video shall be clear and of sufficient quality to show relevant detail. They shall not be blurred, taken in shadow or too far away to provide conclusive information. The City may require that the photographs or video be retaken should the quality be insufficient. Costs for such re-takes are the Contractor's sole responsibility and shall be done at no extra cost to the City.
- C. Qualifications of Photographer: The Contractor shall engage the services of a professional photographer with a minimum of 3 years of experience in construction photography to document the conditions of the project site. Upon request, samples of the photographer's prior work and/or references shall be submitted.
- D. Affidavit of Authenticity: The Contractor shall provide the photographer's signed and notarized affidavit, attesting to the production of the original photographs, videos and their authenticity. An affidavit of authenticity shall be provided with each submittal/deliverable.

1.07 MINIMUM REQUIREMENTS

- A. The section specifies several different sets of photographic and video documentation requirements. The extent of documentation will depend upon the size and type of the project. The following table summarizes the basic documentation requirements.

Table 1. Summary of Requirements

Set of Documentation	Mandatory	As Required by Section 01015
Pre-Construction Video		✓
Haul Route Video		✓
Pre-Construction Photographs	✓	
Interactive Index Map		✓
Construction Progress/Activity Photographs		✓
Post-Construction Photographs/Video		✓

1.08 OWNERSHIP

- A. The photographs and videos shall become the sole property of the City.

1.09 SCHEDULES

- A. Schedule of Values: Photographic/Video documentation shall be listed as one line item in the Schedule of Values.
- B. Construction Progress Documentation: Each set of photographs or videos shall be listed in the Preliminary Project Schedule as a discrete activity. See Section 01320 – Construction Progress Documentation.

1.10 PHASING

- A. Based on the nature and scope of the Work, the Contractor may phase the Pre-Construction Photographs and Video. If phasing is to be implemented, the following shall apply:
 - 1. The Contractor shall submit a Phasing Plan that identifies each area of the Work.
 - 2. For each phase, Pre-Construction Photographs and Videos shall be taken within 21 days of the start of construction activities unless otherwise approved in writing by the City/Design Professional.
- B. Under no circumstances shall construction begin in any area until the Pre-Construction Photographs and/or Video have been submitted and approved by the City/Design Professional.

PART 2 - PRODUCTS

2.01 PHOTOGRAPH QUALITY

- A. Photographic images shall be captured in digital format, with a minimum of 10-megapixel resolution and taken without JPG compression.
- B. Each photograph shall include a date/time stamp in the image, showing when the image was taken.

2.02 VIDEO QUALITY

- A. All video recordings shall be captured in full 1080-dpi Hi-Definition digital format, without compression or file-reduction whether applied in-camera or after capture during editing.
- B. The original video segments shall be retained in the format captured in camera (such as MP4 or MTS for Canon HD Video) without compression or modification that would reduce resolution or quality. The video shall include a date/time stamp in the image, showing when the image was taken. Video shall include verbal description and narrative of what is being captured.

2.03 METADATA

- A. Digital files for photographs and videos shall, at a minimum, contain the following metadata:
 - 1. Project Name.
 - 2. Date and Time Taken.
 - 3. All other metadata inherently provided by the camera/video equipment.

2.04 MEDIA LOG

- A. The Contractor shall maintain a media log (photographs and videos) for the project. The log shall include, but is not limited to, the following information for each photograph and/or video:
 - 1. Project Name.
 - 2. Project Number.
 - 3. Contract Number.
 - 4. Name of City and Department.

5. Name of Contractor.
6. Name of Design Professional.
7. Photograph file name (the specific format should be tied to the project name).
Photograph file name shall be unique to each digital file and shall be embedded in the digital image in a manner that is permanent and clearly legible when the file is opened.
8. Include a date designator in file names.
9. Date the photograph was taken.
10. The name of the photographer who took the photograph.

2.05 PHOTOGRAPH AND VIDEO NAVIGATION SYSTEM

- A. If specified in Section 01015 – Specific Project Requirements, the Contractor shall provide an electronic photographic and video navigation system (navigation system) for searching and viewing recorded imagery.
- B. Interactive Index Map: The navigation system shall indicate the general location of each area photographed or video recorded using icons and other suitable mark-ups on the actual construction drawings in PDF-format.
- C. The navigation system shall utilize standard PDF-reader software (such as Adobe Reader, Acrobat, or Bluebeam Vu) or other software that shall be included with the deliverables. Icons shall be individually hyperlinked to the respective photograph, video, affidavit of authenticity and media log file for immediate playback in Windows Media Player, VLC or other players.
- D. The navigation system shall include the following:
 1. Project Name.
 2. Project Number.
 3. Contract Number.
 4. Name of City.
 5. Name of Contractor.
 6. Name of Design Professional.
 7. Ranges of dates for which the photographs or videos were taken.
 8. The name of the photographer.
 9. Affidavit of Authenticity.
 10. Media Log.
 11. Photographs.
 12. Videos.
- E. A navigation system shall be provided for each set of photographs and videos taken.

PART 3 - EXECUTION

3.01 PRIOR TO PHOTOGRAPHIC AND VIDEO DOCUMENTATION

- A. Construction Limits: Prior to the Pre-Construction Photographs and Video, the Contractor shall flag or mark the construction limits and excavation areas for identification, and project centerlines shall be physically marked with survey stakes and/or high visibility paint (including station numbers).
- B. Mark Utilities: Prior to the Pre-Construction Photographs or Video, the Contractor shall notify utilities and have them marked so that utility locations are documented.
- C. Coordinate with City: For any work that requires a representative of the City to be present, the Contractor shall provide the City a minimum of 2 days' notice.

3.02 PRE-CONSTRUCTION VIDEO

- A. If specified in Section 01015 – Specific Project Requirements, the Contractor shall provide a pre-construction video.
- B. Scope: Prior to the start of construction, the Contractor shall prepare a color video recording with audio of all the areas to be affected by construction. All pre-construction video recordings shall have sufficient detail to reveal the condition (including defects and damage) of all existing features, such as pavement, driveways, culverts, inlets, sidewalks, landscaping, vegetation, creek banks, trees, structures, foundations and other such items along the construction route and in the immediate adjacent areas, which might be affected by the construction operations. In addition, the videographer shall move beyond the construction zone as needed to ensure documentation of features and areas that may not be adequately recorded from the centerline rotations. Videos shall be taken on both sides of the street when construction is in or along a roadway (use this approach along drainage channels and in other similar situations).
- C. Schedule: Taken after utilities have been marked and prior to the placement of materials or equipment on the Site. Videos shall be submitted to the City for review and approval. Under no circumstances shall construction begin until the pre-construction video has been submitted and approved.
- D. The pre-construction video recording shall be done in the presence of a representative of the City.
- E. The Contractor shall document all pre-existing site conditions/elements of the Site, the same as listed for the Pre-construction Photographs.
- F. The video documentation shall provide a clear and continuous view of the project showing all visible utilities and features within the limits of construction.
- G. To preclude the possibility of tampering or editing in any manner, all video recordings shall, by electronic means, generate and display continuously and simultaneously on the screen or in the video file metadata properties digital information to include the date and time of recording. The time information shall consist of hours, minutes and seconds, separated by colons (i.e., 10:35:18).
- H. The audio/video recording shall consist of one video and one audio track which shall be recorded simultaneously. All tracks shall consist of the original live recordings and thus shall not be copies of other audio or video recordings.
- I. The audio track shall contain the narrative commentary. Ample descriptive narrative shall be recorded simultaneously during all recordings. Narration shall include clearly audible comments that will deliver station number and/or street address, locations, direction of view and rotation.
- J. Typical video segments should not exceed 10 minutes in length.
- K. Rotations of 360-degrees shall be at the beginning and end of each video segment and at each 100 foot increment throughout the video.
- L. The rate of speed in the general direction of travel of the conveyance used during recording shall be controlled to provide a usable image. On average, the rate of forward travel during videotaping shall not be less than fifteen minutes for every 1000 linear feet of pipeline route or street centerline; slower rates shall be utilized in residential/commercial areas.
- M. Panning rate, zoom-in rate and zoom-out rate shall be controlled sufficiently such that playback will provide clarity of the object viewed.
- N. All recording shall be done during times of good visibility. No recording shall be done during periods of precipitation unless authorized by the City.

3.03 HAUL ROUTE VIDEO

- A. If specified in Section 01015 – Specific Project Requirements, the Contractor shall provide pre-construction video documentation of all haul routes associated with the Project.
- B. Haul route videos shall be made at the time of the Pre-Construction Photographs.
- C. Haul Route Videos shall meet the requirements of the paragraph PRE-CONSTRUCTION VIDEO as well as the following:
 - 1. Haul routes shall be recorded during daylight hours and during good weather conditions.
 - 2. Video equipment may be mounted on a vehicle. The speed of the vehicle while recording shall not be more than 5 miles per hour (mph). If traffic or safety concerns prohibit driving 5 mph then the video shall be taken while walking the route.
 - 3. No audio/narrative commentary is required for the haul route video.

3.04 PRE-CONSTRUCTION PHOTOGRAPHS

- A. The Contractor shall provide pre-construction photographs as specified in this Section and as specified in Section 01015 – Specific Project Requirements.
- B. Scope: The purpose for pre-construction photo documentation is to record existing conditions, damage and features on or adjacent to the project site. The principal reason for obtaining photographs is so that items such as cracked curbs, broken pavement, sidewalks, plugged culverts, driveway conditions, lawn conditions and other existing conditions located in the Project Site may be clearly shown and documented. This will to some degree mitigate the possibility of post-construction restoration issues with property owners in the Project area.
- C. Schedule: Take photographs after utilities have been marked, prior to placement of materials or equipment on the Site and prior to the start of construction activities in an area. Photographs shall be submitted to the City for review and approval. Under no circumstances shall construction begin until the pre-construction photographs have been submitted and approved.
- D. Pre-construction photographs shall be taken at sufficient intervals to be able to carefully document the pre-construction conditions of the Site and in no case more than 50-foot intervals along the street, right-of-way, drainage easement and water/wastewater line route before commencement of the Work.
- E. In addition, select photographs shall be taken as needed along the construction limits, and of adjacent properties, to ensure documentation of features and areas that may not be adequately recorded in the centerline rotations. Photographs shall be taken along both sides of the street when construction is in or along a roadway.
- F. Overlapping composition techniques shall be employed to ensure maximum photographic coverage.
- G. Pre-construction photographs shall be taken after the utility locations have been marked.
- H. Pre-construction photographs shall be taken with a representative of the City present unless otherwise authorized by the City.
- I. All Pre-Construction Photographs shall have sufficient detail to reveal the condition (including defects and damage) of all existing features, such as pavement, driveways, culverts, inlets, sidewalks, landscaping, vegetation, creek banks, trees, structures, foundations and other such items along the construction route, and adjacent areas which might be affected by the construction operations. An identifier such as house or business address/signs, property numbers, mail boxes, landscaping, etc... shall be included when practical in each view for ease of identification.
- J. At a minimum, pre-construction photographs must be taken of the following views:
 - 1. The entire street right of way and limits of construction; whichever is greater.
 - 2. The entire easement width and length (both permanent and temporary).

3. All curb lines (both sides of street) – all pre-existing curb damage not called for replacement within the Work and shall include major cracks.
4. All driveways, steps, and curbs and curb ramps (both sides of street).
5. Fence and gate conditions.
6. Trees, ornamental shrubs, plantings/planter boxes and evidence of irrigation features.
7. Other privately or publicly owned features or facilities that might be disturbed by the construction.
8. Views of structures, both inside and adjacent to the project site and easements in areas where the Contractor will be working within five (5) feet of said structure.
9. Prominent utility features, such as: guy wires, poles, signs, valves, fire hydrants, meters, pull boxes, etc.
10. Streams and stream banks within the limits of construction.
11. At the discretion of the Contractor, photograph offsite roadways that will be subjected to heavy usage such as for haul routes or delivery of heavy components or equipment. Refer to Paragraph HAUL ROAD VIDEO for additional requirements.
12. Other significant or prominent features to protect the City and the Contractor following construction (e.g. close-up photographs of pre-existing broken curbs, cracked/failed pavement, damaged adjacent retaining walls, etc.).
13. Views of structures, both inside and adjacent to the ROW/easement in areas where the Contractor will be working within five (5) feet of said structure.
14. Other views as requested by the City.

3.05 CONSTRUCTION PROGRESS PHOTOGRAPHS

- A. If specified in Section 01015 – Specific Project Requirements, the Contractor shall provide Construction Progress Photographs.
- B. Scope: The Contractor shall provide construction progress photographs to depict the progress of the work. The Contractor shall be responsible for photographs of the Site to show the existing and general progress of the Work. The City will advise as to which views are of interest.
- C. Schedule: Photographs shall be taken at the time of the Pre-construction Photographs, a minimum of once per month throughout the duration of the Project, and at the time of the Post Construction Photographs. Construction Progress Photographs are to be submitted each month with the Contractor's Application for Payment. Applications for Payment was not be considered acceptable until the photographs are provided.
- D. This set of photographs will be taken as close as possible to the same locations and views of the pre-construction photography.

3.06 CONSTRUCTION ACTIVITY PHOTOGRAPHS

- A. If specified in Section 01015 – Specific Project Requirements, the Contractor shall provide Construction Activity Photographs.
- B. Scope: The Contractor shall provide photographs taken to document Site conditions and specific construction activities throughout the duration of the Project.
- C. Schedule: Photographs shall be taken two times per month (every two weeks) for the duration of the Project.
- D. Construction Activity Photographs are to be submitted each month with the Contractor's Application for Payment.
- E. Photographs shall be taken to depict the work accomplished during the month. These photographs are to include, but are not limited to, the following:
 1. Work not yet covered up.
 2. When mechanical, electrical, plumbing or building inspections are scheduled.

3. The beginning of installation of major items of equipment.
4. After installation of major items of equipment.
5. Other significant construction activities.
6. As directed by the City.

3.07 POST-CONSTRUCTION PHOTOGRAPHS

- A. If specified in Section 01015 – Specific Project Requirements, the Contractor shall provide Post-Construction Photographs.
- B. Scope: The Contractor shall provide Post-Construction Photographs of the project area that documents the final restoration and construction improvements. Post-Construction photographs shall show the general condition of the construction zone (recording finished landscape and other restoration, plus construction improvements), and other areas that may have been affected by construction activities.
- C. Schedule
 1. Photographs shall be taken after completion of the Substantial Completion punch list when the project is complete, the Site is restored to the satisfaction of the City, and before submission of the Application for Final Payment.
 2. Post-construction photographs shall be taken after all items have been address from the Substantial Completion inspection, after cleanup and site restoration, and before application for final payment.
- D. Post-Construction Photographs are to be submitted with the Contractor's Application for Final Payment.
- E. The Contractor shall coordinate the schedule of the post-construction photographs with the City's Project Manager and shall provide at least 5 days written notice to allow the City's Representative to be present when the photographs are taken.

3.08 POST-CONSTRUCTION VIDEO

- A. If specified in Section 01015 – Specific Project Requirements, the Contractor shall provide a Post-Construction Video.
- B. Scope: The Contractor shall prepare a color video recording with audio of all the areas affected by construction. All Post-Construction video recordings shall have sufficient detail to reveal the final, restored condition of all existing features, such as pavement, driveways, culverts, inlets, sidewalks, landscaping, vegetation, creek banks, trees, structures, foundations, and other such items along the construction route, and in the immediate adjacent areas, which might have been affected by the construction operations. In addition, videographer shall move beyond the construction zone as needed to insure documentation of features and areas that may not be adequately recorded from the centerline rotations. Videos shall be taken on both sides of the street when construction is in or along a roadway (use this approach along drainage channels and in other similar situations).
- C. Schedule: The post-construction video shall be taken in conjunction with the post-construction photographs.
- D. Post-construction videos are to be submitted with the Contractor's Application for Final Payment.
- E. Unless otherwise authorized by the City, the post-construction video recording shall be done with a representative of the City present.
- F. The Contractor shall document all post-construction site conditions/elements of the Site as listed for the post-construction Photographs.
- G. The video documentation shall provide a clear and continuous view of the project alignment showing all visible utilities and features within the limits of construction.

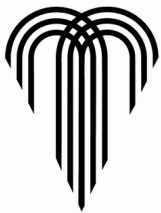
- H. To preclude the possibility of tampering or editing in any manner, all video recordings shall, by electronic means, generate and display continuously and simultaneously on the screen digital information to include the date and time of recording. The time information shall consist of hours, minutes and seconds, separated by colons (i.e., 10:35:18).
- I. The audio video recording shall consist of one video and one audio track which shall be recorded simultaneously. All tracks shall consist of original live recordings and thus shall not be copies of other audio and video recordings.
- J. The audio track shall contain the narrative commentary. Ample descriptive narrative shall be recorded simultaneously during all recordings. Narration shall include clearly audible comments that will deliver station number and/or street address locations, direction of view and rotation.
- K. Typical video segments should not exceed 10 minutes in length.

3.09 DELIVERABLES

- A. Refer to Section 01015 – Specific Project Requirements for additional deliverables required for the Project.
- B. Delivery of the documentation record shall be made as soon as is practical after the images are recorded. Deliverables include original photographs in JPG format, photographs converted to pdf format, interactive map index and navigation system.
- C. Electronic Storage Devices: Submit the navigation system on a non-returnable USB compatible flash drive. Submittals shall conform to the following:
 - 1. Submit with the monthly invoice two sets of digital photographs and/or videos. Each set shall be contained on a separate electronic storage device.
 - 2. Each set shall be cumulative of all photographs and/or videos taken to date.
 - 3. Affidavit(s) of Authenticity shall be included in a digital format.
- D. Document Management System: Unless otherwise noted in Section 01015 – Specific Project Requirements, all deliverables shall be provided in an electronic format using the specified document management system and in accordance with paragraph 1.05 of this Section.

END OF SECTION

CITY OF FOUNTAINS
HEART OF THE NATION



KANSAS CITY
MISSOURI

TRANSMITTAL LETTER

Project Number 81000975

Project Title Green Infrastructure Project 1-2: Paseo Gateway/KCU

TO: _____	Date _____
_____	Re: _____
_____	_____
ATTN: _____	_____

We are sending you ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop Drawings ☐ Prints ☐ Drawings ☐ Samples ☐ Specifications

☐ Copy of Letter ☐ Change Order ☐ _____

Copies	Date	No.	Description

These are transmitted as checked below:

<input type="checkbox"/> For Approval	<input type="checkbox"/> Approved as Submitted	<input type="checkbox"/> Resubmit _____ Copies for Approval
<input type="checkbox"/> For Your Use	<input type="checkbox"/> Approved as Noted	<input type="checkbox"/> Submit _____ Copies for Distribution
<input type="checkbox"/> As Requested	<input type="checkbox"/> Returned for Corrections	<input type="checkbox"/> Return _____ Corrected Prints
<input type="checkbox"/> For Review and Comment	<input type="checkbox"/> _____	

Remarks: _____

By: _____

Distribution:

- ☐ Owner
- ☐ Contractor
- ☐ Construction Manager
- ☐ Design Professional
- ☐ Consultant
- ☐ Other

SECTION 01335 –DOCUMENT MANAGEMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. An internet-based coordination and document management system (DMS) will be used for the Project. This system will be used to manage project documentation among the City, Contractor and Design Professional. The Contractor shall utilize the document management system for all project related correspondence and documentation.
- B. The DMS will be utilized to create, track and organize all project documentation, including, but not limited to, the following:
 - 1. Schedules.
 - 2. Applications for Payment.
 - 3. Meeting minutes with action items.
 - 4. Project correspondence.
 - 5. Shop Drawing and Sample(s) Submittals.
 - 6. Transmittals.
 - 7. Change Management:
 - (a) Requests for Interpretation.
 - (b) Requests for Proposal.
 - (c) Work Change Directives.
 - (d) Change Orders.
 - 8. Reporting:
 - (a) Certified Payroll Report.
 - (b) Subcontractors and Major Material Suppliers List.
 - (c) Daily Labor Force Reports.
 - (d) Daily Inspection Reports.
 - (e) Photographs and Video.
 - (f) Certificate of Achievement of Full Operation.
 - (g) Contractor Affidavit for Final Payment.
 - (h) Subcontractor Affidavit for Final Payment.
 - (i) Punch Lists.
 - 9. Notifications:
 - (a) Correction of Defective Work.
 - (b) Notification of Non-Compliance.

1.02 RELATED SECTIONS

- A. Section 00700 – General Conditions.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01300 – Submittals.

1.03 COORDINATION MEETING

- A. Prior to the pre-construction conference, the City will facilitate a meeting with the Contractor to review requirements for project coordination, document control and use of the DMS. The meeting should be scheduled to allow the Contractor time to submit the initial project correspondence and preliminary schedules in accordance with Section 00700-General Conditions.

- B. At this meeting, the City will present the procedures to be used for document management for the Project.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01500 – TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SUMMARY

- A. This specification covers the requirements for temporary construction facilities required on all projects.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. Section 01000 – General Project Requirements.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01300 – Submittals.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. National Fire Protection Association:
 - 1. NFPA 10 - Standard for Portable Fire Extinguishers.
 - 2. NFPA 70 - National Electric Code.
 - 3. NFPA 241 - Standard for Safeguarding Construction, Alteration and Demolition Operations.

1.05 INFORMATION PROVIDED BY THE CITY

- A. As provided in the Contract Documents.

1.06 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.

1.07 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. Regulations – Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:
 - 1. Building Code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, Fire Department and rescue squad rules.
- C. Standards:
 - 1. Comply with NFPA 10 and 241 and ANSI A10 Series standards “Temporary Electrical Facilities.”
 - 2. Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70.

- D. Inspections – Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 OFFICE

- A. Stationary Office – If required in Section 01015 - Specific Project Requirements, Contractor shall maintain a suitable stationary office at or near the Site during the performance of the Work.
- B. Assigned Vehicle – For projects of a certain scale and duration, the City will allow the Contractor to use an assigned vehicle to serve as a mobile office at the site of the Work. See Section 01015 – Specific Project Requirements regarding the use of a vehicle in lieu of a stationary office.
- C. The office shall serve as the headquarters of the Contractor's representative authorized to receive Contract Documents, instructions, other communication or articles associated with the Work.
- D. Any communication given to the Contractor's representative or delivered to Contractor's office at the site of the Work shall be deemed to have been delivered to Contractor.
- E. Copies of the Contract Documents shall be kept at the office and shall be available for use at all times.

3.02 FIELD OFFICE FOR RESIDENT PROJECT REPRESENTATIVE

- A. See Section 01015 – Specific Project Requirements regarding the requirement of the Contractor to provide a field office for the Resident Project Representative.

3.03 TEMPORARY UTILITIES

- A. Provide temporary utilities required for construction. Materials may be new or used, must be adequate for the required usage, not create unsafe conditions and not violate applicable codes and standards.
- B. Power:
 - 1. All power for lighting, operations of the Contractor's plant/equipment or for any other use which may be required for proper completion of the Work shall be provided by the Contractor.
 - 2. Temporary heat and lighting shall be maintained until the Work is accepted.
- C. Telephone/internet service:
 - 1. Contractor shall make all necessary arrangements and pay all installation and monthly charges for telephone/internet service for the temporary office at the site and shall provide all required devices for such service.
- D. Sanitary Facilities:
 - 1. Contractor shall furnish temporary sanitary facilities at the site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the Project.
 - 2. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period and obscured from public view to the greatest

practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each 20 persons. Contractor shall enforce the use of such sanitary facilities by all personnel at the site.

3. Ventilate the units to control odors and fumes and empty and clean them at least once a week or more often if required by the City. The doors shall be self-closing. Locate the facility behind the construction fence or out of the public view.

3.04 SECURITY

- A. See Section 01000 – General Project Requirements – SECURITY regarding the requirements for security.

3.05 PARKING

- A. See Section 01000 – General Project Requirements – PARKING regarding the requirements for parking.

END OF SECTION

SECTION 01566 – CLEANUP OPERATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. The Contractor shall provide all material, labor and equipment necessary for cleanup operations. The Contractor shall maintain a neat and clean job site at all times.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. Section 00700 – General Conditions.
- B. Section 01000 – General Project Requirements.
- C. Section 01015 – Specific Project Requirements.
- D. Section 02510 – PCC Sidewalks, Driveways, Ramps.
- E. Section 02930 – Seeding.
- F. Section 02931 – Sodding.
- G. Section 03000 – Miscellaneous Concrete.

1.04 CODES AND STANDARDS

- A. Not used.

1.05 DEFINITIONS

- A. Not used.

1.06 INFORMATION PROVIDED BY THE CITY

- A. As provided in the Contract Documents.

1.07 SUBMITTALS

- A. The Contractor shall submit as specified in Section 01300 – Submittals, if proposing alternate methods and facilities for concrete washout facilities. See paragraph 3.03.E. 3 in this Section.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SITE MAINTENANCE

- A. Cleanup operations shall be conducted in accordance with Section 00700 General Conditions, Article 6 – Contractor’s Responsibilities.
- B. Adequate cleanup shall be a condition for the processing of the Contractor’s monthly progress payment applications.
- C. The Contractor shall, at all times, keep the premises from accumulations of excavated materials, waste materials and other debris resulting from the Work. Site maintenance shall include, but is not limited to, the following:

1. The Contractor shall sweep streets daily to maintain the Site in a neat and clean condition.
 2. Provide adequate trash receptacles on the Site and promptly empty when filled.
 3. Conduct periodic cleanup of the Site to avoid hazards, interference with traffic or operations at the Site.
 4. Keep construction materials such as pipe, forms and scaffolding neatly stacked.
 5. Conduct immediate cleanup to protect the Work by removing splattered concrete, asphalt, oil, paint, corrosive liquids and cleaning solutions from all surfaces (linear construction) including walls, floors and metal surfaces (vertical construction) before the surfaces are marred.
 6. Volatile wastes shall be properly stored in covered metal containers and removed from the Site daily.
 7. Wastes shall not be buried on the site or disposed of into storm drains, sanitary sewers, streams or waterways. All wastes shall be removed from the site and disposed of in a manner complying with all local permits, ordinances and anti-pollution laws.
 8. Overloading of trucks is prohibited to prevent spillages on all access and haul routes. The Contractor shall provide periodic inspection of traffic areas to enforce the requirements of this Section.
 9. The Contractor shall prevent all excess material from washing into stream beds, storm water facilities, streets, culverts, etc.
- D. All excavated material not incorporated into the Work shall be removed and disposed of by the Contractor so that the site will be left in equal or better condition than its original state.
- E. Any deficiency in the quantity of material for filling depressions caused by settlement shall be supplied by the Contractor.
- F. The Contractor shall remove all mobilized equipment, surplus materials, debris and temporary facilities from the site. The construction site shall be left in its original condition or better condition than before the Work commenced.
- G. In addition, as directed by the City, the Contractor may be required to obtain a City approved release form, signed by the property owners affected by the Work.

3.02 DUST CONTROL

- A. The Contractor shall take all reasonable measures to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water or by the approved application of an approved chemical suppressant. When practical, dusty materials in piles or in transit shall be covered to prevent blowing.
- B. The Contractor shall make provisions so that buildings or operating facilities that may be adversely affected by dust shall be adequately protected from dust. Existing or new machinery, motors, instrument panels or similar equipment shall be protected by suitable dust screens. Proper ventilation shall be included with dust screens.
- C. Contractor shall maintain and keep all streets clean throughout the Work period. The Contractor shall perform street sweeping on a daily basis to remove dust and debris from paved areas within the Work site as well as on all access and haul routes.

3.03 CONCRETE WORK

- A. See Section 02510 – PCC Sidewalks, Driveways and Handicap Access Ramps for additional requirements.
- B. See Section 03000 – Miscellaneous Concrete for additional requirements.

- C. Three (3) working days after all subsurface work has been completed, the contractor shall initiate the following restoration work: seed and/or sod (depending on contract requirements and/or written agreements with property owners), replacing concrete sidewalks, curbs, gutters, driveways and other surfaces impacted by the Work.
- D. Three (3) working days after the placement of concrete, the Contractor shall conduct cleanup operations related to the completed concrete work as follows:
 - 1. Removal of forms, backfilling of the form excavation and debris removal from streets, sidewalks and parkway areas shall be accomplished within three (3) working days after the concrete placement. The backfilled areas within one foot of new concrete shall not be compacted until the concrete has cured a minimum of five (5) days.
 - 2. Five (5) working days after the concrete is placed, the Contractor shall complete all joint caulking, pavement restoration, seeding and sodding. If construction is being performed during periods other than designated seeding and sodding seasons, all locations without turf cover shall be completed within ten (10) working days after the beginning of the next seeding and sodding season. Refer to Section 02930 – Seeding and Section 02931 - Sodding for additional requirements.
 - 3. If cleanup, backfilling, sodding, joint caulking or pavement restoration is not accomplished within the above limits, all tear-out and installation operations shall cease until these items are finished. Proceeding without these items being completed is at the sole discretion of the City.
 - 4. All excavated material shall be removed and disposed of by the Contractor so that the grounds will be left in equal or better condition than its original state. Any deficiency in the quantity of material for filling depressions caused by settlement shall be supplied by the Contractor.
 - 5. Surplus materials, equipment, tools, temporary facilities and structures shall be removed by the Contractor; all debris shall be hauled away by the Contractor and the construction site shall be left in equal or better condition than its original state. Payment of completed items on the Schedule of Values shall be subject to the completion of the cleanup operations.
 - 6. Tear-out and installation shall not begin if unfavorable conditions for concrete placement are forecast for the next day.
 - 7. All cleanup operations, as stated above, shall be completed five (5) working days after concrete placement.
- E. Concrete Washout Facilities:
 - 1. The Contractor shall provide facilities for concrete washout to collect and retain all the concrete washout water and solids in leak proof containers.
 - 2. Lined wash pits or washout boxes are acceptable.
 - 3. Alternate methods for washout facilities may be considered by the City. The Contractor shall submit for review and approval, per Section 01300 – Submittals, the alternate methods and facilities to be used.
 - 4. The location of washout facilities shall be indicated on the Construction Site Plan (See Section 01000 – General Project Requirements, paragraph CONSTRUCTION SITE PLAN).
 - 5. Concrete washout facilities shall be inspected daily and after heavy rains to check for leaks, identify any plastic linings or sidewalls that have been damaged by construction activities and determine whether they have been filled to over 75 percent capacity.

6. When the washout container is filled to over 75 percent of its capacity, the wash-water shall be vacuumed out or allowed to evaporate to avoid overflows. When the remaining cementitious solids have hardened, they shall be removed from the Site.
7. Damages to the washout container shall be repaired promptly.
8. Before heavy rains, the washout container's liquid level shall be lowered or the container shall be covered to avoid an overflow during the rain storm.
9. Washout facilities shall be removed from the Site upon completion of the Work and the area restored as specified herein.

END OF SECTION

SECTION 01570 - TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 – GENERAL

1.01 SUMMARY

- A. The Contractor shall provide erosion and sediment control measures for all areas within and adjacent to the Project site. The Contractor shall assume that the work is to be done under the City's General Operating Permit (Permit No: MOR100006). The Contractor does not need to make separate application to the Missouri Department of Natural Resources (MDNR).
- B. Specific erosion and sediment control measures are specified in APWA 5100 and Standard Erosion and Sediment Control (ESC) Drawings. These measures shall be implemented in order to control erosion and water pollution.
- C. No separate payment shall be made for Erosion and Sediment Control. The Contractor shall include in the lump sum total bid price: all labor, material and equipment necessary to comply with this Section and all other Work indicated in the Contract Documents.

1.02 DESCRIPTION

- A. The Contractor shall install and maintain temporary erosion and sediment control devices prior to commencing construction operations and continue through the construction period until such time as seeding and sodding has been completed and turf is established on all graded areas.
- B. The Contractor shall prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) utilizing the latest version of the City's SWPPP template to develop the plan. The plan must include a narrative of the types and appropriate uses of Best Management Practices (BMPs) for erosion and sediment control and stormwater management. The requirements of the SWPPP must be as stringent as those described in the City's General Operating Permit (No: MOR100006) and 10 CSR 20-6.200. Additionally, the SWPPP must comply with the City of Kansas City's MS4 permit.
- C. Failure to control erosion and water pollution will result in the Contractor being noncompliant. Any noncompliance constitutes grounds for the following enforcement actions. The Contractor shall have 24 hours after receiving a notice of noncompliance from the City's representative (i.e. Project Manager, Design Professional, Inspector/ Representative of the City) to correct the problem. If weather conditions prevent the 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. The Contractor shall correct the problem as soon as weather conditions allow. If the Contractor fails to correct the problem after the time prescribed, the City will hire a remediation expert to fix the problem. In such an event, the Contractor shall be liable to the City for the remediation costs plus a 10 percent mark-up of the total contract price. If the Contractor continues to be noncompliant, the Director (or an authorized agent thereof) may issue a stop work order and delay any payment until control measures are properly functioning and any damage has been mitigated. In such an event, any delay to the Project schedule will result in liquidated damages assessed against the Contractor.

1.03 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section, these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.04 RELATED SECTIONS

- A. Section 01000 – General Project Requirements.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01300 – Submittals.
- D. Section 02200 – Earthwork.
- E. Section 02575 – Surface Restoration.
- F. Section 02930 – Seeding.
- G. Section 02931 – Sodding.

1.05 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work. The Work shall be performed by a contractor with a proven record of performance for similar erosion and sedimentation control work.

1.06 INFORMATION PROVIDED BY THE CITY

- A. As provided in the Contract Documents.

1.07 CONTRACTOR SUBMITTALS

- A. The Contractor shall submit to the City/Design Professional for review and approval, in accordance with Section 01300 – Submittals, all specifications and data covering the proposed materials to be used for erosion and sedimentation control work.
- B. The Contractor shall submit the following to the City/Design Professional for review and approval prior to the preconstruction conference:
 - 1. The Contractor shall prepare a Stormwater Pollution Prevention Plan (SWPPP) for Projects that disturb one or more acres of land or disturb less than one acre when part of a larger Project which will disturb one or more acres over the life of the Project.
 - 2. The SWPPP shall meet the requirements of this Section, applicable references on the plans, the City's adopted Erosion and Sediment Control Specifications (ESCS), and all sections of the APWA-KCMO specifications that reference erosion control requirements. The Contractor shall develop, implement, and adhere to the erosion control and stormwater pollution prevention plan based upon the City's guidelines and requirements.
 - 3. No work can begin until the SWPPP is approved by the City/Design Professional.
 - 4. The Contractor shall update and maintain the SWPPP as necessary to develop ongoing site-specific control measures until final acceptance of the Project.

PART 2 – PRODUCTS

- B. Unless otherwise specified in Section 01015 – Specific Project Requirements, acceptable products for Inlet Protection include the following:
 - 1. Gutter Buddy, Dandy Curb® or approved equal.

PART 3 – EXECUTION

3.01 SAFETY

- A. Perform all work in accordance with applicable Occupational Safety and Health Administration (OSHA) standards.

3.02 PERFORMANCE

- A. City Projects are covered by a general NPDES permit maintained by the Water Services Department's Storm Water Division. The Permit imposes a number of obligations including, but not limited to, the following:
 - 1. New Projects must be reported to the MDNR 90 days before the Project starts.
 - 2. Each site must have and follow a written Storm Water Pollution Prevention Plan (SWPPP). Each site must be inspected weekly and following each rain event, for compliance with the SWPPP. Written inspection reports must be kept.
 - 3. All personnel on site must be briefed on the requirements of the SWPPP.
 - 4. A copy of the SWPPP must be on site at all times.
 - 5. All deficient items shall be promptly corrected. In no case shall the correction period exceed two calendar days.
 - 6. Quarterly reports must be filed by the City with MDNR identifying and giving the status and percent complete of each Project.
 - 7. MDNR must be notified if hazardous substances or contaminated soil are discovered on site.
- B. The Contractor shall follow the approved SWPPP, as well as all erosion control measures included in the Contract Documents and implement other BMP measures as directed by the City/Design Professional.
- C. The Contractor shall prevent erosion during his operations until vegetation is re-established. The Contractor shall prepare erosion control plans and submit in writing to the City/Design Professional any proposed modifications to the plans. The proposed modifications shall describe materials that will be used and the tasks that will be performed to control runoff on the site.
- D. Erosion control devices shall be in place before land is disturbed.
- E. All earthen structures shall be seeded or sodded. See Section 02930 – Seeding or Section 02931 – Sodding for additional requirements.
- F. Vegetation shall be established to provide adequate protection or develop other suitable means.
- G. Sediment trapping devices shall be installed in the proper location prior to grading.
- H. The Contractor shall establish perimeter sediment trapping measures that function properly.
- I. The Contractor shall prevent sediment from leaving the site and/or from damaging adjacent property.
- J. The Contractor shall prevent and or remove mud on public roads or at intersections with public roads that is related to the Project work being completed.
- K. The Contractor shall provide a temporary construction entrance to reduce/eliminate the transport of mud from the construction site onto public right of ways.
- L. The Contractor shall provide dust control measures for any graveled areas or exposed soil areas. See Section 01000 – General Project Requirements, paragraph DUST CONTROL for additional requirements.
- M. The Contractor shall temporarily or permanently stabilize all areas with exposed soil. See Section 02930 – Seeding or Section 02931 – Sodding for additional requirements.
- N. The Contractor shall adequately stabilize all finished cut and fill slopes.
- O. All on-site drainage channels and outlets shall be adequately stabilized.
- P. Route stream around work areas.
- Q. Repair stream channel damages per the Contract Documents.
- R. Provide stabilization or a temporary stream channel crossing where needed.

3.03 INSTALLATION

- A. Methods, materials and maintenance shall be the sole responsibility of the Contractor. The Contractor and the City/Design Professional shall conduct weekly onsite inspections using the “Erosion and Sediment Control Checklist” provided by the Water Services Department. Remove any onsite pollutant sources (debris piles with petroleum cans, chemical containers, fueling trucks/tanks or other possible sources of pollution). Upon notification of a weather forecast with a reasonable likelihood of rain, or at the direction of the City/Design Professional, the Contractor shall construct temporary berms and install erosion control fencing as necessary to control the potential eroded sediment and prevent it from leaving the construction area. If the Contractor’s construction operations are complete to the point where seeding or sodding is the major item at hand before final acceptance can be made, and seeding or sodding is out-of-season or disallowed by the City/Design Professional, the Contractor shall construct one of the following erosion control measures:
1. Incorporate the use of erosion control fencing immediately downstream of vulnerable areas that are susceptible to the formation of small streams. Maintain the erosion control devices until seeding or sodding season returns. Upon return of the sodding season, the area shall be re-graded to the lines and grades established in the Contract Drawings and sodded at the direction of the City/Design Professional. See Section 02930 – Seeding and Section 02931 – Sodding for additional requirements.
 2. Terrace the ground with graded berms and incorporate the use of both temporary slope drains (See ESCS Section 10.03.4.3 and Section 02200 – Earthwork for additional requirements) and erosion control fencing (as specified in this Section). Maintain the erosion control devices until seeding or sodding season returns. Upon return of the seeding or sodding season, the area shall be re-graded to the lines and grades established in the Contract Drawings and seeded/sodded at the direction of the City/Design Professional. See Section 02930 – Seeding and Section 02931 – Sodding for additional requirements.
 3. Fertilize, place seed or sod, and irrigate as directed by APWA-KCMO 2400. Maintain the erosion control devices until seeding or sodding season returns. Upon return of the seeding or sodding season the Contractor shall re-establish the grade and replace all dead seed or sod at the direction of the City/Design Professional. See Section 02930 – Seeding and Section 02931 – Sodding for additional requirements.
- B. Silt fence shall be installed, inspected and maintained in accordance with APWA ESC–10.
- C. Berms shall be constructed in accordance to APWA ESC–29:
1. Berms are required if the silt fence is not installed or properly maintained.
 2. Inspection shall be frequent and repair or replacement shall be made promptly as needed.
 3. Remove sediment deposits as necessary to provide adequate storage volume for the next rain.
 4. The Contractor shall remove berms when they have served their usefulness.
 5. Sediment trapped by this practice shall be uniformly distributed on the source area prior to seeding or sodding.
- D. The Rock Check Dam shall be constructed, inspected and maintained in accordance to APWA ESC–15.

- E. Inlet Protection. Work covered under this item consists of installing a Gutter Buddy, Dandy Curb® or equal inlet protection system for inlets and median barrier inlets without grates. The purpose is to keep silt, sediment and construction debris out of the storm system:
1. The inlet protection system shall be a sewn fabric unit enclosing a porous structure in the form of a cylindrical tube placed in front of and extending beyond the inlet opening on both sides.
 2. Place inlet protection unit on the street with aggregate pouch near the inlet it will be installed to protect.
 3. For oil and sediment, place absorbent in the sock tube.
 4. Center the unit against curb or median inlet opening so that the curb side of the unit creates a seal with the curb or median barrier and inlet structure. There will be approximately twelve (12) inches of the inlet protection unit overhanging on each side of the opening. If the unit is not installed in this manner, it will not function properly.
 5. The Contractor shall remove all accumulated sediment and debris from in front of the unit and from the street surface in the vicinity of every installed unit after each rain event or as directed by the City/Design Professional. Dispose of the unit at an appropriate recycling or solid waste facility when the unit is no longer being used.
 6. Oil and sediment. Remove and replace absorbent when near saturation.

3.04 MAINTENANCE AND REPAIR

- A. The Contractor is responsible for maintaining all erosion and sediment control measures until acceptance of the Project by the City.
- B. Erosion control measures showing evidence of overtopping, breaks or erosion shall be repaired or replaced with suitable materials.
- C. All storm sewer inlets shall be regularly maintained so that sediment will not enter the system.
- D. Repair and clean-out all control measures that are not functioning properly.
- E. Remove temporary measures that are no longer needed.
- F. Seeded or sodded areas requiring maintenance (fertilizer, re-sodding, re-seeding or additional mulch and watering) shall be promptly addressed. See Section 02930 – Seeding and Section 02931 – Sodding for additional requirements.

3.05 WARRANTY

- A. Seeding and sodding work shall have taken root and established satisfactory coverage before acceptance by the City. The Contractor shall maintain as described in paragraph 3.04 above and shall guarantee seeding and sodding for one (1) year after acceptance. The Contractor shall scarify, re-seed or re-sod, fertilize and mulch (seeded areas) any barren area greater than 1 square foot. See Section 02575 – Surface Restoration for requirements on early acceptance.

END OF SECTION

CITY OF KANSAS CITY, MISSOURI



STORMWATER POLLUTION PREVENTION PLAN

(SWPPP)

For Capital Improvement Projects Disturbing One or More Acres
Missouri State General Operating Permit (Land Disturbance Permit) MO-R100000
(July 2022 – Jun 2027)

Green Infrastructure Project 1-2: Paseo Gateway/KCU

NE corner of the Intersection of Independence Ave. & The Paseo

KC Water

Contacts in case of spills:

For **hazardous substances releases**, under the Missouri Spill Bill, responsible parties or spillers are required to report to Missouri department of Natural Resources 24-hour Environmental Emergency Response Spill Line at **(573) 634-2436**, or the National Response Center at (800)-424-8802.

For **non-hazardous substances releases**, should a spill or an unauthorized discharge cause or permit any contaminants, other than sediment, or hazardous substance to discharge or enter waters of the state, the unauthorized discharge must be reported to the Missouri Department of Natural Resources regional office as soon as practicable but no more than 24 hours after the discovery of the discharge. Call Kansas City Regional Office **(816) 251-0700**, or the department's Environmental Services Program (573) 526-3315.

CERTIFICATIONS **(To be Completed by ALL PARTIES)**

Design Professional's Declaration:

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 gather and evaluate 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.

Design Professional: _____

Print Name: _____ Title: _____

Signature: _____ Date: _____

City's Review:

I have reviewed this SWPPP for compliance with the requirements contained in the City's Missouri State Operating Permit for land disturbance activities and have found the plan complete prior to commencement of land disturbance activities.

Owner Department: _____

Print Name: _____ Title: _____

Signature: _____ Date: _____

General Contractor's Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate 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.

General Contractor: _____

Print Name: _____ Title: _____

Signature: _____ Date: _____

Note: Name the person(s) responsible for inspection, operation, and maintenance of BMPs. The SWPPP shall list the names and describe the role of all owners/primary operators (such as general contractor, project manager) responsible for environmental or sediment and erosion control at the land disturbance site.

Subcontractors Certification:

I hereby certify that I understand the requirements stated in this SWPPP, that I am responsible for completing the requirements, which have been listed in the plan as being a part of my scope of work.

Subcontractor: _____
Print Name/Signature: _____ Title: _____
Project Role(s): _____ Date: _____

Subcontractor: _____
Print Name/Signature: _____ Title: _____
Project Role(s): _____ Date: _____

Subcontractor: _____
Print Name/Signature: _____ Title: _____
Project Role(s): _____ Date: _____

Subcontractor: _____
Print Name/Signature: _____ Title: _____
Project Role(s): _____ Date: _____

Subcontractor: _____
Print Name/Signature: _____ Title: _____
Project Role(s): _____ Date: _____

Subcontractor: _____
Print Name/Signature: _____ Title: _____
Project Role(s): _____ Date: _____

Subcontractor: _____
Print Name/Signature: _____ Title: _____
Project Role(s): _____ Date: _____

Contents

CERTIFICATIONS..... I

PART I: GENERAL PROJECT INFORMATION..... 1

PART II: GENERAL REQUIREMENTS..... 2

PART III: PROJECT PLANNING & DESIGN 3

PART IV: PROJECT INFORMATION 14

PART V: BMP PERFORMANCE REQUIREMENTS..... 17

PART VI: SITE INSPECTION REPORT 21

Appendix A – SWPPP Update and Modification Log 24

Appendix B – Public Notification Sign 26

Appendix C – General Location Map..... 28

Appendix D – Site Map(s)..... 30

Appendix E – Site Inspection Reports..... 39

Appendix F – City’s Construction General Permit & Additional Information 45

PART I: GENERAL PROJECT INFORMATION

(To be completed by Owner Department or Design Professional)

1. Project Site Name: Green Infrastructure Project 1-2: Paseo Gateway/KCU

Project Site Address/Location: NE corner of Intersection of Independence Ave. & The Paseo

City: Kansas City **State:** MO **Zip Code:** 64106 **County:** Jackson

Section, Township, Range: S33, T50N, R33W

Project Number: 81000975

Owner Department: Water Services Department (KC Water)

Address: 4800 E 63rd Street,

City: Kansas City **State:** MO **Zip Code:** 64130

Phone: 816-513-1313 **Fax:** N/A

E-mail: N/A **Cell Phone:** N/A

2. Record of Important Dates: fill in during construction activities.

Completed SWPPP approval	
Groundbreaking activities begin	
Stabilization measures initiated	
Permanent stabilization achieved	

3. Describe the Nature of the Land Disturbance Activity:

- (a) The function of the project (e.g., low density residential, shopping mall, highway, etc.),
- (b) The intended sequence and timing of activities that disturb the soils at the site; and
- (c) Estimates of the total area expected to be disturbed by excavation, grading, or other land disturbance support activities including off-site borrow and fill areas.

(Use additional sheets as necessary)

(a) Green Infrastructure	
(b) 1) 1.6 acres (approximate)	7)
2)	8)
3)	9)
4)	10)
5)	11)
6)	12)

Estimated Project Start Date: October 2023

Estimated Project Completion Date: December 2024 (Substantially Complete)

(c) **Total Site Area (in acres):** 1.6

Estimated Total Area (in acres) to be disturbed by all activities: 1.6

PART II: GENERAL REQUIREMENTS (Applicable to All PARTIES)

1. Conditions for SWPPP Update

The SWPPP shall be amended and updated as appropriate during the term of the land disturbance activity. All SWPPP modifications shall be signed and dated. The SWPPP shall be amended to incorporate any significant site condition changes which impact the nature and condition of stormwater discharges. At a minimum, these changes include whenever:

- (a) The location, design, operation, or maintenance of BMPs is changed;
- (b) Design of the construction project is changed that could significantly affect the quality of the stormwater discharges;
- (c) Site inspections indicate deficiencies in the SWPPP or any BMP;
- (d) Missouri Department of Natural Resources notifies the permittee in writing of deficiencies in the SWPPP;
- (e) The SWPPP is determined to be ineffective in minimizing or controlling erosion and sedimentation (e.g., there is visual evidence of excessive site erosion or sediment deposits in streams, lakes, or downstream waterways, sediment or other wastes off site); and/or
- (f) Missouri Department of Natural Resources determines violations of water quality standards may occur or have occurred.

2. Record of SWPPP Update: fill in Appendix A

3. Restriction and Limitations

The land disturbance permit does NOT allow placement of fill material into any stream or wetland, alteration of a stream channel, or obstruction of stream flow unless authorized by a CWA Section 404 Permit, or placement of fill in floodplains unless authorized by appropriate federal and/or state floodplain development authorities.

The land disturbance permit does NOT supersede any requirement of the National Environmental Policy Act; the Endangered Species Act; the National Historic Preservation Act; the Comprehensive Environmental Response, Compensation and Liability Act; the Resource Conservation and Recovery Act; or any other relevant acts.

4. Erosion and Sediment Controls

Ensure the **design, installation, and maintenance** of effective erosion and sediment controls to minimize the discharge of pollutants. At a minimum, such controls must be designed, installed, and maintained to:

- (a) Control stormwater volume, velocity, and peak flow rates to minimize soil erosion;
- (b) Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion and scour;
- (c) Minimize the amount of exposed soil during construction activity;
- (d) Minimize the disturbance of steep slopes;
- (e) Minimize sediment discharges from the site. Address factors such as:
 - 1) The amount, frequency, intensity, and duration of precipitation;
 - 2) The nature of resulting stormwater runoff;
 - 3) Expected flow from impervious surfaces, slopes, and drainage features; and
 - 4) Soil characteristics, including the range of soil particle size expected to be present on the site.
- (f) Provide and maintain natural buffers around surface waters as detailed in the Permit – Part V. BMP REQUIREMENTS Condition 7, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration and filtering, unless infeasible; and
- (g) Minimize soil compaction and preserve topsoil where practicable.

PART III: PROJECT PLANNING & DESIGN

(To be completed by DESIGN PROFESSIONAL)

1. General Information

Design Professional develops the initial SWPPP, including narrative description and SITE MAP (s) containing all the information as required by the MO-R100000 (effective July 2022).

Designer's Name: _____
Company Name: McClure
Address: 11031 Strang Line Road
City: Lenexa **State:** KS **Zip Code:** 66215
Phone: 913-888-7800 **Fax:** N/A
E-mail: _____ **Cell Phone:** N/A

2. Soil Disturbing Activities:

Soil disturbing activities for this project will include the following (Check all that apply):

- ☐ Clearing and grubbing of existing trees
 ☐ Stripping of topsoil within the limits of construction
☒ Stockpiling and re-spreading
 ☒ Utility trench excavation and backfill
☒ Preparing sub grade for streets and sidewalks
 ☒ Backfilling curbs and sidewalks
☒ Disposal areas for excess excavated material
 ☒ Borrow areas for fill material
☐ Construction of sediment basins or storm water
 ☐ Construction of compacted fill areas for residential building
☐ Minimize soil compaction and preserve topsoil
 ☐ Provide and maintain natural buffers around surface waters
☐ Other: _____

3. Downstream Information:

Name of primary receiving water body: Combined Sewer System to Missouri River

Does this Project require 404 Permit? ☐ Permit Number: _____

☐ Water Quality Certification Number: _____

List and Describe the location of all outfalls:

Outfall Location	Receiving Waterbody	Distance to receiving waterbody
1) CSO Outfall 074	Missouri River	0
2)		
3)		
4)		
5)		

4. Determine the 2-year, 24-hour Storm Event

A 2-year, 24-hour storm event can be determined for the project location using the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html, or can be determined using local rainfall distribution for a 2-year, 24 hours storm event using multi-decade local high density rain gauge data, as approved by Missouri Department of Natural Resources.

Specify the method used to determine the 2-year, 24-hour storm event for the project location:

☒ NOAA Atlas 14

☐ Based on multi-decade local high density rain gauge data, as approved by the Department

Specify the 2-year, 24-hour storm event for the project location: 3.65 inch

5. Authorized Non-stormwater Discharges

Authorized non-stormwater discharges associated with construction activities: check all occurring on site, and note where these discharges occur.

☐ (a) Discharges from emergency fire-fighting activities;

Where: _____

☐ (b) Hydrant flushing and water line flushing, provided the discharged water is managed to avoid instream water quality impacts;

Where: _____

☒ (c) Landscape watering, including to establish vegetation;

Where: At landscaped/vegetated areas. See Drawing No. L-500

☒ (d) Water used to control dust;

Where: At Construction Entrance. See Drawing No. C-010

☐ (e) Waters used to rinse vehicles and equipment, provided there is no discharge of soaps, solvents, or detergents used for such purposes;

Where: _____

☐ (f) External building washdown, provided soaps, solvents, and detergents are not used, and external surfaces do not contain hazardous substances (e.g., paint or caulk containing polychlorinated biphenyls (PCBs))

Where: _____

☐ (g) Pavement wash waters, provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used. Directing pavement wash waters directly into any water of the state, storm drain inlet, or stormwater conveyance (constructed or natural site drainage features), unless the conveyance is connected to an effective control, is prohibited;

Where: _____

☐ (h) Uncontaminated air conditioning or compressor condensate;

Where: _____

☐ (i) Uncontaminated, non-turbid discharges of ground water or spring water;

Where: _____

☐ (j) Foundation or footing drains where flows are not contaminated with process materials;

Where: _____

and

☐ (k) Uncontaminated construction dewatering water discharged in accordance with requirements found in this permit for specific dewatering activities.

Where: _____

6. Requirements for Best Management Practices (BMPs)

BMPs for land disturbance are a schedule of activities, practices, or procedures that reduces the amount of soil available for transport or a device that reduces the amount of suspended solids in runoff before discharge to waters of the state. BMPs are divided into two main categories: structural or non-structural; and they are also classified as temporary or permanent. Temporary BMPs may be added and removed as necessary with updates to the Stormwater Pollution Prevention Plan (SWPPP).

(1) Site Preservation:

- (a) **EXISTING VEGETATION, TREES, AND TOPSOIL SHALL BE PRESERVED WHERE PRACTICABLE.**
- (b) The disturbance of steep slopes shall be minimized.

(2) Riparian Buffer or a Structural Equivalent for Surface Waters of the State:

For surface waters of the state, defined in Section 644.016.1(27) RSMo, located on or adjacent to the site, a riparian buffer or structural equivalent must be maintained in accordance with at least one of the following options.

- (a) Provide and maintain a 50-foot undisturbed natural buffer; or
- (b) Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or
- (c) If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.
- (d) Exempt from compliance with (a), (b), or (c) above if one or more of the following exceptions apply and documentation is provided in the SWPPP:
 - 1) As authorized per CWA Section 404 Department of the Army permit and its associated Section 401 Water Quality Certification from the Department.
 - 2) If there is no discharge of stormwater to waters of the state through the area between the disturbed portions of the site and waters of the state located within 50 feet of the site. This includes situations where permanent control measures have been implemented that will prevent such discharges, such as a berm or other barrier.
 - 3) Where no natural buffer exists due to preexisting development disturbances that occurred prior to the initiation of planning for the current development of the site.
 - a. Where some natural buffer exists but portions of the area within 50 feet of the waters of the state are occupied by preexisting development disturbances the permittee is required to comply with (a), (b), or (c) above.
 - 4) For linear projects where site constraints make it infeasible to implement a buffer or equivalent provided the permittee limit disturbances within 50 feet of any waters of the state and/or supplemental erosion and sediment controls are provided to treat stormwater discharges from earth disturbances within 50 feet of the water of the state. It must also be documented in the SWPPP the rationale for why it is infeasible to implement (a), (b), or (c) and describe any buffer width retained and supplemental BMPs installed.
- (e) Where the permittee is retaining a buffer of any size, the buffer should be measured perpendicularly from any of the following points, whichever is further landward from the water:
 - 1) The ordinary high water mark of the water body, defined as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris; or
 - 2) The edge of the stream or river bank, bluff, or cliff, whichever is applicable.

(3) Perimeter Control:

Sediment controls shall be used along any perimeter areas of the site that are downgradient from any exposed soil or other disturbed areas. Prevent stormwater from circumventing the edge of the perimeter control. For sites where perimeter controls are infeasible, other practices shall be implemented to minimize discharges to perimeter areas of the site.

(4) Stockpile Management:

Manage stockpiles or land clearing debris piles composed, in whole or in part, of sediment and/or soil.

- (a) Locate the piles outside of any natural buffers zones, established under the condition above, and away from any stormwater conveyances, drain inlets, and areas where stormwater flow is concentrated;
- (b) Install a sediment barrier along all downgradient perimeter areas;
- (c) Divert surface flows around stockpiles to reduce and minimize erosion of the stockpile

(5) Sedimentation Basins:

A sedimentation basin shall be included for each drainage area with ten or more acres disturbed at one time.

- (a) The sedimentation basin shall be sized, at a minimum, to treat a local 2-year, 24-hour storm.
- (b) Sediment basins shall not be constructed in any waters of the state or natural buffer zones.
- (c) Discharges from dewatering activities shall be managed by appropriate controls. The SWPPP shall include a description of any anticipated dewatering methods and specific BMPs designed to treat dewatering water.
 - 1) Appropriate controls include, but are not limited to, sediment socks, dewatering tanks, tube settlers, weir tanks, filtration systems (e.g., bag or sand filters), and passive treatment systems that are designed to remove or retain sediment.
 - 2) Erosion controls and velocity dissipation devices (e.g., check dams, riprap, and vegetated buffers) to minimize erosion at inlets, outlets, and discharge points from shall be utilized.

Where use of a sediment basin is infeasible, the SWPPP shall evaluate and specify other similarly effective BMPs to be employed to control erosion and sediment. These similarly effective BMPs shall be selected from appropriate BMP guidance documents authorized by this permit. The BMPs must provide equivalent water quality protection to achieve compliance with this permit. The SWPPP shall require both temporary and permanent sedimentation basins to have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.

(6) Concrete Washout Facilities:

Concrete washout facilities shall be used to contain concrete waste from the activities onsite, unless the washout of trucks and equipment is managed properly at an off-site location. The washout facility shall be managed to prevent solid and/or liquid waste from entering waters of the state by the following:

- (a) Direct the wash water into leak-proof containers or pits designed so that no overflows can occur due to inadequate sizing or precipitation;
- (b) Locate washout activities away from waters of the state, stormwater inlets, and/or stormwater conveyances where practicable. If not practicable, use BMPs to reduce risk of waste leaving the washout facility;
- (c) Designate the washout area(s) and conduct such activities only in these areas.
- (d) Ensure contractors are aware of the location, such as by marking the area(s) on the map or signage visible to the truck and/or equipment operators.

(7) Sediment Trackout from the Site:

Minimize sediment trackout from the site and sediment transport onto roadways.

- (a) Restrict vehicle traffic to designated exit points.
- (b) Use appropriate stabilization techniques or BMPs at all points that exit onto paved roads or areas outside of the site.
- (c) Use additional controls or BMPs to remove sediment from vehicle and equipment tires prior to exit from facility where necessary.
- (d) Stormwater inlets susceptible to receiving sediment or other pollutants from the permitted land disturbance site shall have curb inlet protection. This may include inlets off the active area where track out from vehicles and equipment could impact the stormwater runoff to those inlets.

(8) Selection of BMPs:

Appropriate BMPs shall be selected for use at the site.

- (a) Stormwater volume and velocity shall be considered when selecting effective BMPs.
- (b) A BMP that has demonstrated ineffectiveness in preventing or minimizing sediment or other pollutants from leaving a given site shall be replaced with a more effective BMP, or additional and sequential BMPs and treatment devices may be incorporated as site conditions allow.
- (c) A schedule for performing erosion control measures shall be considered in selecting BMPs.

(d) Stormwater discharges which leave the site from disturbed areas shall pass through an appropriate impediment to sediment movement such as a sedimentation basin, sediment traps (including vegetative buffers), or silt fences prior to leaving the land disturbance site.

(9) Types of BMPs:

Check all the types of BMPs used at the site:

• ***Soil Stabilization and Slope Protection BMPs***

- | | | |
|---------------------------------------|----------------------------------------------------|--------------------------------------------------------------|
| <input type="checkbox"/> Scheduling | <input type="checkbox"/> Hydro-seeding | <input type="checkbox"/> Earth Dikes/Swales & Lined Ditches |
| <input type="checkbox"/> Straw Mulch | <input type="checkbox"/> Hydraulic/Wood Mulch | <input type="checkbox"/> Outlet Protection/Velocity |
| <input type="checkbox"/> Slope Drains | <input type="checkbox"/> Streambank Stabilization | <input type="checkbox"/> Preservation of Existing Vegetation |
| <input type="checkbox"/> Soil Binders | <input type="checkbox"/> Geotextiles, ECBs or TRMs | <input type="checkbox"/> Other (specify): _____ |

• ***Perimeter Controls & Sediment Barriers***

- | | | | |
|-------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------|
| <input checked="" type="checkbox"/> Silt Fence | <input type="checkbox"/> Sandbag Barrier | <input checked="" type="checkbox"/> Storm Drain Inlet Protection | <input type="checkbox"/> Fiber Rolls |
| <input type="checkbox"/> Sediment Traps | <input type="checkbox"/> Check Dam | <input type="checkbox"/> Sediment/Desilting Basin | <input type="checkbox"/> Gravel Bag Berm |
| <input type="checkbox"/> Street Sweeping and Vacuuming | <input type="checkbox"/> Direct Stormwater to vegetated areas | | |
| <input type="checkbox"/> Maintain natural buffers around surface waters | <input type="checkbox"/> Other (specify): _____ | | |

• ***Establish Stabilized Construction Exits***

- | | | |
|------------------------------------------------|----------------------------------------------------|-------------------------------------------------|
| <input checked="" type="checkbox"/> Stone Pads | <input type="checkbox"/> Entrance/Outlet Tire Wash | <input type="checkbox"/> Other (specify): _____ |
|------------------------------------------------|----------------------------------------------------|-------------------------------------------------|

• ***Non-Storm Water Management BMPs***

- | | | |
|------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------|
| <input type="checkbox"/> Pile Driving | <input type="checkbox"/> Concrete Finishing | <input type="checkbox"/> Demolition/Removal Over Water |
| <input type="checkbox"/> Dewatering | <input type="checkbox"/> Concrete Curing | <input type="checkbox"/> Illicit/Illegal Discharge |
| <input type="checkbox"/> Clean Water | <input type="checkbox"/> Paving & Grinding | <input type="checkbox"/> Vehicle & Equipment Cleaning |
| <input type="checkbox"/> Dust Control | <input type="checkbox"/> Water Conservation Practices | <input type="checkbox"/> Temporary Stream Crossing |
| <input type="checkbox"/> Material/Equipment Use Over water | <input type="checkbox"/> Vehicle & Equipment Fueling & Maintenance | |
| <input checked="" type="checkbox"/> Other (specify): <u>Concrete Washout</u> | | |

• ***Waste Management & Materials Pollution Control BMPs***

- | | | |
|-----------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------|
| <input type="checkbox"/> Spill Prevention & Control | <input type="checkbox"/> Liquid Waste Management | <input type="checkbox"/> Sanitary/Septic Waste Management |
| <input type="checkbox"/> Stockpile Management | <input type="checkbox"/> Concrete Waste Management (Washout Area) | <input type="checkbox"/> Hazardous Waste Management |
| <input type="checkbox"/> Solid Waste Management | <input type="checkbox"/> Material Delivery/Storage/Use | <input type="checkbox"/> Contaminated Waste Management |

☐ Other (specify): _____

• ***Permanent Stabilization BMPs***

- | | | |
|-----------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Retaining Walls | <input type="checkbox"/> Infiltration Basins | <input checked="" type="checkbox"/> Outlet Protection/Velocity Dissipation |
| <input type="checkbox"/> Biofilters | <input type="checkbox"/> Vegetative Buffers | <input type="checkbox"/> Earth Dikes, Drainage Swales & Lined Ditches |
| <input type="checkbox"/> Porous Pavement | <input checked="" type="checkbox"/> Slope Protection | <input checked="" type="checkbox"/> Detention/Retention Devices |

☐ Other (specify): _____

Note: make copies of this page if more BMP instances are to be included

(10) Description of BMPs:

Describe both structural and non-structural BMPs that will be used at the site.

(a) Provide the following general information for each BMP type which will be used one or more times at the site:

BMP Type 1: Concrete Washout

Physical description: Area where slurry concrete can be washed and removed from the site.

Site conditions required: Install prior to concrete placement on site.

Installation/construction procedures (including typical drawing): See Section 01570 and Drawing Numbers C-010 & C-014

Operation/maintenance procedures and schedules:

BMP Type 2: Construction Entrance

Physical description: Area for construction vehicles and equipment to enter and exist the site.

Site conditions required:

Installation/construction procedures (including typical drawing): See Section 01570 and Drawing Numbers C-010 & C-014

Operation/maintenance procedures and schedules:

BMP Type 3: Silt Fence

Physical description: Silt fence consists of a permeable fabric mounted on posts. Removal relies on settlement in a shallow pool behind the fence.

Site conditions required:

Installation/construction procedures (including typical drawing): See Section 01570 and Drawing Numbers C-010 & C-015

Operation/maintenance procedures and schedules:

BMP Type 4: Inlet Protection

Physical description: There are two general types of inlet protection, sump and on-grade. Sump type with or without excavated pit: This type consists of a barrier set a short distance away from the inlet opening. The barrier consists of a structural support and a filter such as a gravel layer or filter fabric. Removal is through settlement of soil particles. High flows overtop the barrier and dewatering is through the filter layer. An excavated pit adjacent to the inlet increases the storage volume and removal efficiency. On-grade type: This type is a semi-permeable throat insert is placed in the inlet opening. Often, a block is used to create a gap between the insert and the throat to allow overtopping at higher flow

Site conditions required:

Note: make copies of this page if more BMP instances are to be included

Installation/construction procedures (including typical drawing): See Section 01570 and Drawing Numbers C-010 & C-016

Operation/maintenance procedures and schedules:

BMP Type 5: Retaining Walls

Physical description: Concrete and limestone earth retaining walls.

Site conditions required:

Installation/construction procedures (including typical drawing):

For concrete retaining walls, see Drawing Numbers C-005, C-011, and C-012.

For limestone wall blocks, see Drawing Numbers C-005, and landscape plans (L-series).

Operation/maintenance procedures and schedules:

BMP Type 6: Slope Protection

Physical description: Native plants with mulch and non-native sodding.

Site conditions required:

Installation/construction procedures (including typical drawing):

Operation/maintenance procedures and schedules:

BMP Type 7: Outlet Protection/Velocity Dissipation

Physical description: Riprap outlet protection.

Site conditions required:

Installation/construction procedures (including typical drawing): See Drawing numbers C-005 and C-006.

Operation/maintenance procedures and schedules:

BMP Type 8: Detention/Retention Devices

Physical description: Two (2) extended wet detention basins.

Site conditions required:

Installation/construction procedures (including typical drawing):

Operation/maintenance procedures and schedules:

(b) Provide the following information for each specific instance where a BMP is to be installed:

- 1) The BMP is temporary or permanent

Note: make copies of this page if more BMP instances are to be included

- 2) When the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project
- 3) Site conditions required before removal of the temporary BMP

BMP 1: Concrete Washout

The BMP is temporary ☒, or permanent ☐.

Describe when the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project:

Installation/construction procedures (including typical drawing):

Operation/maintenance procedures and schedules:

BMP 2: Construction Entrance

The BMP is temporary ☒, or permanent ☐.

Describe when the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project:

Installation/construction procedures (including typical drawing):

Operation/maintenance procedures and schedules:

BMP 3: Silt Fence

The BMP is temporary ☒, or permanent ☐.

Describe when the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project:

Installation/construction procedures (including typical drawing):

Operation/maintenance procedures and schedules:

BMP 4: Inlet Protection

The BMP is temporary ☒, or permanent ☐.

Describe when the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project:

Installation/construction procedures (including typical drawing):

Operation/maintenance procedures and schedules:

BMP 5: Retaining Walls

Note: make copies of this page if more BMP instances are to be included

The BMP is temporary ☐, or permanent ☒.

Describe when the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project:

Installation/construction procedures (including typical drawing):

Operation/maintenance procedures and schedules:

BMP 6: Slope Protection

The BMP is temporary ☐, or permanent ☒.

Describe when the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project:

Installation/construction procedures (including typical drawing):

Operation/maintenance procedures and schedules:

BMP 7: Outlet Protection/Velocity Dissipation

The BMP is temporary ☐, or permanent ☒.

Describe when the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project:

Installation/construction procedures (including typical drawing):

Operation/maintenance procedures and schedules:

BMP 8: Detention/Retention Devices

The BMP is temporary ☐, or permanent ☒.

Describe when the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project:

Installation/construction procedures (including typical drawing):

Operation/maintenance procedures and schedules:

7. Site Map Requirements:

Bid #2

Create a legible site map or multiple maps if necessary, identifying:

- (a) Site boundaries of the property;
- (b) Locations of all waters of the state (including wetlands) within the site and half a mile downstream of the site's outfalls;
- (c) Location of all outfalls;
- (d) Location of stormwater inlets and conveyances including ditches, pipes, man-made conduits, and swales;
- (e) Areas of soil disturbance and areas that will not be disturbed (or a statement that all areas of the site will be disturbed unless otherwise noted);
- (f) Locations of on-site and off-site material, waste, borrow, concrete washout facility, disposal of the material removed from sediment basins, equipment storage areas and stockpiles;
- (g) Designated points where vehicles will exit the site;
- (h) Location of structural and non-structural BMPs, including natural buffer areas, identified in the SWPPP;
- (i) Direction(s) of stormwater flow (use arrows) and approximate slopes before and after grading activities;
- (j) Location and timing of stabilization measures;
- (k) Areas where final stabilization has been achieved;
- (l) Change of a drainage course; and
- (m) The sloped areas for all phases of the project.

Add the maps to Appendices C and D.

8. Resources:

The contractor must select, install, use, operate, and maintain appropriate BMPs for the permitted sites. The following manuals are acceptable resources for the selection of appropriate BMPs, but should not be considered exclusive:

- Kansas City Metro Chapter of the American Public Works Association:
Design Guidance Documents: Division 5100 Erosion and Sediment Control manual.

Standard Drawings: Erosion and Sediment Control Details (2/2017)
http://kcmetro.apwa.net/Content/Chapters/kcmetro.apwa.net/File/Specifications%20Erosion%20and%20Sediment%20Control_Details_APWA%20021517.pdf
- National Menu of Best Management Practices (BMPs) for Stormwater-Construction. United States Environmental Protection Agency USEPA (1/27/2022).
<https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater-construction>
- Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites. United States Environmental Protection Agency (USEPA), EPA 833-R-06-004 (May 2007).
https://www.epa.gov/sites/production/files/2015-10/documents/sw_swppp_guide.pdf
- Developing a Stormwater Pollution Prevention Plan (SWPPP)
<https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp>
- Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri. Missouri Department of Natural Resources. 1/7/2016
<https://dnr.mo.gov/document-search/protecting-water-quality-field-guide>

PART IV: PROJECT INFORMATION

(To be completed by OWNER DEPARTMENT & GENERAL CONTRACTOR)

1. Project Contact Information

City Department: KC Water
Project Manager's Name: Madison Gibler
Address: 4800 E 63rd Street, Kansas City, MO 64130
Phone: 816-448-7506 **Fax:** N/A
E-mail: mgibler@burnsmcd.com **Cell Phone:** 816809-2216

Note: The project manager is responsible for notifying the landowner and each contractor or entity (including utility crews and city employees or their agents) who will perform work at the site of the existence of the SWPPP and what actions or precautions shall be taken while on site to minimize the potential for erosion and the potential for damaging any BMP. The project manager and owner department are responsible for any damage a subcontractor may do to established BMPs and any subsequent water quality violation resulting from the damage.

General Contractor's Name: _____
Company Name: _____
Address: _____
City: _____ **State:** _____ **Zip Code:** _____
Phone: _____ **Fax:** _____
E-mail: _____ **Cell Phone:** _____

Contractor's Environmental Lead

Designated Individual: _____
Address: _____
City: _____ **State:** _____ **Zip Code:** _____
Phone: _____ **Fax:** _____
E-mail: _____ **Cell Phone:** _____

Note: The General Contractor must designate an environmental lead who has primary responsibility for ensuring compliance with the Storm Water Pollution Prevention Plan (SWPPP) during construction. This environmental lead shall have knowledge in erosion, sediment, and stormwater control principles, knowledge of the permit, and the site's SWPPP. The environmental lead shall ensure all personnel and contractors understand any requirements of this permit may be affected by the work they are doing. The environmental lead or designated inspector(s) knowledgeable in erosion, sediment, and stormwater control principles shall inspect all structures that function to prevent or minimize pollution of waters of the state.

State Contacts for Spills, Overflows, and Other Unauthorized Discharges:

Should an unauthorized discharge cause or permit any contaminants, other than sediment, or hazardous substance to discharge or enter waters of the state, the unauthorized discharge must be reported to the regional office, **(816) 251-0700**, as soon as practicable but no more than 24 hours after the discovery of the discharge.

If the spill or overflow needs to be reported after normal business hours or on the weekend, the facility must call the Department's Environmental Emergency Response hotline at **(573) 634-2436**. Leaving a message on a Department staff member voice-mail does not satisfy this reporting requirement.

Note: A record of all spills shall be retained with the SWPPP and made available to the Department upon request.

Subcontractors: Check all items for which subcontractors will be used and provide a list of all the subcontractor's company names: Bid #2

- ☐ Gas
- ☐ Grading
- ☐ Sanitary sewers
- ☐ Concrete flatwork
- ☐ Concrete drainage structures
- ☐ Water
- ☐ Blasting
- ☐ Storm sewers
- ☐ Sediment controls
- ☐ Seeding & Mulching
- ☐ Electric
- ☐ Paving
- ☐ Curb & Gutters
- ☐ Other (specify): _____

List All Additional subcontractors used on the project whose scope of work includes land disturbance activities (keep list updated throughout the project):

Contact Name / Project Role (including inspection, operation, and maintenance of BMPs)	Phone Number
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
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_____	_____
_____	_____
_____	_____

Other Utilities and Contractors: List all other utility companies and contractors which will be doing work on the site with their own sub-contractors involving land disturbance:

Contact Name / Project Role	Phone Number
_____	_____
_____	_____
_____	_____
_____	_____

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2. Sequence of Construction:

The General Contractor must complete the following intended construction sequence and timing for major activities, including any opportunities for phasing, grading and stabilization activities to minimize the overall amount of disturbed soil that will be subject to potential erosion at one time.

Phase	BMP's & Stabilization Methods
1) <hr/>	<hr/>
2) <hr/>	<hr/>
3) <hr/>	<hr/>
4) <hr/>	<hr/>
5) <hr/>	<hr/>
6) <hr/>	<hr/>
7) <hr/>	<hr/>
8) <hr/>	<hr/>
9) <hr/>	<hr/>
10) <hr/>	<hr/>
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12) <hr/>	<hr/>
13) <hr/>	<hr/>
14) <hr/>	<hr/>
15) <hr/>	<hr/>
16) <hr/>	<hr/>
17) <hr/>	<hr/>

PART V: BMP PERFORMANCE REQUIREMENTS (To be Implemented by GENERAL CONTRACTOR)

Bid #2

1. On-site Record Keeping

- (1) The SWPPP must be developed and implemented prior to conducting any land disturbance activities and must be specific to the land disturbance activities at the site.
- (2) The SWPPP shall be updated any time site conditions warrant adjustments to the project or BMPs. See Part I. General Requirements – 1. SWPPP Update and 2. Record of SWPPP Update.
- (3) An electronic copy or a paper copy of the SWPPP, and any required reports, must be accessible to anyone on site at all times when land disturbance operations are in process or other operational activities that may affect the maintenance or integrity of the BMP structures and made available.
- (4) A log of each inspection and/or copy of the inspection report shall be kept readily accessible and must be made available upon request by the Missouri Department of Natural Resources. Electronic logs are acceptable as long as reports can be provided within 24 hours. The inspection report shall be signed by the environmental lead or designated inspector.
- (5) A record of all spills shall be retained with the SWPPP.

2. General Requirements

(1) Notification Sign:

A public notification sign shall be posted at the main entrance to the site, or a publicly visible location, with the specific MOR100 permit number. See Appendix B. for the sign. The public notification sign must be visible from the public road that provides access to the site's main entrance. An alternate location is acceptable provided the public can see it and it is noted in the SWPPP. The public notification sign must remain posted at the site until the site is finalized.

(2) Housekeeping Practices:

Good housekeeping practices shall be maintained at all times to keep waste from entering waters of the state.

- (a) Provide solid and hazardous waste management practices, including providing trash containers, regular site cleanup for proper disposal of solid waste such as scrap building material, product/material shipping waste, food/beverage containers, spent structural BMPs;
- (b) Provide containers and methods for proper disposal of waste paints, solvents, and cleaning compounds.
- (c) Manage sanitary waste. Portable toilets shall be positioned so that they are secure and will not be tipped or knocked over and so that they are located away from waters of the state and stormwater inlets and stormwater conveyances.
- (d) Ensure the storage of construction materials be kept away from drainage courses, stormwater conveyances, storm drain inlets, and low areas.

(3) Fueling Facilities:

All fueling facilities present shall at all times adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers.

(4) Equipment and Vehicle Washing:

No detergents, additives, or soaps of any kind shall be discharged. Rinse waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge.

(5) Hazardous Wastes:

Any hazardous wastes that are generated onsite shall be managed, stored, and transported according to the provisions of the Missouri Hazardous Waste Laws and Regulations.

(6) Material and Chemical Storage:

- (a) 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;
- (b) Store all paints, solvents, petroleum products, petroleum waste products, and storage containers (such as drums, cans, or cartons) so they are not exposed to stormwater or provide other prescribed BMPs (such as plastic lids and/or portable spill pans) to prevent the commingling of stormwater with container contents. Commingled water may not be discharged.

- (c) Provide spill prevention, control, and countermeasures to contain the spill. Any containment system used to implement this requirement shall be constructed of materials compatible with the substances contained and shall prevent the contamination of groundwater. Bid #2

(7) Leak and Spill Prevention:

Implement measures intended to prevent the spillage or loss of fluids, oil, grease, fuel, etc. from vehicles and equipment to thereby prevent the contamination of stormwater from these substances. This may include prevention measures such as, but not limited to, utilizing drip pans under vehicles and equipment stored outdoors, covering fueling areas, using dry clean-up methods, use of absorbents, and cleaning pavement surfaces to remove oil and grease.

(8) Spills, Overflows, and Other Unauthorized Discharges:

- (a) Any spill, overflow, or other discharge not specifically authorized in the permit are unauthorized.
- (b) Spills must be cleaned up as soon as possible to prevent entrainment in stormwater.
- (c) Should a spill or an unauthorized discharge cause or permit any contaminants, other than sediment, or hazardous substance to discharge or enter waters of the state, the unauthorized discharge must be reported to the Missouri Department of Natural Resources regional office as soon as practicable but no more than 24 hours after the discovery of the discharge. If the spill or overflow needs to be reported after normal business hours or on the weekend, the facility must call the Department's Environmental Emergency Response hotline at (573) 634-2436. Leaving a message on a Department staff member voice-mail does not satisfy this reporting requirement.
- (d) A record of all spills shall be retained with the SWPPP and made available to the Missouri Department of Natural Resources upon request.

3. Structural BMP Installation and Maintenance

All BMPs shall be properly installed and operational at the locations and relative times specified in the SWPPP. Installation of BMPs necessary to prevent soil erosion and sedimentation at the downgradient project boundary (e.g. buffers, perimeter controls, exit point controls, storm drain inlet protection) must be complete prior to the start of all phases of construction. By the time construction activity in any given portion of the site begins, downgradient BMPs must be installed and operational to control discharges from the initial site clearing, grading, excavating, and other earth-disturbing activities. Additional BMPs shall be installed as necessary throughout the life of the project.

All BMPs shall be maintained and remain in effective operating condition during the entire duration of the project, with repairs made within the timeframes specified elsewhere in this permit, until final stabilization has been achieved. BMPs must be protected from activities that would reduce their effectiveness. Any sediment must be removed per the BMP manufacturer's instructions or before it has accumulated to one-half of the above-ground height of any BMP that collects sediment (i.e., silt fences, sediment traps, etc.). The project is considered to achieve final stabilization when Condition 5 listed below is met.

(1) Perimeter Control BMPs:

- (a) Perimeter control BMPs for runoff from disturbed areas shall be installed before general site clearing is started. Note this requirement does not apply to earth disturbances related to initial site clearing and establishing entry, exit, or access of the site, which may require that stormwater controls be installed immediately after the earth disturbance.
- (b) For phased projects, BMPs shall be properly installed as necessary prior to construction activities.
- (c) Install sediment controls along any perimeter areas of the site that are downgradient from any exposed soil or other disturbed areas. Prevent stormwater from circumventing the edge of the perimeter control. For sites where perimeter controls are infeasible, other practices shall be implemented to minimize discharges to perimeter areas of the site.
- (d) Stormwater discharges which leave the site from disturbed areas shall pass through an appropriate impediment to sediment movement such as a sedimentation basin, sediment traps (including vegetative buffers), or silt fences prior to leaving the land disturbance site.

(2) Stockpiles or Land Clearing Debris Piles of Sediment or Soil:

- (a) Install a sediment barrier along all downgradient perimeter areas;
- (b) Divert surface flows around stockpiles to reduce and minimize erosion of the stockpile.
- (c) For piles that will be unused for 14 or more days, provide cover with appropriate temporary stabilization.
- (d) It is prohibited to rinse, sweep, or otherwise place any soil, sediment, debris, or stockpiled product which has accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the state.

(3) Sedimentation Basins:

A sedimentation basin shall be used for each drainage area with ten or more acres disturbed at one time.

- (a) Sediment basins shall not be constructed in any waters of the state or natural buffer zones.
- (b) Both temporary and permanent sedimentation basins shall have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.
- (c) The basin shall be maintained until final stabilization of the disturbed area served by the basin.
- (d) Accumulated sediment shall not exceed 50% of total volume or as prescribed in the design, whichever is less.
- (e) Dewatering:
 - 1) Discharges from dewatering activities shall be managed by appropriate controls as specified in the SWPPP. Appropriate controls may include, but are not limited to, sediment socks, dewatering tanks, tube settlers, weir tanks, filtration systems (e.g. bag or sand filters), and passive treatment systems that are designed to remove or retain sediment.
 - 2) Erosion controls and velocity dissipation devices (e.g., check dams, riprap, and vegetated buffers) to minimize erosion at inlets, outlets, and discharge points from shall be utilized.
 - 3) Water with an oil sheen, or visible floating solids and foam shall not be discharged.
 - 4) Prevent discharges to the receiving stream causing excessive visual turbidity. Visual turbidity refers to a sediment plume or other cloudiness in the water caused by sediment that can be identified by an observer.
 - 5) Until final stabilization has been achieved, sediment basins and impoundments shall utilize outlet structures or floating skimmers that withdraw water from the surface when discharging. Under frozen conditions, it may be considered infeasible to withdraw water from the surface and an exception can be made for that specific period as long as discharges that may contain sediment and other pollutants are managed by appropriate controls. If determined infeasible due to frozen conditions, documentation must be provided in the SWPPP to support the determination, including the specific conditions or time period when this exception applies.

(4) Sediment Trackout And Sediment Transport:

Minimize sediment trackout from the site and sediment transport onto roadways.

- (a) Restrict vehicle traffic to designated exit points.
- (b) Use appropriate stabilization techniques or BMPs at all points that exit onto paved roads or areas outside of the site.
- (c) Use additional controls or BMPs to remove sediment from vehicle and equipment tires prior to exit from facility where necessary.
- (d) Any sediment or debris that is tracked out past the exit pad or is deposited on a roadway after a precipitation event shall be removed by the shorter of either the same business day (for business days only), or by the end of the next business day if track-out occurs on a non-business day, and before predicted rain events. Remove the track-out sediment by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. Sediment or debris tracked out on pavement or other impervious surfaces shall not be disposed of into any stormwater conveyance, storm drain inlet, or water of the state.
- (e) Stormwater inlets susceptible to receiving sediment or other pollutants from the permitted land disturbance site shall have curb inlet protection. This may include inlets off the active area where track out from vehicles and equipment could impact the stormwater runoff to those inlets.

(5) Concrete Washout Facilities:

Concrete washout facilities shall be used to contain concrete waste from the activities onsite, unless the washout of trucks and equipment is managed properly at an off-site location. The washout facility shall be managed to prevent solid and/or liquid waste from entering waters of the state by the following:

- (a) Direct the wash water into leak-proof containers or pits designed so that no overflows can occur due to inadequate sizing or precipitation;
- (b) Locate washout activities away from waters of the state, stormwater inlets, and/or stormwater conveyances where practicable. If not practicable, use BMPs to reduce risk of waste leaving the washout facility;
- (c) Washout facilities shall be cleaned, or new facilities must be constructed and ready for use, once the washout is 75% full;
- (d) Designate the washout area(s) and conduct such activities only in these areas.
- (e) Ensure contractors are aware of the location, such as by marking the area(s) on the map or signage visible to the truck and/or equipment operators.

(6) Immediate Stabilization After Soil Disturbing Activities:

Soil disturbing activities on site that have ceased either temporarily or permanently shall initiate stabilization immediately in accordance with the options below.

- (a) For soil disturbing activities that have been temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days:
 - 1) BMPs shall be constructed to establish interim stabilization;
 - 2) Interim stabilization must be initiated immediately and completed within 14 calendar days.
- (b) For soil disturbing activities that have been permanently ceased on any portion of the site:
 - 1) Final stabilization of disturbed areas shall be implemented;
 - 2) Final stabilization must be initiated immediately and completed within 14 calendar days.
- (c) If the slope of the area is greater than 3:1 (three feet horizontal to one foot vertical), then interim stabilization shall be established within seven calendar days of ceasing operations on that part of the site.
- (d) Allowances to the 14-day completion period for temporary and final stabilization may be made due to weather and equipment malfunctions. The use of allowances shall be documented in the SWPPP. Allowances may be determined unnecessary after review by the Department.
- (e) The following activities would constitute the immediate initiation of stabilization:
 - 1) Prepping the soil for vegetative or non-vegetative stabilization as long as seeding, planting, and/or installation of non-vegetative stabilization products takes place as soon as practicable;
 - 2) Applying mulch or other non-vegetative product to the exposed areas;
 - 3) Seeding or planting the exposed areas;
 - 4) Finalizing arrangements to have stabilization product fully installed in compliance with the deadlines for completing stabilization.
- (f) Until stabilization is complete, interim sediment control shall consist of well-established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time. This may require adding more BMPs to an area than is normally used during daily operations. The types of BMPs used must be suited to the area disturbed, taking into account the number of acres exposed and the steepness of the slopes.
- (g) If vegetative stabilization measures are being implemented, stabilization is considered “installed” when all activities necessary to seed or plant the area are completed. Installed does not mean established.
- (h) If non-vegetative stabilization measures are being implemented, stabilization is considered “installed” when all such measures are implemented or applied. Non-vegetative stabilization shall prevent erosion and shall be chosen for site conditions, such as slope and flow of stormwater.
- (i) Final stabilization is not considered achieved until vegetation has grown and established to meet the requirements below.

(7) Final Stabilization:

Prior to removal of BMPs, ceasing site inspections, and removing from the quarterly report, final stabilization must be achieved. Final stabilization shall be achieved as soon as possible once land disturbance activities have ceased. Document in the SWPPP the type of stabilization and the date final stabilization is achieved.

- (a) The project is considered to have achieved final stabilization when perennial vegetation (excluding volunteer vegetation), pavement, buildings, or structures using permanent materials (e.g., riprap, gravel, etc.) cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetation must be at least **70%** coverage of 100% of the vegetated areas on site. Vegetation must be evenly distributed.
- (b) Disturbed areas on agricultural land are considered to have achieved final stabilization when they are restored to their preconstruction agricultural use. If former agricultural land is changing to non-agricultural use, this is no longer considered agricultural land and shall follow condition (a).
- (c) If the intended function of a specific area of the site necessitates that it remains disturbed, final stabilization is considered achieved if all of the following are met:
 - 1) Only the minimum area needed remains disturbed (i.e., dirt access roads, motocross tracks, utility pole pads, areas being used for storage of vehicles, equipment, materials). Other areas must meet the criteria above.
 - 2) Permanent structural BMPs (e.g., rock checks, berms, grading, etc.) or non-vegetative stabilization measures are implemented and designed to prevent sediment and other pollutants from entering waters of the state.
 - 3) Inspection requirements in Part IV. SWPPP MANAGEMENT REQUIREMENT, Condition 11 are met and documented in the SWPPP.
 - 4) Winter weather and frozen conditions do not excuse any of the above final stabilization requirements. If vegetation is required for stabilization the permittee must maintain BMPs throughout winter weather and frozen conditions until thawing and vegetation meets final stabilization criteria above. Document stabilization attempts during frozen conditions in the SWPPP. Consider future freezing when removing vegetation and plan with temporary stabilization techniques before the ground becomes frozen.

PART VI: SITE INSPECTION REPORT (To be Maintained by GENERAL CONTRACTOR)

Bid #2

Refer to page 4 in Part III. Project Planning & Design, specify the **2-year, 24-hour storm event** for the project location:
_____ inch.

Specify the notification method when stormwater runoff occurs: _____

1. Site Inspector:

Regularly scheduled inspections shall be conducted by a qualified person (an inspector). An inspector can be the environmental lead or a person trained by and directly supervised by the environmental lead. The inspector shall be knowledgeable in erosion, sediment, and stormwater control principles, and shall have knowledge of the permit, and the site's SWPPP.

2. Scope of Inspection:

Refer to **Appendix E** for the site inspection report. Site inspections shall include, at a minimum, the following:

- (1) Inspect all structures that function to prevent or minimize pollution of waters of the state.
- (2) For disturbed areas that have not achieved final stabilization, all installed BMPs and other pollution control measures shall be inspected to ensure they are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
- (3) For areas on site that have achieved either temporary or final stabilization, while at the same time active construction continues on other areas, ensure that all stabilization measures are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
- (4) Inspect all material, waste, borrow, and equipment storage and maintenance areas that are covered by this permit. Inspect for conditions that could lead to spills, leaks, or other accumulations of pollutants on the site.
- (5) Inspect all areas where stormwater typically flows within the site, including drainage ways designed to divert, convey, and/or treat stormwater.
- (6) All stormwater outfalls shall be inspected for evidence of erosion, sediment deposition, or impacts to the receiving stream. If a discharge is occurring during an inspection, the inspector must observe and document the visual quality of the discharge and take note of the characteristics of the stormwater discharge, including turbidity, color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants.
- (7) When practicable the receiving stream shall also be inspected for a minimum of 50 feet downstream of the outfall.
- (8) The perimeter of the site shall be inspected for evidence of BMP failure to ensure concentrated flow does not develop a new outfall.

3. Inspection Frequency:

All BMPs must be inspected in accordance to one of the schedules listed below. The inspection frequency shall be documented in the table below, and any changes to the frequency of inspections, including switching between the options listed below, must be documented on the inspection report:

- (1) **7-day option:** at least once every seven (7) calendar days and within 48 hours after any storm event equal to or greater than a 2-year, 24-hour storm has ceased during a normal workday or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday; or
- (2) **14-day option:** once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches of precipitation or greater, or the occurrence of runoff from snowmelt. To determine if a storm event of 0.25 inches or greater has occurred on the site, the permittee shall either keep a properly maintained rain gauge on site, or obtain the storm event information from a weather station near the site location.
 - (a) Inspections are only required during the project's normal working hours.
 - (b) An inspection must be conducted within 24 hours of a storm event which has produced 0.25 inches. The inspection shall be conducted within 24 hours of the event end, or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
 - (c) If it is elected to inspect every 14 calendar days and there is a storm event at the site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, the permittee shall conduct an inspection

within 24 hours of the end of the storm or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday. Bid #2

Specify the inspection frequency based on the above (1) 7-Day option, or (2) 14-day option. Any changes to the frequency of inspections, including switching between the options, must be documented both here and on the inspection report:

Option	Date Implemented

- (3) Areas on site that have achieved stabilization, while at the same time active construction continues on other areas, may reduce inspection frequency to monthly, for those stabilized areas, if the following conditions exist:
 - (a) For areas where disturbed portions have undergone temporary stabilization, inspections shall occur at least once a month while stabilized and when re-disturbed shall follow either frequency outlined in (1) or (2) above.
 - (b) Areas on site that have achieved final stabilization must be inspected at least once per month until the permit is terminated.
- (4) If construction activities are suspended due to frozen conditions, the permittee may temporarily reduce site inspections to monthly until thawing conditions begin to occur if all of the following are met:
 - (a) Land disturbances have been suspended; and
 - (b) All disturbed areas of the site have been stabilized per BMP requirements.
 - (c) The change shall be noted in the table above.
- (5) Any basin dewatering shall be inspected daily when discharge is occurring. The discharge shall be observed, and dewatering activities shall be ceased immediately if the receiving stream is being impacted. These inspections shall be noted on a log or on the inspection report.

4. Site Inspection Reports:

A log of each inspection and/or copy of the inspection report shall be kept readily accessible and must be made available upon request by the Department. Electronic logs are acceptable as long as reports can be provided within 24 hours. If inspection reports are kept off site, the SWPPP must indicate where they are stored. The inspection report shall be signed by the environmental lead or designated inspector (electronically or otherwise).

- (1) The inspection report is to include the following minimum information:
 - (a) Inspector's name and title.
 - (b) Date and time of inspection.
 - (c) Observations relative to the effectiveness of the BMPs and stabilization measures. The following must be documented:
 - 1) Whether BMPs are installed, operational, and working as intended;
 - 2) Whether any new or modified stormwater controls are needed;
 - 3) Facilities examined for conditions that could lead to spill or leak;

4) Outfalls examined for visual signs of erosion or sedimentation at outfalls. Excessive erosion or sedimentation may be due to BMP failure or insufficiency. Response to observations should be addressed in the inspection report. BMP #2

(d) Corrective actions taken or necessary to correct the observed problem.

(e) Listing of areas where land disturbance operations have permanently or temporarily stopped.

5. Inspection Follow-up

Any structural or maintenance deficiencies for BMPs or stabilization measures shall be documented and corrected as soon as possible but no more than seven (7) calendar days after the inspection.

- (1) Corrective action documentation shall be stored with the associated site inspection report.
- (2) Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events.
- (3) If weather conditions or other issues prevent correction of BMPs within seven calendar days, the reasons for the delay must be documented (this may include pictures) and there must be a narrative explaining why the work cannot be accomplished within the seven-day time period. The problem shall be corrected as soon as weather conditions or issues allow.
- (4) Corrective actions may be required by the Missouri Department of Natural Resources. The site operator must comply with any corrective actions required by the Department as a result of permit violations found during an inspection.

Appendix A – SWPPP Update and Modification Log

SWPPP UPDATE & MODIFICATION LOG
(To be completed, when necessary, during design modification or construction)

Create a log here of the changes and updates to the SWPPP. You should include additions of new BMPs, significant changes in the activities or their timing on the project, changes in personnel, changes in inspection and maintenance procedures, and updates to the SITE MAP, etc.

Summary of Content Updates	Date

Appendix B – Public Notification Sign



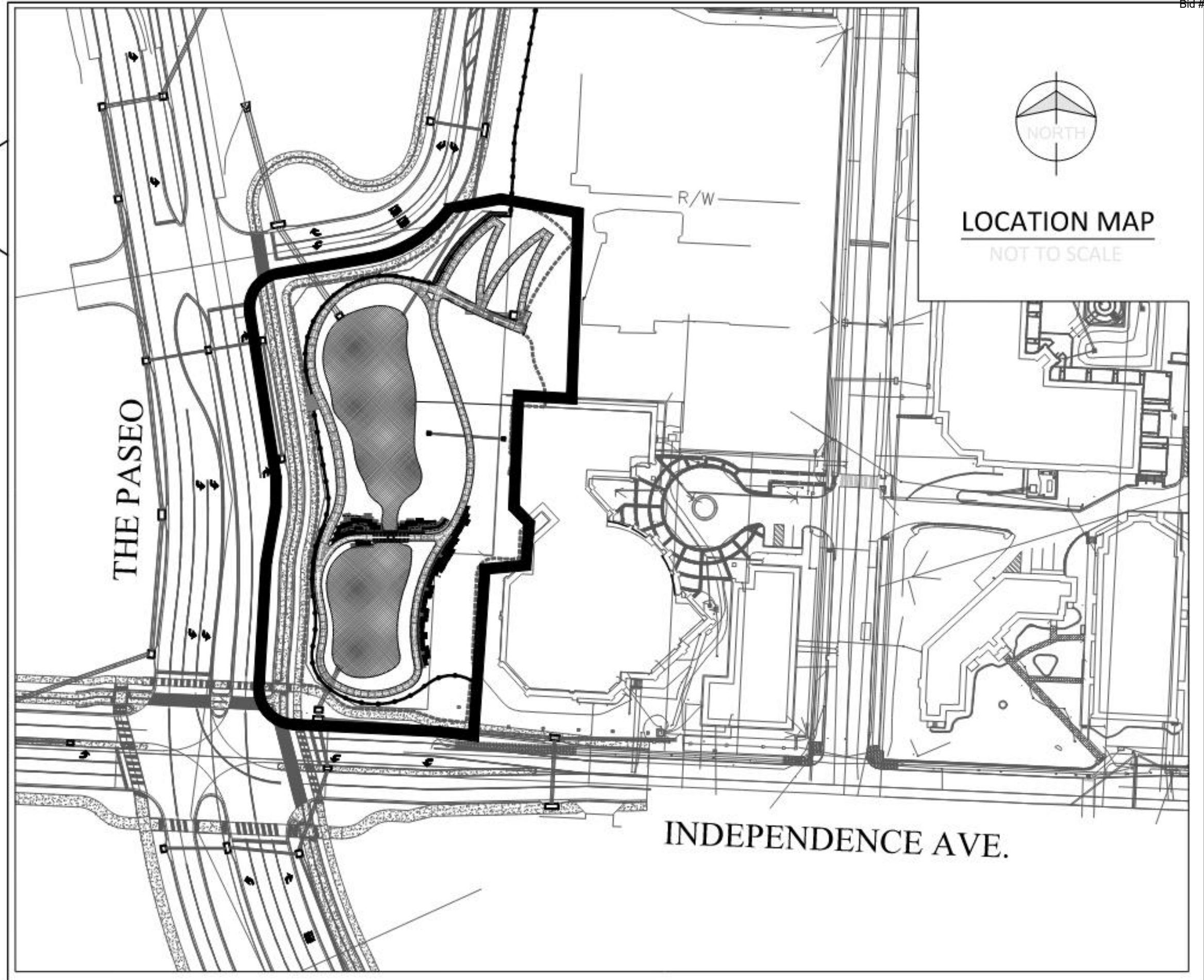
MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

STORMWATER DISCHARGES FROM
THIS LAND DISTURBANCE SITE ARE
AUTHORIZED BY THE MISSOURI
STATE OPERATING PERMIT NUMBER:

ANYONE WITH QUESTIONS OR
CONCERNS ABOUT STORMWATER
DISCHARGES FROM THIS SITE,
PLEASE CONTACT THE MISSOURI
DEPARTMENT OF NATURAL
RESOURCES AT

1-800-361-4827

Appendix C – General Location Map



Appendix D – Site Map(s)

SITE MAP REQUIREMENTS:

The first should show the undeveloped site and its current features. An additional map or maps should be created to show the developed site. These maps should include the following:

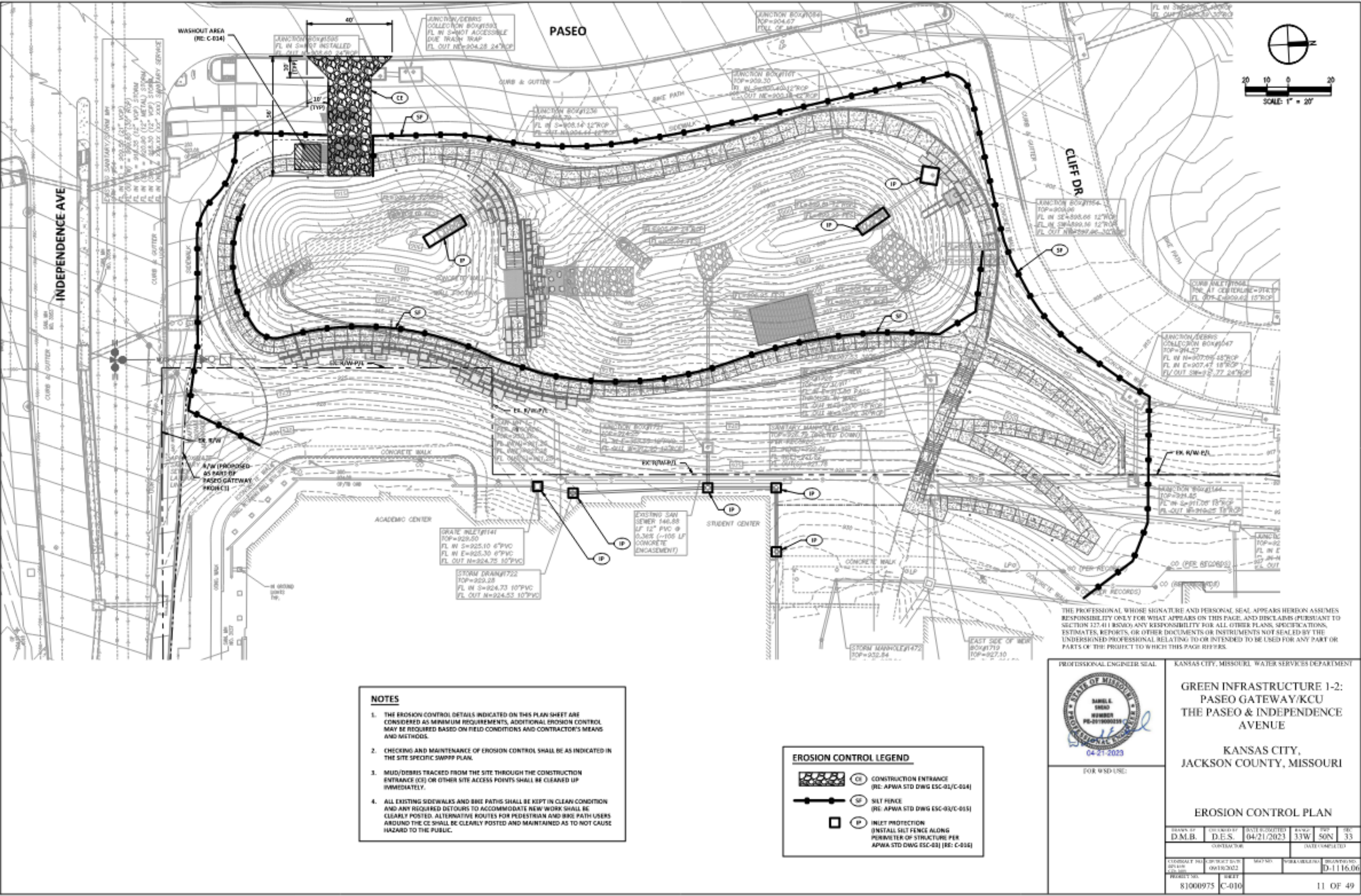
- ☐ Site boundaries of the property;
- ☐ Locations of all waters of the state (including wetlands) within the site and half a mile downstream of the site's outfalls;
- ☐ Location of all outfalls;
- ☐ Location of stormwater inlets and conveyances including ditches, pipes, man-made conduits, and swales;
- ☐ 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);
- ☐ Locations of on-site and off-site material, waste, borrow, concrete washout facility, disposal of the material removed from sediment basins, equipment storage areas and stockpiles;
- ☐ Designated points where vehicles will exit the site;
- ☐ Location of structural and non-structural BMPs, including natural buffer areas, identified in the SWPPP;
- ☐ Direction(s) of stormwater flow (use arrows) and approximate slopes before and after grading activities;
- ☐ Location and timing of stabilization measures;
- ☐ Areas where final stabilization has been achieved;
- ☐ Change of a drainage course; and
- ☐ The sloped areas for all phases of the project.

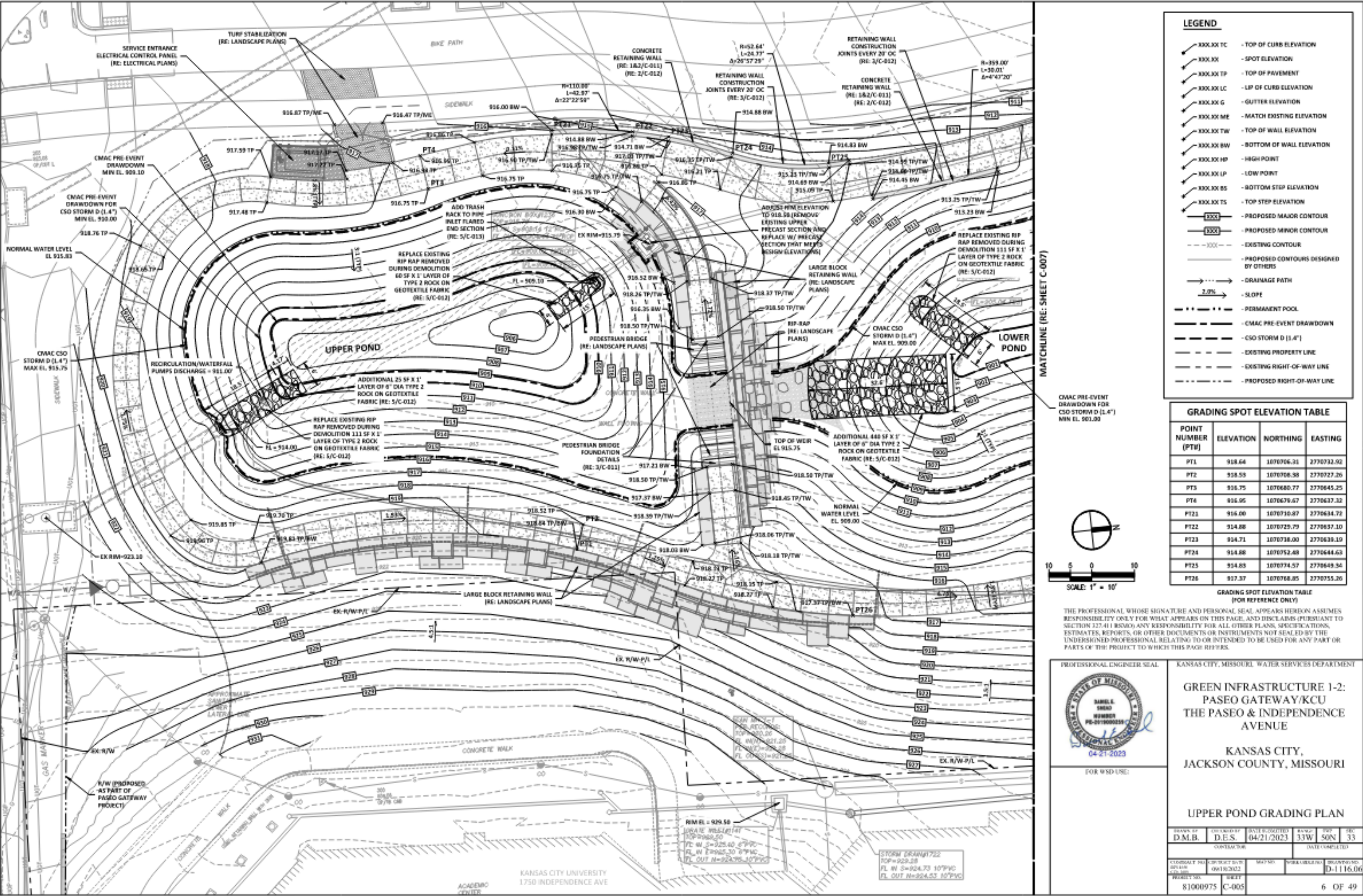


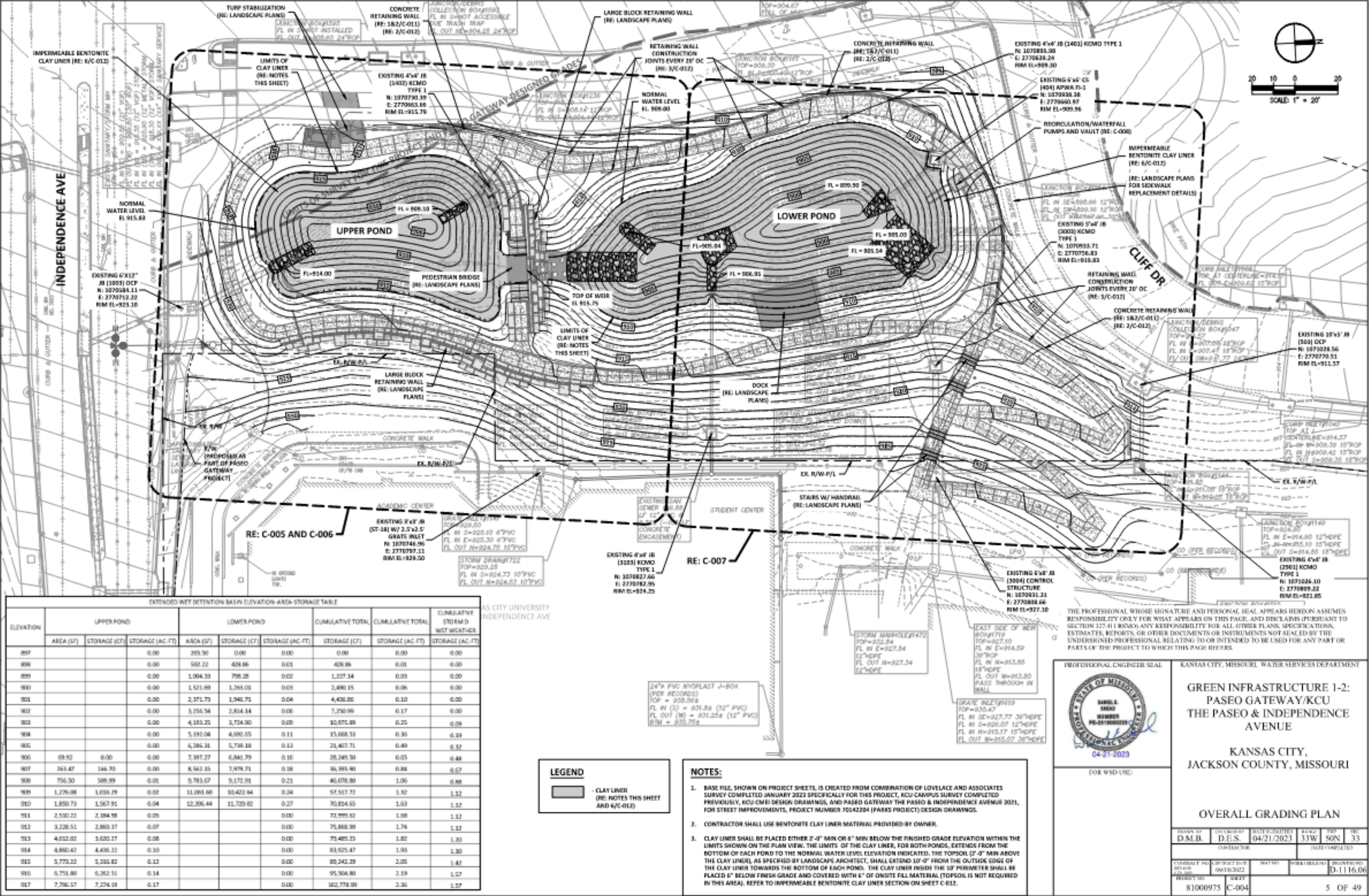
BASE FILE, SHOWN ON FOLLOWING SHEETS, IS CREATED FROM COMBINATION OF LOVEACE AND ASSOCIATES SURVEY COMPLETED JANUARY 2023 SPECIFICALLY FOR THIS PROJECT (THIS SHEET), KCU CAMPUS SURVEY COMPLETED PREVIOUSLY, KCU CNEI DESIGN DRAWINGS, AND "PASED GATEWAY THE PASED & INDEPENDENCE AVENUE 2021" FOR STREET IMPROVEMENTS, PROJECT NUMBER 70142204 (PAROS PROJECT).

THE PROFESSIONAL, WHOSE SIGNATURE AND PERSONAL SEAL APPEARS HEREON ASSUMES RESPONSIBILITY ONLY FOR WHAT APPEARS ON THIS PAGE, AND DISCLAIMS (PURSUANT TO SECTION 127.411 (B)(5)(C)) ANY RESPONSIBILITY FOR ALL OTHER PLANS, SPECIFICATIONS, ESTIMATES, REPORTS, OR OTHER DOCUMENTS OR INSTRUMENTS NOT SEALED BY THE UNDERSIGNED PROFESSIONAL RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE PROJECT TO WHICH THIS PAGE REFERS.

PROFESSIONAL ENGINEER SEAL	KANSAS CITY, MISSOURI WATER SERVICES DEPARTMENT						
	GREEN INFRASTRUCTURE 1-2: PASEO GATEWAY/KCU THE PASEO & INDEPENDENCE AVENUE						
	KANSAS CITY, JACKSON COUNTY, MISSOURI						
	EXISTING SURVEY						
	FOR WSD USE:						
DRAWN BY D.M.B.	CHECKED BY D.E.S.	DATE RE-CHECKED 04/21/2023	RANGE 13W	TWP. 50N	SHEET NO. 3		
CONTRACTOR					DATE COMPLETED		
CITY/COUNTY FILE NUMBER 81000975	PROJECT DIVISION 06010202	MAP NO. C-002	WORK ORDER NO.	DRAWING NUMBER D-1116			
SHEET NO.		SHEET	3 OF				









Appendix E – Site Inspection Reports

Using the Inspection Report

This inspection report is designed to be customized according to the BMP's and conditions at your site. For ease of use, you should take a copy of your site plan and number all of the stormwater BMPs and areas of your site that will be inspected. A brief description of the BMP or area should then be listed in the site-specific section of the inspection report. For example, specific structural BMPs such as construction site entrances, sediment ponds, or specific areas with silt fence (e.g., silt fence along Main Street; silt fence along slope in NW corner, etc.) should be numbered and listed. You should also number specific non-structural BMPs or areas that will be inspected (such as trash areas, material storage areas, temporary sanitary waste areas, etc.).

You can complete the items in the "General Information" section that will remain constant, such as the project name, NPDES tracking number, and inspector (if you only use one inspector). Print out multiple copies of this customized inspection report to use during your inspections.

When conducting the inspection, walk the site by following your SITE MAP and numbered BMPs/areas for inspection.

Also note whether the overall site issues have been addressed (customize this list according to the conditions at your site). Note any required corrective actions and the date and responsible person for the correction in the Corrective Action Log.

Stormwater Construction Site Inspection Report

Bid #2

General Information			
Project Name:			
NPDES Tracking No.:		Location:	
Date of Inspection:		Start/End Time:	
Inspector's Name(s):			
Inspector's Title(s):			
Inspector's Contact:			
Inspector's Qualifications:			
Describe present phase of construction:			
Type of Inspection: <input type="checkbox"/> Regular - <input type="checkbox"/> 7-day, <input type="checkbox"/> 14-day <input type="checkbox"/> Pre-storm Event <input type="checkbox"/> During Storm Event <input type="checkbox"/> Post-storm Event			
Weather Information			
Has there been a storm event since the last inspections? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, provide: <div> <div>Storm Start Date & Time</div> <div>Storm Durations (hrs)</div> <div>Approximate Amount of Precipitation (in.)</div> </div>			
Weather at time of this Inspection? <input type="checkbox"/> Clear <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Sleet <input type="checkbox"/> Fog <input type="checkbox"/> Snowing <input type="checkbox"/> High Winds <input type="checkbox"/> Other: _____ Temperature: _____			
Have any discharges occurred since the last inspection?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, describe:			
Are there any discharges at the time of inspection?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, describe the visual quality of the discharge including turbidity; color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants:			

Site-specific BMPs

- Number the structural and non-structural BMPs identified in your SWPPP on your SITE MAP and list them below (add as many BMPs as necessary). Carry a copy of the numbered SITE MAP with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.
- Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.

	BMP	BMP Installed Properly?	BMP Maintenance Required?	Corrective Action Needed and Notes
1		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

8		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	Bid #2
9		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
13		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
14		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
15		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
16		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
17		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
18		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
19		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
20		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Timeline Requirements
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4	Are discharge points free of sediment deposition, erosion, or impacts on the receiving stream?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	If practicable, is the receiving stream (including 50 ft or more downstream) free from the impact of the discharge points?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	Are storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6	Is the construction exit equipped to prevent sediment from being tracked out?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

7	Is trash, litter or other type of waste on site properly handled?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	Bid #2
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9	Are vehicle and equipment fueling, cleaning, storage and maintenance areas free of spills, leaks, or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12	(Other)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Non-Compliance

CERTIFICATION STATEMENT

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in 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.”

Print name and title: _____

Signature: _____ Date: _____

Appendix F – City’s Construction General Permit & Additional Information

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION



MISSOURI STATE 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. MO-R100000

Owner:
Address:

Continuing Authority:
Address:

Facility Name:
Facility Address:

Legal Description:
UTM Coordinates:

Receiving Stream:
First Classified Stream and ID:
USGS Basin & Sub-watershed No.:

is authorized to discharge from the facility described herein, in accordance with the effluent limitations, inspection, reporting, and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

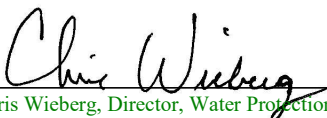
All Outfalls

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 authorizes stormwater and certain non-stormwater 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 Section 644.051.6 of the Law.

July 5, 2022
Effective Date

June 30, 2027
Expiration Date


Chris Wieberg, Director, Water Protection Program

I. APPLICABILITY

A. Permit Coverage and Authorized Discharges

1. This Missouri State Operating Permit (permit) authorizes the discharge of stormwater and certain non-stormwater discharges from land disturbance sites that disturb one or more acres, or disturb less than one acre when part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project.

A Missouri State Operating Permit must be issued before any site vegetation is removed or the site disturbed. Any site owner/operator subject to these requirements for stormwater discharges and who disturbs land prior to permit issuance from the Missouri Department of Natural Resources (Department) is in violation of both State regulations per 10 CSR 20-6.200(1)(A) and Federal regulations per 40 CFR 122.26. The owner/operator of this permit is responsible for compliance with this permit [10 CSR 20-6.200 (3)(B)].

2. This general permit is issued to a city, county, state or federal agency, other governmental jurisdiction, or other private area-wide projects as determined by the Department on a case-by-case basis, for land disturbance projects performed by or under contract to the permittee.
3. This permit authorizes stormwater discharges from land disturbance support activities (e.g., equipment staging yards, material storage areas, excavated material disposal areas, borrow areas, concrete, or asphalt batch plants) provided appropriate stormwater controls are designed, installed, and maintained and the following conditions are met and addressed in the Stormwater Pollution Prevention Plan (SWPPP). The permittee is responsible for compliance with this permit for any stormwater discharges from construction support activity.
 - (a) The support activity is directly related to the construction site required to have permit coverage for stormwater discharges;
 - (b) The support activity is not a commercial operation or serve multiple unrelated construction sites;
 - (c) The support activity does not continue to operate beyond the completion of the construction activity at the project it supports;
 - (d) Sediment and erosion controls are implemented in accordance with the conditions of this permit; and
 - (e) The support activity is strictly stormwater discharges or non-stormwater discharges listed in PART I, APPLICABILITY, Condition A.4. Support activities which discharge process water shall apply for separate coverage (e.g., a concrete batch plant discharging process water shall be covered under a MOG49).
4. This permit authorizes non-stormwater discharges associated with your construction activity from the following activities provided that these discharges are treated by appropriate Best Management Practices (BMPs) where applicable and addressed in the permittee's site specific SWPPP required by this general permit:
 - (a) Discharges from emergency fire-fighting activities;
 - (b) Hydrant flushing and water line flushing, provided the discharged water is managed to avoid instream water quality impacts;
 - (c) Landscape watering, including to establish vegetation;
 - (d) Water used to control dust;
 - (e) Waters used to rinse vehicles and equipment, provided there is no discharge of soaps, solvents, or detergents used for such purposes;
 - (f) External building washdown, provided soaps, solvents, and detergents are not used, and external surfaces do not contain hazardous substances (e.g., paint or caulk containing polychlorinated biphenyls (PCBs));
 - (g) Pavement wash waters, provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used. Directing pavement wash waters directly into any water of the state, storm drain inlet, or stormwater conveyance (constructed or natural site drainage features), unless the conveyance is connected to an effective control, is prohibited;
 - (h) Uncontaminated air conditioning or compressor condensate;
 - (i) Uncontaminated, non-turbid discharges of ground water or spring water;
 - (j) Foundation or footing drains where flows are not contaminated with process materials; and
 - (k) Uncontaminated construction dewatering water discharged in accordance with requirements found in this permit for specific dewatering activities.

B. Permit Restrictions and Limitations

1. This permit does not authorize the discharge of process wastewaters, treated or otherwise.
2. For sites operating within the watershed of any Outstanding National Resource Water (which includes the Ozark National Riverways and the National Wild and Scenic Rivers System), sites that discharge to an Outstanding State Resource Water, or facilities located within the watershed of an impaired water as designated in the Clean Water Act (CWA) Section 303(d) list with an impairment for sedimentation/siltation:
 - (a) This permit authorizes stormwater discharge provided no degradation of water quality occurs due to discharges from the permitted facility per 10 CSR 20-7.031(3)(C).
 - (b) A site with a discharge found to be causing degradation or contributing to an impairment by discharging a pollutant of concern, during an inspection or through complaint investigations, may be required to become a no discharge facility or obtain a site-specific permit with more stringent monitoring and SWPPP requirements.
3. This permit does not allow placement of fill material into any stream or wetland, alteration of a stream channel, or obstruction of stream flow unless the appropriate CWA Section 404 permitting authority provides approval for such actions or determines such actions are exempt from Section 404 jurisdiction. Additionally, this permit does not authorize placement of fill in floodplains unless approved or determined exempt by appropriate federal and/or state floodplain development authorities.
4. This operating permit does not affect, remove, or replace any requirement of the National Environmental Policy Act; the Endangered Species Act; the National Historic Preservation Act; the Comprehensive Environmental Response, Compensation and Liability Act; the Resource Conservation and Recovery Act; or any other relevant acts. Determination of applicability to the above mentioned acts is the responsibility of the permittee. Additionally, this permit does not establish terms and conditions for runoff resulting from silvicultural activities listed in Section 402(l)(3)(a) of the Clean Water Act.
5. Compliance with all requirements in this permit does not supersede any requirement for obtaining project approval from an established local authority nor remove liability for compliance with county and other local ordinances.
6. The Department may require any facility or site authorized by a general permit to apply for a site-specific permit [10 CSR 20-6.010(13)(C)].
7. If a facility or site covered under a current general permit desires to apply for a site-specific permit, the facility or site may do so by contacting the Department for application requirements and procedures.
8. Any discharges not expressly authorized in this permit and not clearly disclosed in the permit application cannot become authorized or shielded from liability under CWA section 402(k) or Section 644.051.16, RSMo, by disclosure to EPA, state, or local authorities after issuance of this permit via any means, including any other permit applications, funding applications, the SWPPP, discharge monitoring reporting, or during an inspection. Discharges at the facility not expressly authorized by this permit must be covered by another permit, be exempt from permitting, or be authorized through some other method.

II. EXEMPTIONS FROM PERMIT REQUIREMENTS

1. Sites that discharge all stormwater runoff directly to a combined sewer system (as defined in 40 CFR 122.26 and 40 CFR 35.2005) connecting to a publicly owned treatment works which has consented to receive such a discharge are exempt from Department stormwater permit requirements.
2. Land disturbance activities that disturb less than one (1) acre of total land area which are not part of a common plan or sale where water quality standards are not exceeded are exempt from Department stormwater permit requirements.

3. Oil and gas related activities as listed in 40 CFR 122.26(a)(2)(ii) where water quality standards are not exceeded are exempt from Department stormwater permit requirements.
4. Linear, strip, or ribbon construction or maintenance operations meeting one (1) of the following criteria are exempt from Department stormwater permit requirements:
 - (a) Grading of existing dirt or gravel roads which does not increase the runoff coefficient and the addition of an impermeable surface over an existing dirt or gravel road;
 - (b) Cleaning or routine maintenance of roadside ditches, sewers, waterlines, pipelines, utility lines, or similar facilities;
 - (c) Trenches two (2) feet in width or less; or
 - (d) Emergency repair or replacement of existing facilities as long as BMPs are employed during the emergency repair.

III. REQUIREMENTS

1. The permittee shall post a public notification sign at the main entrance to the site, or a publically visible location, with the specific MOR100 permit number. The public notification sign must be visible from the public road that provides access to the site's main entrance. An alternate location is acceptable provided the public can see it and it is noted in the SWPPP. The public notification sign must remain posted at the site until the site is finalized.
2. The permittee shall be responsible for notifying the land owner and each contractor or entity (including utility crews and city employees or their agents) who will perform work at the site of the existence of the SWPPP and what actions or precautions shall be taken while on site to minimize the potential for erosion and the potential for damaging any BMP. The permittee is responsible for any damage a subcontractor may do to established BMPs and any subsequent water quality violation resulting from the damage.
3. Ensure the design, installation, and maintenance of effective erosion and sediment controls to minimize the discharge of pollutants. At a minimum, such controls must be designed, installed, and maintained to:
 - (a) Control stormwater volume, velocity, and peak flow rates to minimize soil erosion;
 - (b) Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion and scour;
 - (c) Minimize the amount of exposed soil during construction activity;
 - (d) Minimize the disturbance of steep slopes;
 - (e) Minimize sediment discharges from the site. Address factors such as:
 - 1) The amount, frequency, intensity, and duration of precipitation;
 - 2) The nature of resulting stormwater runoff;
 - 3) Expected flow from impervious surfaces, slopes, and drainage features; and
 - 4) Soil characteristics, including the range of soil particle size expected to be present on the site.
 - (f) Provide and maintain natural buffers around surface waters as detailed in Part V. BMP REQUIREMENTS Condition 7, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration and filtering, unless infeasible; and
 - (g) Minimize soil compaction and preserve topsoil where practicable.

A 2-year, 24-hour storm event can be determined for the project location using the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 which can be located at https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html, or the permittee can determine local rainfall distribution for a 2-year, 24 hours storm event using multi-decade local high density rain gauge data, as approved by the Department.

4. BMPs for land disturbance [10 CSR 20-6.200(1)(D)2] are a schedule of activities, practices, or procedures that reduces the amount of soil available for transport or a device that reduces the amount of suspended solids in runoff before discharge to waters of the state. The term BMPs are also used to describe the sediment and erosion controls and other activities used to prevent stormwater pollution. BMPs are divided into two main categories: structural or non-structural; and they are also classified as temporary or permanent. Temporary BMPs may be added and removed as necessary with updates to the SWPPP as specified in the requirements below.

5. Installation of BMPs necessary to prevent soil erosion and sedimentation at the downgradient project boundary (e.g. buffers, perimeter controls, exit point controls, storm drain inlet protection) must be complete prior to the start of all phases of construction. By the time construction activity in any given portion of the site begins, downgradient BMPs must be installed and operational to control discharges from the initial site clearing, grading, excavating, and other earth-disturbing activities. Additional BMPs shall be installed as necessary throughout the life of the project.
6. All BMPs shall be maintained and remain in effective operating condition during the entire duration of the project, with repairs made within the timeframes specified elsewhere in this permit, until final stabilization has been achieved.
 - (a) Ensure BMPs are protected from activities that would reduce their effectiveness.
 - (b) Remove any sediment per the BMP manufacturer's instructions or before it has accumulated to one-half of the above-ground height of any BMP that collects sediment (i.e., silt fences, sediment traps, etc.)
 - (c) The project is considered to achieve final stabilization when Part V. BMP REQUIREMENTS, Condition 13 is met.
7. Minimize sediment trackout from the site and sediment transport onto roadways.
 - (a) Restrict vehicle traffic to designated exit points.
 - (b) Use appropriate stabilization techniques or BMPs at all points that exit onto paved roads or areas outside of the site.
 - (c) Use additional controls or BMPs to remove sediment from vehicle and equipment tires prior to exit from facility where necessary.
 - (d) Any sediment or debris that is tracked out past the exit pad or is deposited on a roadway after a precipitation event shall be removed by the shorter of either the same business day (for business days only), or by the end of the next business day if track-out occurs on a non-business day, and before predicted rain events. Remove the track-out sediment by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. Sediment or debris tracked out on pavement or other impervious surfaces shall not be disposed of into any stormwater conveyance, storm drain inlet, or water of the state.
 - (e) Stormwater inlets susceptible to receiving sediment or other pollutants from the permitted land disturbance site shall have curb inlet protection. This may include inlets off the active area where track out from vehicles and equipment could impact the stormwater runoff to those inlets.
8. Concrete washout facilities shall be used to contain concrete waste from the activities onsite, unless the washout of trucks and equipment is managed properly at an off-site location. The washout facility shall be managed to prevent solid and/or liquid waste from entering waters of the state by the following:
 - (a) Direct the wash water into leak-proof containers or pits designed so that no overflows can occur due to inadequate sizing or precipitation;
 - (b) Locate washout activities away from waters of the state, stormwater inlets, and/or stormwater conveyances where practicable. If not practicable, use BMPs to reduce risk of waste leaving the washout facility;
 - (c) Washout facilities shall be cleaned, or new facilities must be constructed and ready for use, once the washout is 75% full;
 - (d) Designate the washout area(s) and conduct such activities only in these areas.
 - (e) Ensure contractors are aware of the location, such as by marking the area(s) on the map or signage visible to the truck and/or equipment operators.
9. Good housekeeping practices shall be maintained at all times to keep waste from entering waters of the state.
 - (a) Provide solid and hazardous waste management practices, including providing trash containers, regular site cleanup for proper disposal of solid waste such as scrap building material, product/material shipping waste, food/beverage containers, spent structural BMPs;
 - (b) Provide containers and methods for proper disposal of waste paints, solvents, and cleaning compounds.
 - (c) Manage sanitary waste. Portable toilets shall be positioned so that they are secure and will not be tipped or knocked over and so that they are located away from waters of the state and stormwater inlets and stormwater conveyances.
 - (d) Ensure the storage of construction materials be kept away from drainage courses, stormwater conveyances, storm drain inlets, and low areas.

10. All fueling facilities present shall at all times adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers.
11. Any hazardous wastes that are generated onsite shall be managed, stored, and transported according to the provisions of the Missouri Hazardous Waste Laws and Regulations.
12. Store all paints, solvents, petroleum products, petroleum waste products, and storage containers (such as drums, cans, or cartons) so they are not exposed to stormwater or provide other prescribed BMPs (such as plastic lids and/or portable spill pans) to prevent the commingling of stormwater with container contents. Commingled water may not be discharged under this permit. Provide spill prevention, control, and countermeasures to contain the spill. Any containment system used to implement this requirement shall be constructed of materials compatible with the substances contained and shall prevent the contamination of groundwater.
13. Implement measures intended to prevent the spillage or loss of fluids, oil, grease, fuel, etc. from vehicles and equipment to thereby prevent the contamination of stormwater from these substances. This may include prevention measures such as, but not limited to, utilizing drip pans under vehicles and equipment stored outdoors, covering fueling areas, using dry clean-up methods, use of absorbents, and cleaning pavement surfaces to remove oil and grease.
14. Spills, Overflows, and Other Unauthorized Discharges.
 - (a) Any spill, overflow, or other discharge not specifically authorized in the permit above are unauthorized.
 - (b) Should an unauthorized discharge cause or permit any contaminants, other than sediment, or hazardous substance to discharge or enter waters of the state, the unauthorized discharge must be reported to the regional office as soon as practicable but no more than 24 hours after the discovery of the discharge. If the spill or overflow needs to be reported after normal business hours or on the weekend, the facility must call the Department's Environmental Emergency Response hotline at (573) 634-2436. Leaving a message on a Department staff member voice-mail does not satisfy this reporting requirement.
 - (c) A record of all spills shall be retained with the SWPPP and made available to the Department upon request.
 - (d) Other spills not reaching waters of the state must be cleaned up as soon as possible to prevent entrainment in stormwater but are not required to be reported to the Department.
15. The full implementation of this operating permit shall constitute compliance with all applicable federal and state statutes and regulations in accordance with RSMo 644.051.16 and the CWA §402(k); however, this permit may be reopened and modified or alternatively revoked and reissued to comply with any applicable effluent standard or limitation issued or approved under Clean Water Act §§ 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) if the effluent standard or limitation so issued or approved contains different conditions or is otherwise more stringent than any effluent limitation in the permit or controls any pollutant not limited in the permit. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, termination, notice of planned changes, or anticipated non-compliance does not stay any permit condition.

IV. STORMWATER POLLUTION PREVENTION PLAN (SWPPP) MANAGEMENT REQUIREMENTS

1. The primary requirement of this permit is the development and implementation of a SWPPP which incorporates site specific practices to best minimize the soil exposure, soil erosion, and the discharge of pollutants, including solids for each site covered under this permit.

The purpose of the SWPPP is to ensure the design, implementation, management, and maintenance of BMPs in order to prevent sediment and other pollutants in stormwater discharges associated with the land disturbance activities [40 CFR 122.44 (k)(4)] from entering waters of the state above established general and narrative criteria; compliance with Missouri Water Quality Standards; and compliance with the terms and conditions of this general permit.

- (a) **The SWPPP must be developed and implemented prior to conducting any land disturbance activities and must be specific to the land disturbance activities at the site.**
- (b) The permittee shall fully implement the provisions of the SWPPP required under this permit as a condition of this general permit throughout the term of the land disturbance project. Failure to develop, implement, and maintain a SWPPP may lead to immediate enforcement action.

- (c) The SWPPP shall be updated any time site conditions warrant adjustments to the project or BMPs.
 - (d) Either an electronic copy or a paper copy of the SWPPP, and any required reports, must be accessible to anyone on site at all times when land disturbance operations are in process or other operational activities that may affect the maintenance or integrity of the BMP structures and made available as specified under Part VIII. STANDARD PERMIT CONDITIONS, Condition 1 of this permit. The SWPPP shall be readily available upon request and should not be sent to the Department unless specifically requested
2. Failure to implement and maintain the BMPs chosen, which can be revised and updated, is a permit violation. The chosen BMPs will be the most reasonable and cost effective while also ensuring the highest quality water discharged attainable for the facility. Facilities with established SWPPPs and BMPs shall evaluate BMPs on a regular basis and change the BMPs as needed if there are BMP deficiencies.
3. The SWPPP must:
- (a) List and describe the location of all outfalls;
 - (b) List any allowable non-stormwater discharges occurring on site and where these discharges occur;
 - (c) Incorporate required practices identified below;
 - (d) Incorporate sediment and erosion control practices specific to site conditions;
 - (e) Discuss whether or not a 404 Permit is required for the project; and
 - (f) Name the person(s) responsible for inspection, operation, and maintenance of BMPs. The SWPPP shall list the names and describe the role of all owners/primary operators (such as general contractor, project manager) responsible for environmental or sediment and erosion control at the land disturbance site.
4. The SWPPP briefly must describe the nature of the land disturbance activity, including:
- (a) The function of the project (e.g., low density residential, shopping mall, highway, etc.);
 - (b) The intended sequence and timing of activities that disturb the soils at the site; and
 - (c) Estimates of the total area expected to be disturbed by excavation, grading, or other land disturbance support activities including off-site borrow and fill areas;
5. In order to identify the site, the SWPPP shall include site information including size in acres. The SWPPP shall have sufficient information to be of practical use to contractors and site construction workers to guide the installation and maintenance of BMPs.
6. The function of the SWPPP and the BMPs listed therein is to prevent or minimize pollution to waters of the state. A deficiency of a BMP means it was not effective in preventing or minimizing pollution of waters of the state.

The permittee shall select, install, use, operate and maintain appropriate BMPs for the permitted site. The following manuals are acceptable resources for the selection of appropriate BMPs.

Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites, (Document number EPA 833-R-06-004) published by the United States Environmental Protection Agency (USEPA) in May 2007. This manual as well as other information, including examples of construction SWPPPs, is available at the USEPA internet site at https://www.epa.gov/sites/production/files/2015-10/documents/sw_swppp_guide.pdf; and <https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp>.

The latest version of *Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri*, published by the Department. This manual is available at: <https://dnr.mo.gov/document-search/protecting-water-quality-field-guide>.

The permittee is not limited to the use of these guidance manuals. Other guidance publications may be used to select appropriate BMPs. However, all BMPs must be described and justified in the SWPPP. Although the use of these manuals or other resources is recommended and may be used for BMP selection, they do not supersede the conditions of this permit. They may be used to inform in the decision making process for BMP selection but they are not themselves part of the permit conditions.

The permittee may retain the SWPPP, inspection reports, and all other associated documents (including a copy of this permit) electronically pursuant to RSMo 432.255. The documents must be made available to all interested persons in either paper or electronic format as required by this permit and the permittee must remit a copy (electronic or otherwise) of the SWPPP and inspection reports to the Department upon request.

7. The SWPPP must contain a legible site map, multiple maps if necessary, identifying:
 - (a) Site boundaries of the property;
 - (b) Locations of all waters of the state (including wetlands) within the site and half a mile downstream of the site's outfalls;
 - (c) Location of all outfalls;
 - (d) Direction(s) of stormwater flow (use arrows) and approximate slopes before and after grading activities;
 - (e) Areas of soil disturbance and areas that will not be disturbed (or a statement that all areas of the site will be disturbed unless otherwise noted);
 - (f) Location of structural and non-structural BMPs, including natural buffer areas, identified in the SWPPP;
 - (g) Locations where stabilization practices are expected to occur;
 - (h) Locations of on-site and off-site material, waste, borrow, or equipment storage areas and stockpiles;
 - (i) Designated points where vehicles will exit the site;
 - (j) Location of stormwater inlets and conveyances including ditches, pipes, man-made conduits, and swales; and
 - (k) Areas where final stabilization has been achieved.
8. An individual shall be designated by the permittee as the environmental lead. This environmental lead shall have knowledge in erosion, sediment, and stormwater control principles, knowledge of the permit, and the site's SWPPP. The environmental lead shall ensure all personnel and contractors understand any requirements of this permit may be affected by the work they are doing. The environmental lead or designated inspector(s) knowledgeable in erosion, sediment, and stormwater control principles shall inspect all structures that function to prevent or minimize pollution of waters of the state.
9. Throughout coverage under this permit, the permittee shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. All SWPPP modifications shall be signed and dated. The permittee shall amend the SWPPP to incorporate any significant site condition changes which impact the nature and condition of stormwater discharges. At a minimum, these changes include whenever the:
 - (a) Location, design, operation, or maintenance of BMPs is changed;
 - (b) Design of the construction project is changed that could significantly affect the quality of the stormwater discharges;
 - (c) The permittee's inspections indicate deficiencies in the SWPPP or any BMP;
 - (d) Department notifies the permittee in writing of deficiencies in the SWPPP;
 - (e) SWPPP is determined to be ineffective in minimizing or controlling erosion and sedimentation (e.g., there is visual evidence of excessive site erosion or sediment deposits in streams, lakes, or downstream waterways, sediment or other wastes off site); and/or
 - (f) Department determines violations of water quality standards may occur or have occurred.
10. Site Inspections: The environmental lead, or a designated inspector, shall conduct regularly scheduled inspections. These inspections shall be conducted by a qualified person, one who is responsible for environmental matters at the site, or a person trained by and directly supervised by the person responsible for environmental matters at the site. Site inspections shall include, at a minimum, the following:
 - (a) For disturbed areas that have not achieved final stabilization, all installed BMPs and other pollution control measures shall be inspected to ensure they are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
 - (b) For areas on site that have achieved either temporary or final stabilization, while at the same time active construction continues on other areas, ensure that all stabilization measures are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
 - (c) Inspect all material, waste, borrow, and equipment storage and maintenance areas that are covered by this permit. Inspect for conditions that could lead to spills, leaks, or other accumulations of pollutants on the site.
 - (d) Inspect all areas where stormwater typically flows within the site, including drainage ways designed to divert, convey, and/or treat stormwater.

- (e) All stormwater outfalls shall be inspected for evidence of erosion, sediment deposition, or impacts to the receiving stream. If a discharge is occurring during an inspection, the inspector must observe and document the visual quality of the discharge and take note of the characteristics of the stormwater discharge, including turbidity, color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants.
 - (f) When practicable the receiving stream shall also be inspected for a minimum of 50 feet downstream of the outfall.
 - (g) The perimeter of the site shall be inspected for evidence of BMP failure to ensure concentrated flow does not develop a new outfall.
 - (h) The SWPPP must explain how the environmental lead will be notified when stormwater runoff occurs.
11. Inspection Frequency: All BMPs must be inspected in accordance to one of the schedules listed below. The inspection frequency shall be documented in the SWPPP, and any changes to the frequency of inspections, including switching between the options listed below, must be documented on the inspection form:
- (a) At least once every seven (7) calendar days and within 48 hours after any storm event equal to or greater than a 2-year, 24-hour storm has ceased during a normal work day or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday; or
 - (b) Once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches of precipitation or greater, or the occurrence of runoff from snowmelt. To determine if a storm event of 0.25 inches or greater has occurred on the site, the permittee shall either keep a properly maintained rain gauge on site, or obtain the storm event information from a weather station near the site location.
 - 1) Inspections are only required during the project's normal working hours.
 - 2) An inspection must be conducted within 24 hours of a storm event which has produced 0.25 inches. The inspection shall be conducted within 24 hours of the event end, or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
 - 3) If it is elected to inspect every 14 calendar days and there is a storm event at the site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, the permittee shall conduct an inspection within 24 hours of the end of the storm or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
 - (c) Areas on site that have achieved stabilization, while at the same time active construction continues on other areas, may reduce inspection frequency to monthly, for those stabilized areas, if the following conditions exist:
 - 1) For areas where disturbed portions have undergone temporary stabilization, inspections shall occur at least once a month while stabilized and when re-disturbed shall follow either frequency outlined in (a),(b), or (c) above.
 - 2) Areas on site that have achieved final stabilization must be inspected at least once per month until the permit is terminated.
 - (d) If construction activities are suspended due to frozen conditions, the permittee may temporarily reduce site inspections to monthly until thawing conditions begin to occur if all of the following are met:
 - 1) Land disturbances have been suspended; and
 - 2) All disturbed areas of the site have been stabilized in accordance with Part V. BMP REQUIREMENTS, Condition 13.
 - 3) The change shall be noted in the SWPPP.
 - (e) Any basin dewatering shall be inspected daily when discharge is occurring. The discharge shall be observed and dewatering activities shall be ceased immediately if the receiving stream is being impacted. These inspections shall be noted on a log or on the inspection report.

If weather conditions or other issues prevent correction of BMPs within seven calendar days, the reasons for the delay must be documented (including pictures), and there must be a narrative explaining why the work cannot be accomplished within the seven day time period. The documentation must be filed with the regular inspection reports. The corrections shall be made as soon as weather conditions or other issues allow.

12. Site Inspection Reports: A log of each inspection and/or copy of the inspection report shall be kept readily accessible and must be made available upon request by the Department. Electronic logs are acceptable as long as reports can be provided within 24 hours. If inspection reports are kept off site, the SWPPP must indicate where they are stored. The inspection report shall be signed by the environmental lead or designated inspector (electronically or otherwise).
- (a) The inspection report is to include the following minimum information:
 - 1) Inspector's name and title.
 - 2) Date and time of inspection.
 - 3) Observations relative to the effectiveness of the BMPs and stabilization measures. The following must be

documented:

- a. Whether BMPs are installed, operational, and working as intended;
 - b. Whether any new or modified stormwater controls are needed;
 - c. Facilities examined for conditions that could lead to spill or leak;
 - d. Outfalls examined for visual signs of erosion or sedimentation at outfalls. Excessive erosion or sedimentation may be due to BMP failure or insufficiency. Response to observations should be addressed in the inspection report.
- 4) Corrective actions taken or necessary to correct the observed problem.
 - 5) Listing of areas where land disturbance operations have permanently or temporarily stopped.
13. Any structural or maintenance deficiencies for BMPs or stabilization measures shall be documented and corrected as soon as possible but no more than seven (7) calendar days after the inspection.
- (a) Corrective action documentation shall be stored with the associated site inspection report.
 - (b) Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events.
 - (c) If weather conditions or other issues prevent correction of BMPs within seven calendar days, the reasons for the delay must be documented (this may include pictures) and there must be a narrative explaining why the work cannot be accomplished within the seven day time period. The permittee shall correct the problem as soon as weather conditions or issues allow.
 - (d) Corrective actions may be required by the Department. The permittee must comply with any corrective actions required by the Department as a result of permit violations found during an inspection.

V. BMP REQUIREMENTS

1. The information, practices, and BMP requirements in this section shall be implemented on site and, where noted, provided for in the SWPPP.
2. Existing vegetation and trees shall be preserved where practicable. The permittee is encouraged to preserve topsoil where practicable.
3. The permittee shall select appropriate BMPs for use at the site and list them in the SWPPP. When selecting effective BMPs, the permittee shall consider stormwater volume and velocity. A BMP that has demonstrated ineffectiveness in preventing or minimizing sediment or other pollutants from leaving a given site shall be replaced with a more effective BMP, or additional and sequential BMPs and treatment devices may be incorporated as site conditions allow. The permittee should consider a schedule for performing erosion control measures when selecting BMPs.
4. The SWPPP shall include a description of both structural and non-structural BMPs that will be used at the site.
 - (a) The SWPPP shall provide the following general information for each BMP which will be used one or more times at the site:
 - 1) Physical description of the BMP;
 - 2) Site conditions that must be met for effective use of the BMP;
 - 3) BMP installation/construction procedures, including typical drawings; and
 - 4) Operation and maintenance procedures and schedules for the BMP.
 - (b) The SWPPP shall provide the following information for each specific instance where a BMP is to be installed:
 - 1) Whether the BMP is temporary or permanent;
 - 2) When the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project; and
 - 3) Site conditions that must be met before removal of the BMP if the BMP is not a permanent BMP.
5. Structural BMP Installation: The permittee shall ensure all BMPs are properly installed and operational at the locations and relative times specified in the SWPPP.
 - (a) Perimeter control BMPs for runoff from disturbed areas shall be installed before general site clearing is started. Note this requirement does not apply to earth disturbances related to initial site clearing and establishing entry, exit, or access of the site, which may require that stormwater controls be installed immediately after the earth

disturbance.

- (b) For phased projects, BMPs shall be properly installed as necessary prior to construction activities.
 - (c) Stormwater discharges which leave the site from disturbed areas shall pass through an appropriate impediment to sediment movement such as a sedimentation basin, sediment traps (including vegetative buffers), or silt fences prior to leaving the land disturbance site.
 - (d) A drainage course change shall be clearly marked on a site map and described in the SWPPP.
 - (e) If vegetative stabilization measures are being implemented, stabilization efforts are considered “installed” when all activities necessary to seed or plant the area are completed. Vegetative stabilization is not considered “operational” until the vegetation is established.
6. Install sediment controls along any perimeter areas of the site that are downgradient from any exposed soil or other disturbed areas. Prevent stormwater from circumventing the edge of the perimeter control. For sites where perimeter controls are infeasible, other practices shall be implemented to minimize discharges to perimeter areas of the site.
7. For surface waters of the state, defined in Section 644.016.1(27) RSMo, located on or adjacent to the site, the permittee must maintain a riparian buffer or structural equivalent in accordance with at least one of the following options. The selection and location must be described in the SWPPP.
- (a) Provide and maintain a 50-foot undisturbed natural buffer; or
 - (b) Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or
 - (c) If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.
 - (d) The permittee is not required to comply with (a), (b), or (c) above if one or more of the following exceptions apply and documentation is provided in the SWPPP:
 - 1) As authorized per CWA Section 404 Department of the Army permit and its associated Section 401 Water Quality Certification from the Department.
 - 2) If there is no discharge of stormwater to waters of the state through the area between the disturbed portions of the site and waters of the state located within 50 feet of the site. This includes situations where the permittee has implemented permanent control measures that will prevent such discharges, such as a berm or other barrier.
 - 3) Where no natural buffer exists due to preexisting development disturbances that occurred prior to the initiation of planning for the current development of the site.
 - a. Where some natural buffer exists but portions of the area within 50 feet of the waters of the state are occupied by preexisting development disturbances the permittee is required to comply with (a), (b), or (c) above.
 - 4) For linear projects where site constraints make it infeasible to implement a buffer or equivalent provided the permittee limit disturbances within 50 feet of any waters of the state and/or the permittee provides supplemental erosion and sediment controls to treat stormwater discharges from earth disturbances within 50 feet of the water of the state. The permittee must also document in the SWPPP the rationale for why it is infeasible for the permittee to implement (a), (b), or (c) and describe any buffer width retained and supplemental BMPs installed.
 - (e) Where the permittee is retaining a buffer of any size, the buffer should be measured perpendicularly from any of the following points, whichever is further landward from the water:
 - 1) The ordinary high water mark of the water body, defined as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris; or
 - 2) The edge of the stream or river bank, bluff, or cliff, whichever is applicable.
8. Slopes for disturbed areas must be identified in the SWPPP. A site map or maps defining the sloped areas for all phases of the project must be included in the SWPPP. The disturbance of steep slopes shall be minimized.
9. Manage stockpiles or land clearing debris piles composed, in whole or in part, of sediment and/or soil.
- (a) Locate the piles outside of any natural buffers zones, established under the condition above, and away from any stormwater conveyances, drain inlets, and areas where stormwater flow is concentrated;
 - (b) Install a sediment barrier along all downgradient perimeter areas;
 - (c) Divert surface flows around stockpiles to reduce and minimize erosion of the stockpile.

- (d) For piles that will be unused for 14 or more days, provide cover with appropriate temporary stabilization in accordance with Part V. BMP REQUIREMENTS, Condition 13.
 - (e) Rinsing, sweeping, or otherwise placing any soil, sediment, debris, or stockpiled product which has accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the state is prohibited.
10. The site shall include BMPs for pollution prevention measures and shall be noted in the SWPPP. At minimum such measures must be designed, installed, implemented, and maintained to:
- (a) Minimize the discharge of pollutants from equipment and vehicle rinsing; no detergents, additives, or soaps of any kind shall be discharged. Rinse waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
 - (b) Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater;
 - (c) Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures, including, but not limited to, the installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers; and
 - (d) Prevent discharges from causing or contributing to an exceedance of water quality standards including general criteria.
11. Sedimentation Basins: The SWPPP shall include a sedimentation basin for each drainage area with ten or more acres disturbed at one time.
- (a) The sedimentation basin shall be sized, at a minimum, to treat a local 2-year, 24-hour storm.
 - (b) Sediment basins shall not be constructed in any waters of the state or natural buffer zones.
 - (c) Discharges from dewatering activities shall be managed by appropriate controls. The SWPPP shall include a description of any anticipated dewatering methods and specific BMPs designed to treat dewatering water.
 - 1) Appropriate controls include, but are not limited to, sediment socks, dewatering tanks, tube settlers, weir tanks, filtration systems (e.g. bag or sand filters), and passive treatment systems that are designed to remove or retain sediment.
 - 2) Erosion controls and velocity dissipation devices (e.g., check dams, riprap, and vegetated buffers) to minimize erosion at inlets, outlets, and discharge points from shall be utilized.
 - 3) Water with an oil sheen shall not be discharged and shall be marked in SWPPP.
 - 4) Visible floating solids and foam shall not be discharged.
 - (d) Until final stabilization has been achieved, sediment basins and impoundments shall utilize outlet structures or floating skimmers that withdraw water from the surface when discharging.
 - 1) Under frozen conditions, it may be considered infeasible to withdraw water from the surface and an exception can be made for that specific period as long as discharges that may contain sediment and other pollutants are managed by appropriate controls. If determined infeasible due to frozen conditions, documentation must be provided in the SWPPP to support the determination, including the specific conditions or time period when this exception applies.
 - (e) Accumulated sediment shall not exceed 50% of total volume or as prescribed in the design, whichever is less. Note in the SWPPP the locations for disposal of the material removed from sediment basins.
 - (f) Prevent discharges to the receiving stream causing excessive visual turbidity. For the purposes of this permit, visual turbidity refers to a sediment plume or other cloudiness in the water caused by sediment that can be identified by an observer.
 - (g) The SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.

Where use of a sediment basin is infeasible, the SWPPP shall evaluate and specify other similarly effective BMPs to be employed to control erosion and sediment. These similarly effective BMPs shall be selected from appropriate BMP guidance documents authorized by this permit. The BMPs must provide equivalent water quality protection to achieve compliance with this permit. The SWPPP shall require both temporary and permanent sedimentation basins to have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.

12. Soil disturbing activities on site that have ceased either temporarily or permanently shall initiate stabilization immediately in accordance with the options below. For soil disturbing activities that have been temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days:
 - (a) The permittee shall construct BMPs to establish interim stabilization; and
 - (b) Stabilization must be initiated immediately and completed within 14 calendar days.
 - (c) For soil disturbing activities that have been permanently ceased on any portion of the site, final stabilization of disturbed areas must be initiated immediately and completed within 14 calendar days.
 - 1) Allowances to the 14-day completion period for temporary and final stabilization may be made due to weather and equipment malfunctions. The use of allowances shall be documented in the SWPPP. Allowances may be determined unnecessary after review by the Department.
 - (d) Until stabilization is complete, interim sediment control shall consist of well-established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time. This may require adding more BMPs to an area than is normally used during daily operations. The types of BMPs used must be suited to the area disturbed, taking into account the number of acres exposed and the steepness of the slopes. If the slope of the area is greater than 3:1 (three feet horizontal to one foot vertical), then the permittee shall establish interim stabilization within seven days of ceasing operations on that part of the site. The following activities would constitute the immediate initiation of stabilization:
 - 1) Prepping the soil for vegetative or non-vegetative stabilization as long as seeding, planting, and/or installation of non-vegetative stabilization products takes place as soon as practicable;
 - 2) Applying mulch or other non-vegetative product to the exposed areas;
 - 3) Seeding or planting the exposed areas;
 - 4) Finalizing arrangements to have stabilization product fully installed in compliance with the deadlines for completing stabilization.
 - (e) If vegetative stabilization measures are being implemented, stabilization is considered "installed" when all activities necessary to seed or plant the area are completed. Installed does not mean established.
 - (f) If non-vegetative stabilization measures are being implemented, stabilization is considered "installed" when all such measures are implemented or applied.
 - 1) Non-vegetative stabilization shall prevent erosion and shall be chosen for site conditions, such as slope and flow of stormwater.
 - (g) Final stabilization is not considered achieved until vegetation has grown and established to meet the requirements below.
13. Prior to removal of BMPs, ceasing site inspections, and removing from the quarterly report, final stabilization must be achieved. Final stabilization shall be achieved as soon as possible once land disturbance activities have ceased. Document in the SWPPP the type of stabilization and the date final stabilization is achieved.
 - (a) The project is considered to have achieved final stabilization when perennial vegetation (excluding volunteer vegetation), pavement, buildings, or structures using permanent materials (e.g., riprap, gravel, etc.) cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetation must be at least 70% coverage of 100% of the vegetated areas on site. Vegetation must be evenly distributed.
 - (b) Disturbed areas on agricultural land are considered to have achieved final stabilization when they are restored to their preconstruction agricultural use. If former agricultural land is changing to non-agricultural use, this is no longer considered agricultural land and shall follow condition (a).
 - (c) If the intended function of a specific area of the site necessitates that it remain disturbed, final stabilization is considered achieved if all of the following are met:
 - 1) Only the minimum area needed remains disturbed (i.e., dirt access roads, motocross tracks, utility pole pads, areas being used for storage of vehicles, equipment, materials). Other areas must meet the criteria above.

- 2) Permanent structural BMPs (e.g., rock checks, berms, grading, etc.) or non-vegetative stabilization measures are implemented and designed to prevent sediment and other pollutants from entering waters of the state.
- 3) Inspection requirements in Part IV. SWPPP MANAGEMENT REQUIREMENT, Condition 11 are met and documented in the SWPPP.
- (d) Winter weather and frozen conditions do not excuse any of the above final stabilization requirements. If vegetation is required for stabilization the permittee must maintain BMPs throughout winter weather and frozen conditions until thawing and vegetation meets final stabilization criteria above. Document stabilization attempts during frozen conditions in the SWPPP. Consider future freezing when removing vegetation and plan with temporary stabilization techniques before the ground becomes frozen.

VI. SITE FINALIZATION & PERMIT TERMINATION

1. Until a site is finalized, the permittee must comply with all conditions in the permit, including continuation of site inspections and reporting quarterly to the Department. To finalize the site and remove from this permit coverage, the site shall meet the following requirements:
 - (a) For any areas that (1) were disturbed during construction, (2) are not covered over by permanent structures, and (3) over which the permittee had control during the construction activities, the requirements for final vegetative or non-vegetative stabilization in Part V. BMP REQUIREMENTS, Condition 13;
 - (b) The permittee has removed and properly disposed of all construction materials, waste, and waste handling devices and has removed all equipment and vehicles that were used during construction, unless intended for long-term beyond construction phase;
 - (c) The permittee has removed all temporary BMPs that were installed and maintained during construction, except those that are intended for long-term use or those that are biodegradable; and
 - (d) The permittee has removed all potential pollutants and pollutant-generating activities associated with construction, unless needed for long-term use following the construction activities.
2. The permit may be terminated if;
 - (a) There has been a transfer of control of all areas of the site for which the current permittee is responsible under this permit to another operator, and that operator has obtained coverage under this permit;
 - (b) Active sites obtain coverage under an individual or alternative general NPDES permit, with land disturbance conditions; or
 - (c) This permit may be terminated when all projects covered under this permit are finalized. In order to terminate the permit, the permittee shall notify the Department by submitting a Request for Termination along with the final quarterly report for the current calendar quarter.

VII. REPORTING AND SAMPLING REQUIREMENTS

1. The permittee is not required to sample stormwater under this permit. The Department may require sampling and reporting as a result of illegal discharges, compliance issues related to water quality concerns, or evidence of off-site impacts from activities at a site. If such an action is needed, the Department will specify in writing the sampling requirements, including such information as location and extent. If the permittee refuses to perform sampling when required, the Department may terminate the general permit and require the facility to obtain a site-specific permit with sampling requirements.
2. Electronic Discharge Monitoring Report (eDMR) Submission System. The NPDES Electronic Reporting Rule, 40 CFR Part 127, reporting of any report required by the permit shall be submitted via an electronic system to ensure timely, complete, accurate, and nationally consistent set of data for the NPDES program. The eDMR system is currently the only Department-approved reporting method for this permit unless specified elsewhere in this permit, or a waiver is granted by the Department. The facility must register in the Department's eDMR system through the Missouri Gateway for Environmental Management (MoGEM) before the first report is due.
3. Permittees shall prepare a quarterly report with a list of active land disturbance sites including any off-site borrow or depositional areas associated with the construction project and submit the following information electronically as an

attachment to the eDMR system until such a time when the current or a new system is available to allow direct input of the data:

- (a) The name of the project;
- (b) The location of the project (including the county);
- (c) The name of the primary receiving water(s) for each project;
- (d) A description of the project;
- (e) The number of acres disturbed;
- (f) The percent of completion of the project; and
- (g) The projected date of completion.

The quarterly report(s) shall be maintained by the permittee and readily available for review by the Department at the address provided on the application as well as submitted quarterly via the Department's eDMR system. The permittee shall submit quarterly reports according to Table A.

Table A	Schedule for Quarterly Reporting
Activity for the months of:	Report is due:
January, February, March (1st Quarter)	April 28
April, May, June (2nd Quarter)	July 28
July, August, September (3rd Quarter)	October 28
October, November, December (4th Quarter)	January 28

VIII. STANDARD PERMIT CONDITIONS

1. **Records:** The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site named in the State Operating Permit, results of any monitoring and analysis, and all site inspection records required by this general permit.
 - (a) The records shall be accessible during normal business hours and retained for a period of at least three (3) years from the date of termination.
 - (b) The permittee shall provide a copy (electronic or otherwise) of the SWPPP to the Department, USEPA, or any local agency or government representative if they request a copy in the performance of their official duties within 24 hours of the request (or next working day), unless given more time by the representative.
 - (c) The permittee shall provide a copy of the SWPPP to those who are responsible for installation, operation, or maintenance of any BMP. The permittee, their representative, and/or the contractor(s) responsible for installation, operation and maintenance of the BMPs shall have a current copy of the SWPPP with them when on the project site.
2. **Land Ownership and Change of Ownership:** Federal and Missouri stormwater regulations [10 CSR 20-6.200(1) (B)] require a stormwater permit and erosion control measures for all land disturbances of one or more acres. These regulations also require a permit for less than one acre lots if the lot is part of a larger common plan of development or sale where that plan is at least one acre in size.
 - (a) If the permittee sells any portion of a permitted site to a developer for commercial, industrial, or residential use, this land remains a part of the common sale and the new owner must obtain a permit prior to conducting any land disturbance activity. Therefore, the original permittee must amend the SWPPP to show that the property has been sold and, therefore, no longer under the original permit coverage.
 - (b) Property of any size which is part of a larger common plan of development where the property has achieved final stabilization and the original permit terminated will require application of a new land disturbance permit for any future land disturbance activity unless the activity is by an individual residential building lot owner on a site less than one acre.
 - (c) If a portion of a larger common plan of development is sold to an individual for the purpose of building his or her own private residence, a permit is required if the portion of land sold is equal to or greater than one acre. No permit is required, however, for less than one acre of land sold.
3. **Permit Transfer:** This permit may not be transferred to a new owner.

4. Termination: This permit may be terminated when the project has achieved final stabilization, defined in Part VI. SITE FINALIZATION & PERMIT TERMINATION.
 - (a) In order to terminate the permit, the permittee shall notify the Department by submitting the form Request for Termination of Operating Permit Form MO 780-2814. The form should be submitted to the appropriate regional office or through an approved electronic system if it should become available.
 - (b) The Cover Page (Certificate Page) of the Master General Permit for Land Disturbance specifies the “effective date” and the “expiration date” of the Master General Permit. The “issued date” along with the “expiration date” will appear on the State Operating Permit issued to the applicant. **This permit does not continue administratively beyond the expiration date.**
5. Duty to Reapply: If the project or development completion date will be after the expiration date of this general permit, then the permittee must reapply to the Department for a new permit. This permit may be applied for and issued electronically in accordance with Section 644.051.10, RSMo.
 - (a) Due to the nature of the electronic permitting system, a period of time may be granted at the discretion of the Department in order to apply for a new permit after the new version is effective. Applicants must maintain appropriate best management practices and inspections during the discretionary period.
6. Duty to Comply: The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.
7. Modification, Revocation, and Reopening:
 - (a) If at any time the Department determines that the quality of waters of the state may be better protected by reopening this permit, or revoking this permit and requiring the owner/operator of the permitted site to apply for a site-specific permit, the Department may revoke a general permit and require any person to obtain such an operating permit as authorized by 10 CSR20-6.010(13) and 10 CSR 20-6.200(1)(B).
 - (b) If this permit is reopened, modified, or revoked pursuant to this Section, the permittee retains all rights under Chapter 536 and 644 Revised Statutes of Missouri upon the Department’s reissuance of the permit as well as all other forms of administrative, judicial, and equitable relief available under law.
8. Other Information: Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.
9. Duty to Provide Information: The permittee shall furnish to the Department, within 24 hours unless explicitly granted more time in writing, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.
10. Inspection and Entry: The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
 - (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of the permit;
 - (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
 - (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
 - (d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.

11. Signatory Requirement:

- (a) All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
- (b) The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit (including monitoring reports or reports of compliance or non-compliance) shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
- (c) The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.

12. Property Rights: This permit does not convey any property rights of any sort or any exclusive privilege.

13. Notice of Right to Appeal: If you were adversely affected by this decision, you may be entitled to pursue an appeal before the administrative hearing commission (AHC) pursuant to Sections 621.250 and 644.051.6 RSMo. To appeal, you must file a petition with the AHC within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal should be directed to:

Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: <https://ahc.mo.gov>



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

STORMWATER DISCHARGES FROM
THIS LAND DISTURBANCE SITE ARE
AUTHORIZED BY THE MISSOURI
STATE OPERATING PERMIT NUMBER:

ANYONE WITH QUESTIONS OR
CONCERNS ABOUT STORMWATER
DISCHARGES FROM THIS SITE,
PLEASE CONTACT THE MISSOURI
DEPARTMENT OF NATURAL
RESOURCES AT

1-800-361-4827

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FACT SHEET FOR MASTER GENERAL PERMIT
MO-R100xxx

The Federal Water Pollution Control Act [Clean Water Act (CWA)] Section 402 of Public Law 92-500 (as amended) established the National Pollution Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the CWA). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Missouri Department of Natural Resources (Department) under an approved program operated in accordance with federal and state laws (Federal CWA and Missouri Clean Water Law Section 644 as amended). Permits are issued for a period of five (5) years unless otherwise specified.

Per 40 CFR 124.56, 40 CFR 124.8, and 10 CSR 20-6.020(1)(A)2, a Fact Sheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the permit. A Fact Sheet is not an enforceable part of an MSOP.

DEFINITIONS FOR THE PURPOSES OF THIS PERMIT:

Common Promotional Plan: A plan undertaken by one (1) or more persons to offer lots for sale or lease; where land is offered for sale by a person or group of persons acting in concert, and the land is contiguous or is known, designated, or advertised as a common unit or by a common name or similar names, the land is presumed, without regard to the number of lots covered by each individual offering, as being offered for sale or lease as part of a common promotional plan.

Dewatering: The act of draining rainwater and/or groundwater from basins, building foundations, vaults, and trenches.

Effective Operating Condition: For the purposes of this permit, a stormwater control is kept in effective operating condition if it has been implemented and maintained in such a manner that it is working as designed to minimize pollutant discharges.

Emergency-Related Project: A project initiated in response to a public emergency (e.g. earthquakes, extreme flooding conditions, tornado, disruptions in essential public services, pandemic) for which the related work requires immediate authorization to avoid imminent endangerment to human health/safety or the environment or to reestablish essential public services.

Exposed Soils: For the purposes of this permit, soils that as a result of earth-disturbing activities are left open to the elements.

Immediately: For the purposes of this permit, immediately should be defined as within 24 hours.

Impervious Surface: For the purpose of this permit, any land surface with a low or no capacity for soil infiltration including, but not limited to, pavement, sidewalks, parking areas and driveways, packed gravel or soil, or rooftops.

Infeasible: Infeasible means not technologically possible or not economically practicable and achievable in light of best industry practices.

Install or Installation: When used in connection with stormwater controls, to connect or set in position stormwater controls to make them operational.

Land Disturbance Site or Site: The land or water area where land disturbance activities will occur and where stormwater controls will be installed and maintained. The land disturbance site includes construction support activities, which may be located at a different part of the property from where the primary land disturbance activity will take place or on a different piece of property altogether. Off-site borrow areas directly and exclusively related to the land disturbance activity are part of the site and must be permitted.

Larger Common Plan of Development or Sale: A continuous area where multiple separate and distinct construction activities are occurring under one plan, including any off-site borrow areas that are directly and exclusively related to the land disturbance activity. Off-site borrow areas utilized for multiple different land disturbance projects are considered their own entity and are not part of the larger common plan of development or sale. See definition of Common Promotional Plan to understand what a 'common plan' is.

Minimize: To reduce and/or eliminate to the extent achievable using stormwater controls that are technologically available and economically practicable and achievable in light of best industry practices.

Non-structural Best Management Practices (BMPs): Institutional, educational, or pollution prevention practices designed to limit the amount of stormwater runoff or pollutants that are generated in the landscape. Examples of non-structural BMPs include picking up trash and debris, sweeping up nearby sidewalks and streets, maintaining equipment, and training site staff on stormwater control practices.

Operational: for the purposes of this permit, stormwater controls are made "operational" when they have been installed and implemented, are functioning as designed, and are properly maintained.

Ordinary High Water Mark: The line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris.

Peripheral: For the purposes of this permit, peripheral should be defined as the outermost boundary of the area that will be disturbed.

Permanently: For the purposes of this permit, permanently is defined as any activity that has been ceased without any intentions of future disturbance.

Pollution Prevention Controls (or Measures): Stormwater controls designed to reduce or eliminate the addition of pollutants to construction site discharges through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Qualified Person (inspections): A person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

Stormwater Control (also referred to as sediment/erosion controls): refers to any temporary or permanent BMP or other method used to prevent or reduce the discharge of pollutants to waters of the state.

Structural BMP: Physical sediment/erosion controls working individually or as a group (treatment train) appropriate to the source, location, and area climate for the pollutant to be controlled. Examples of structural BMPs include silt fences, sedimentation ponds, erosion control blankets, and seeding.

Temporary Stabilization: A condition where exposed soils or disturbed areas are provided temporary vegetation and/or non-vegetative protective cover to prevent erosion and sediment loss. Temporary stabilization may include temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate erosion until either final stabilization can be achieved or until further construction activities take place to re-disturb this area.

Treatment Train: A multi-BMP approach to managing the stormwater volume and velocity and often includes erosion prevention and sediment control practices often applied when the use of a single BMP is inadequate in preventing the erosion and transport of sediment. A good option to utilize as a corrective action.

Volunteer Vegetation: A volunteer plant is a plant that grows on its own, rather than being deliberately planted for stabilization purposes. Volunteers often grow from seeds that float in on the wind, are dropped by birds, or are inadvertently mixed into soils. Commonly, volunteer vegetation is referred to as 'weeds'. This does not meet the requirements for final stabilization.

Waters of the State: Section 644.016.1(27) RSMo. defines waters of the state as, "All waters within the jurisdiction of this state, including all rivers, streams, lakes and other bodies of surface and subsurface water lying within or forming a part of the boundaries of the state which are not entirely confined and located completely upon lands owned, leased or otherwise controlled by a single person or by two or more persons jointly or as tenants in common."

PART I – BASIC PERMIT INFORMATION

Facility Type:	Industrial Stormwater; Land Disturbance
Facility SIC Code(s):	1629
Facility Description:	Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, filling, and other activities that result in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state).

This permit establishes a Stormwater Pollution Prevention Plan (SWPPP) requirement for pollutants of concern from this type of facility or for all facilities and sites covered under this permit. 10 CSR 20-6.200(7) specifies "general permits shall contain BMP requirements and/or monitoring and reporting requirements to keep the stormwater from becoming contaminated".

Land disturbance activities include clearing, grubbing, excavating, grading, filling and other activities that result in the destruction of the root zone and/or other activities that are reasonably certain to cause pollution to waters of the state. A Missouri State Operating Permit for land disturbance permit is required for construction disturbance activities of one or more acres or for construction activities that disturb less than one acre when they are part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project.

The primary requirement of a land disturbance permit is the development of a SWPPP which incorporates site-specific BMPs to minimize soil exposure, soil erosion, and the discharge of pollutants. The SWPPP ensures the design, implementation, management, and maintenance of BMPs in order to prevent sediment and other pollutants from leaving the site.

When it precipitates, stormwater washes over the loose soil on a construction site and various other materials and products being stored outside. As stormwater flows over the site, it can pick up pollutants like sediment, debris, and chemicals from the loose soil and transport them to nearby storm sewer systems or directly into rivers, lakes, or coastal waters.

The Missouri Department of Natural Resources is responsible for ensuring that construction site operators have the proper stormwater controls in place so that construction can proceed in a way that protects your community's clean water and the surrounding environment. One way the department helps protect water quality is by issuing land disturbance permits.

Local conditions are not considered when developing conditions for a general permit. A facility may apply for a site-specific permit if they desire a review of site-specific conditions.

PART II – RECEIVING STREAM INFORMATION

APPLICABLE DESIGNATIONS OF WATERS OF THE STATE:

Per Missouri Effluent Regulations (10 CSR 20-7.015), the waters of the state are divided into seven (7) categories. This permit applies to facilities discharging to the following water body categories:

- ✓ Missouri or Mississippi River [10 CSR 20-7.015(2)]
- ✓ Lakes or Reservoirs [10 CSR 20-7.015(3)]
- ✓ Losing Streams [10 CSR 20-7.015(4)]
- ✓ Metropolitan No-Discharge Streams [10 CSR 20-7.015(5)]
- ✓ Special Streams [10 CSR 20-7.015(6)]
- ✓ Subsurface Waters [10 CSR 20-7.015(7)]
- ✓ All Other Waters [10 CSR 20-7.015(8)]

Missouri Water Quality Standards (10 CSR 20-7.031) defines the Clean Water Commission water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and/or 1st classified receiving stream's designated water uses shall be maintained in accordance with 10 CSR 20-7.031(24). A general permit does not take into consideration site-specific conditions.

MIXING CONSIDERATIONS:

This permit applies to receiving streams of varying low flow conditions. Therefore, the effluent limitations must be based on the smallest low flow streams considered, which includes waters without designated uses. As such, no mixing is allowed [10 CSR 20-7.031(5)(A)4.B.(I)(a)]. No Zone of Initial Dilution is allowed. [10 CSR 20-7.031(5)(A)4.B.(I)(b)].

RECEIVING STREAM MONITORING REQUIREMENTS:

There are no receiving water monitoring requirements recommended at this time.

PART III – RATIONALE AND DERIVATION OF EFFLUENT LIMITATIONS & PERMIT CONDITIONS

305(B) REPORT, 303(d) LIST, & TOTAL MAXIMUM DAILY LOAD (TMDL):

Section 305(b) of the Federal CWA requires each state identify waters not meeting Water Quality Standards and for which adequate water pollution controls have not been required. Water Quality Standards protect such beneficial uses of water as whole body contact, maintaining fish and other aquatic life, and providing drinking water for people, livestock, and wildlife. The 303(d) list helps state and federal agencies keep track of waters which are impaired but not addressed by normal water pollution control programs.

A TMDL is a calculation of the maximum amount of a given pollutant a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed which shall include the TMDL calculation. For facilities with an existing general permit before a TMDL is written on their receiving stream, the Department will evaluate the permit and may require any facility authorized by this general permit to apply for and obtain a site-specific operating permit.

ANTI-BACKSLIDING:

A provision in the Federal Regulations [CWA Section 303(d)(4); CWA Section 402(c); 40 CFR Part 122.44(I)] requires a reissued permit to be as stringent as the previous permit with some exceptions.

- ✓ Not Applicable: All effluent limitations in this permit are at least as protective as those previously established.

ANTIDEGRADATION:

Antidegradation policies ensure protection of water quality for a particular water body on a pollutant by pollutant basis to ensure Water Quality Standards are maintained to support beneficial uses such as fish and wildlife propagation and recreation on and in the water. This also includes special protection of waters designated as an Outstanding National Resource Water or Outstanding State Resource Water [10 CSR 20-7.031(3)(C)]. Antidegradation policies are adopted to minimize adverse effects on water.

The Department has determined the best avenue forward for implementing the Antidegradation requirements into general stormwater permits is by requiring the appropriate development and maintenance of a SWPPP. The SWPPP must identify all reasonable and effective BMPs, taking into account environmental impacts and costs. This analysis must document why no discharge or no exposure options are not feasible at the facility. This selection and documentation of appropriate control measures will then serve as the analysis of alternatives and fulfill the requirements of the Antidegradation Rule and Implementation Procedure 10 CSR 20-7.031(3) and 10 CSR 20-7.015(9)(A)5.

Any facility seeking coverage under this permit which undergoes expansion or discharges a new pollutant of concern must update their SWPPP and select reasonable and cost effective new BMPs. New facilities seeking coverage under this permit are required to develop a SWPPP including this analysis and documentation of appropriate BMPs. Renewal of coverage for a facility requires a review of the SWPPP to ensure the selected BMPs continue to be appropriate.

- ✓ Applicable; the facility must review and maintain stormwater BMPs as appropriate.

BENCHMARKS:

When a permitted feature or outfall consists of only stormwater, a benchmark may be implemented at the discretion of the permit writer. Benchmarks require the facility to monitor and, if necessary, replace and update stormwater control measures. Benchmark concentrations are not effluent limitations. A benchmark exceedance, therefore, is not a permit violation; however, failure to take corrective action is a violation of the permit. Benchmark monitoring data is used to determine the overall effectiveness of control measures and to assist the permittee in knowing when additional corrective actions may be necessary to comply with the limitations of the permit.

- ✓ Not applicable; this permit does not contain numeric benchmarks.

BEST MANAGEMENT PRACTICES (BMPs):

Minimum site-wide BMPs are established in this permit to ensure all permittees are managing their sites equally to protect waters of the state from certain activities which could cause negative effects in receiving water bodies. While not all sites require a SWPPP because the SIC codes are specifically exempted in 40 CFR 122.26(b)(14), these BMPs are not specifically included for stormwater purposes. These practices are minimum requirements for all industrial sites to protect waters of the state. If the minimum BMPs are not followed, the facility may violate general criteria [10 CSR 20-7.031(4)]. Statutes are applicable to all permitted facilities in the state; therefore, pollutants cannot be released unless in accordance with RSMo 644.011 and 644.016 (17).

CHANGES IN DISCHARGES OF TOXIC POLLUTANT:

This special condition reiterates the federal rules found in 40 CFR 122.44(f) and 122.42(a)(1). In these rules, the facility is required to report changes in amounts of toxic substances discharged. Toxic substances are defined in 40 CFR 122.2 as "...any pollutant listed as toxic under section 307(a)(1) or, in the case of "sludge use or disposal practices," any pollutant identified in regulations implementing section 405(d) of the CWA." Section 307 of the CWA then refers to those parameters found in 40 CFR 401.15.

The permittee should also consider any other toxic pollutant in the discharge as reportable under this condition.

EFFLUENT LIMITATION GUIDELINE:

Effluent Limitation Guidelines, or ELGs, are found at 40 CFR 400-499. These are limitations established by the EPA based on the SIC code and the type of work a facility is conducting. Most ELGs are for process wastewater and some address stormwater. All are technology based limitations which must be met by the applicable facility at all times.

- ✓ The industries covered under this permit have an associated Effluent Limit Guideline (ELG) which is applicable to the stormwater discharges in this permit and is applied under 40 CFR 125.3(a).

ELECTRONIC DISCHARGE MONITORING REPORT (EDMR) SUBMISSION SYSTEM:

The U.S. Environmental Protection Agency (EPA) promulgated a final rule on October 22, 2015, to modernize CWA reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. The final rule requires regulated entities and state and federal regulators to use information technology to electronically report data required by the National Pollutant Discharge Elimination System (NPDES) permit program instead of filing paper reports. To comply with the federal rule, the Department is requiring all permittees to begin submitting discharge monitoring data and reports online.

- ✓ Applicable; this permit requires quarterly reports.

GENERAL CRITERIA CONSIDERATIONS:

In accordance with 40 CFR 122.44(d)(1), effluent limitations shall be placed into permits for pollutants determined to cause, have reasonable potential to cause, or to contribute to, an excursion above any water quality standard, including narrative water quality criteria. In order to comply with this regulation, the permit writer has completed a reasonable potential determination on whether discharges have reasonable potential to cause or contribute to an excursion of the general criteria listed in 10 CSR 20-7.031(4). In instances where reasonable potential exists, the permit includes limitations within the permit to address the reasonable potential. In discharges where reasonable potential does not exist, the permit may include monitoring to later determine the discharge's potential to impact the narrative criteria. Additionally, RSMo 644.076.1, as well as Standard Permit Conditions Part VIII of this permit state it shall be unlawful for any person to cause or allow any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law or any standard, rule, or regulation promulgated by the commission.

LAND APPLICATION:

Land application, or surficial dispersion of wastewater and/or sludge, is performed by facilities to maintain a basin as no-discharge. Requirements for these types of operations are found in 10 CSR 20-6.015; authority to regulate these activities is from RSMo 644.026.

- ✓ Not applicable; this permit does not authorize operation of a surficial land application system to disperse wastewater or sludge.

LAND DISTURBANCE:

Land disturbance, sometimes called construction activities, are actions which cause disturbance of the root layer or soil; these include clearing, grading, and excavating of the land. 40 CFR 122.26(b)(14) and 10 CSR 20-6.200(3) requires permit coverage for these activities. Coverage is not required for facilities when only providing maintenance of original line and grade, hydraulic capacity, or to continue the original purpose of the facility.

- ✓ Applicable; this permit provides coverage for land disturbance activities. These activities have SWPPP requirements and may be combined with the standard site SWPPP. Land disturbance BMPs should be designed to control the expected peak discharges. The University of Missouri has design storm events for the 25 year 24 hour storm; these can be found at: http://ag3.agebb.missouri.edu/design_storm/comparison_reports/20191117_25yr_24hr_comparison_table.htm; to calculate peak discharges, the website <https://www.lmnoeng.com/Hydrology/rational.php> has the rational equation to calculate expected discharge volume from the peak storm events.

NUTRIENT MONITORING:

Nutrient monitoring is required for facilities characteristically or expected to discharge nutrients (nitrogenous compounds and/or phosphorus) when the design flow is equal to or greater than 0.1 MGD per 10 CSR 20-7.015(9)(D)8.

- ✓ This is a stormwater only permit; therefore, it is not subject to provisions found in 10 CSR 20-7.015 per 10 CSR 20-7.015(1)(C).

OIL/WATER SEPARATORS:

Oil water separator (OWS) tank systems are frequently found at industrial sites where process water and stormwater may contain oils and greases, oily wastewaters, or other immiscible liquids requiring separation. Food industry discharges typically require pretreatment prior to discharge to municipally owned treatment works. Per 10 CSR 26-2.010(2)(B), all oil water separator tanks must be operated according to manufacturer's specifications and authorized in NPDES permits per 10 CSR 26-2.010(2) or may be regulated as a petroleum tank.

- ✓ Not applicable; this permit does not authorize the operation of OWS. The facility must obtain a separate permit to cover operation of and discharge from these devices.

PERMIT SHIELD:

The permit shield provision of the CWA (Section 402(k)) and Missouri Clean Water Law (644.051.16 RSMo) provides that when a permit holder is in compliance with its NPDES permit or MSOP, they are effectively in compliance with certain sections of the CWA and equivalent sections of the Missouri Clean Water Law. In general, the permit shield is a legal defense against certain enforcement actions but is only available when the facility is in compliance with its permit and satisfies other specific conditions, including having completely disclosed all discharges and all facility processes and activities to the Department at time of application. It is the facility's responsibility to ensure that all potential pollutants, waste streams, discharges, and activities, as well as wastewater land application, storage, and treatment areas, are all fully disclosed to the Department at the time of application or during the draft permit review process. Subsequent requests for authorization to discharge additional pollutants or expanded or newly disclosed flows, or for authorization for previously unpermitted and undisclosed activities or discharges, will likely require permit modification or may require the facility be covered under a site specific permit.

PRETREATMENT PROGRAM:

This permit does not regulate pretreatment requirements for facilities discharging to an accepting permitted wastewater treatment facility. If applicable, the receiving entity (the publicly owned treatment works - POTW) must ensure compliance with any effluent limitation guidelines for pretreatment listed in 40 CFR Subchapter N per 10 CSR 20-6.100. Pretreatment regulations per RSMo 644.016 are limitations on the introduction of pollutants or water contaminants into publicly owned treatment works or facilities.

- ✓ Not Applicable; the facilities covered under this permit are not required to meet pretreatment requirements under an ELG.

PUBLIC NOTICE OF COVERAGE FOR AN INDIVIDUAL FACILITY:

Public Notice of reissuance of coverage is not required unless the facility is a specific type of facility as defined in 10 CSR 20-6.200(1). The need for an individual public notification process shall be determined and identified in the permit [10 CSR 20-6.020(1)(C)5.].

- ✓ Not applicable; public notice is not required for coverage under this permit to individual facilities. The MGP is public noticed in lieu of individual permit PN requirements.

REASONABLE POTENTIAL ANALYSIS (RPA):

Federal regulation 40 CFR Part 122.44(d)(1)(i) requires effluent limitations for all pollutants which are or may be discharged at a level which will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard. In accordance with 40 CFR Part 122.44(d)(iii) if the permit writer determines any given pollutant has the reasonable potential to cause or contribute to an in-stream excursion above the water quality standard, the permit must contain effluent limits for the pollutant.

- ✓ The permit writer reviewed industry materials, available past inspections, and other documents and research to evaluate general and narrative water quality reasonable potential for this permit. Permit writers also use the Department's permit writer's manual, the EPA's permit writer's manual (<https://www.epa.gov/npdes/npdes-permit-writers-manual>), program policies, and best professional judgment. For each parameter in each permit, the permit writer carefully considers all applicable information regarding technology based effluent limitations, effluent limitation guidelines, and water quality standards. Best professional judgment is based on the experience of the permit writer, cohorts in the Department and resources at the EPA, research, and maintaining continuity of permits if necessary. For stormwater permits, the permit writer is required per 10 CSR 6.200(6)(B)2 to consider: A. application and other information supplied by the permittee; B. effluent guidelines; C. best professional judgment of the permit writer; D. water quality; and E. BMPs.

SCHEDULE OF COMPLIANCE (SOC):

Per § 644.051, RSMo, a permit may be issued with a Schedule of Compliance (SOC) to provide time for a facility to come into compliance with new state or federal effluent regulations, water quality standards, or other requirements. Such a schedule is not allowed if the facility is already in compliance with the new requirement or if prohibited by other statute or regulation. An SOC includes an enforceable sequence of interim requirements (e.g. actions, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit. *See also* Section 502(17) of the CWA, and 40 CFR 122.2. For new effluent limitations, the permit may include interim monitoring for the specific parameter to demonstrate the facility is not already in compliance with the new requirement. Per 40 CFR 122.47(a)(1) and 10 CSR 20-7.031(11), compliance must occur as soon as possible. If the permit provides a schedule for meeting new water quality based effluent limits, an SOC must include an enforceable, final effluent limitation in the permit even if the SOC extends beyond the life of the permit.

- ✓ Not Applicable: This permit does not contain a SOC.

SETBACKS:

Setbacks, sometimes called separation distances, are common elements of permits and are established to provide a margin of safety in order to protect the receiving water and other features from accidents, spills, unusual events, etc. Specific separation distances are included in 10 CSR 20-8 for minimum design standards of wastewater structures. While wastewater is considered separately from stormwater under this permit, the guides and Chapter 8 distances may remain relevant to requirements under this permit if deemed appropriate by the permittee.

- ✓ Discharge to the watersheds of a Metropolitan No-Discharge Stream (10 CSR 20-7.031 Table F) is authorized by this permit if the discharges are in compliance with 10 CSR 20-7.015(5) and 10 CSR 20-7.031(7). Discharges to these watersheds are authorized for uncontaminated stormwater discharges only.
- ✓ This permit authorizes stormwater discharges which are located in a way to allow water to be released into sinkholes, caves, fissures, or other openings in the ground which could drain into aquifers (except losing streams) per 10 CSR 20-7.015(7). It is the best professional judgment of the permit writer to allow discharges to losing streams as the effluent is stormwater only.
- ✓ This permit authorizes stormwater discharge in the watersheds of Outstanding state Resource Waters (OSRW); Outstanding National Resources Waters (ONRW), which includes the Ozark National Riverways and the National Wild and Scenic Rivers System; and impaired waters as designated in the 305(b) Report provided no degradation of water quality occurs in the OSRW and ONRW due to discharges from the permitted facility per 10 CSR 20-7.015(6)(B) and 10 CSR 20-7.031(3)(C). Additionally, if the facility is found to be causing degradation or contributing to an impairment by discharging a pollutant of concern during an inspection or through complaint investigations, they will be required to become a no discharge facility or obtain a site specific permit with more stringent monitoring and SWPPP requirements. Missouri's impaired waters can be found at <https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/impaired-waters>. Sites within 1000 feet of a OSRW, ONRW, or water impaired for sediment must operate as a no-discharge facility. These additional protections are borrowed from the USEPA 2021 draft Construction General Permit.

SLUDGE – DOMESTIC BIOSOLIDS:

Biosolids are solid materials resulting from domestic wastewater treatment meeting federal and state criteria for beneficial use (i.e. fertilizer). Sewage sludge is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works; including, but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works.

- ✓ This permit does not authorize discharge or land application of biosolids. Sludge/biosolids is not generated by this industry.

SLUDGE – INDUSTRIAL:

Industrial sludge is solid, semi-solid, or liquid residue generated during the treatment of industrial process wastewater in a treatment works; including, but not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment process; scum and solids filtered from water supplies and backwashed; and a material derived from industrial sludge.

- ✓ Not applicable; sludge is not generated by this industry.

SPILL REPORTING:

Any emergency involving a hazardous substance must be reported to the Department's 24 hour Environmental Emergency Response hotline at (573) 634-2436 at the earliest practicable moment after discovery. The Department may require the submittal of a written report detailing measures taken to clean up a spill. These reporting requirements apply when the spill results in chemicals or materials leaving the permitted property or reaching waters of the state. This requirement is in addition to the noncompliance reporting requirement found in Standard Conditions Part I. <https://dnr.mo.gov/waste-recycling/investigations-cleanups/environmental-emergency-response>.

Underground and above ground storage devices for petroleum products, vegetable oils, and animal fats may be subject to control under federal Spill Prevention, Control, and Countermeasure Regulation and are expected to be managed under those provisions, if applicable. Substances regulated by federal law under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) which are transported, stored, or used for maintenance, cleaning or repair shall be managed according to the provisions of RCRA and CERCLA.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):

In accordance with 40 CFR 122.44(k), BMPs must be used to control or abate the discharge of pollutants when: 1) Authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities; 2) Authorized under section 402(p) of the CWA for the control of stormwater discharges; 3) Numeric effluent limitations are infeasible; or 4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA. In accordance with the EPA's *Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites*, (Document number EPA 833-R-06-004) published by the EPA in 2007 https://www.epa.gov/sites/production/files/2015-10/documents/sw_swppp_guide.pdf, BMPs are measures or practices used to reduce the amount of pollution entering waters of the state from a permitted facility. BMPs may take the form of a process, activity, or physical structure. Additionally, in accordance with the Stormwater Management, a SWPPP is a series of steps and activities to 1) identify sources of pollution or contamination, and 2) select and carry out actions which prevent or control the pollution of storm water discharges. Additional information can be found in *Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006; September 1992).

A SWPPP must be prepared if the SIC code for the facility is found in 40 CFR 122.26(b)(14) and/or 10 CSR 20-6.200(2). A SWPPP may be required of other facilities where stormwater has been identified as necessitating better management.

The purpose of a SWPPP is to comply with all applicable stormwater regulations by creating an adaptive management plan to control and mitigate stream pollution from stormwater runoff. Developing a SWPPP provides opportunities to employ appropriate BMPs to minimize the risk of pollutants being discharged during storm events. The following paragraph outlines the general steps the permittee should take to determine which BMPs will work to achieve the benchmark values or limits in the permit. This section is not intended to be all encompassing or restrict the use of any physical BMP or operational and maintenance procedure assisting in pollution control. Additional steps or revisions to the SWPPP may be required to meet the requirements of the permit.

Areas which should be included in the SWPPP are identified in 40 CFR 122.26(b)(14). Once the potential sources of stormwater pollution have been identified, a plan should be formulated to best control the amount of pollutant being released and discharged by each activity or source. This should include, but is not limited to, minimizing exposure to stormwater, good housekeeping measures, proper facility and equipment maintenance, spill prevention and response, vehicle traffic control, and proper materials handling. Once a plan has been developed, the facility will employ the control measures determined to be adequate to prevent pollution from entering waters of the state. The facility will conduct inspections of the BMPs to ensure they are working properly and re-evaluate any BMP not achieving compliance with permitting requirements. For example if the BMP being employed is deficient in controlling stormwater pollution, corrective action should be taken to repair, improve, or replace the failing BMP. If failures do occur, continue this trial and error process until appropriate BMPs have been established.

The EPA has developed factsheets on the pollutants of concern for specific industries along with the BMPs to control and minimize stormwater (<https://www.epa.gov/npdes/stormwater-discharges-industrial-activities>). Along with EPA's factsheets, the International Stormwater BMP database (<https://bmpdatabase.org/>) may provide guidance on BMPs appropriate for specific industries.

For new, altered, or expanded stormwater discharges, the SWPPP shall identify reasonable and effective BMPs while accounting for environmental impacts of varying control methods. The antidegradation analysis must document why no discharge or no exposure options are not feasible. The selection and documentation of appropriate control measures shall serve as an alternative analysis of technology and fulfill the requirements of antidegradation [10 CSR 20-7.031(3)].

Alternative analysis evaluation of the BMPs is a structured evaluation of BMPs which are reasonable and cost effective. The alternative analysis evaluation should include practices designed to be: 1) non-degrading; 2) less degrading; or 3) degrading water quality. The glossary of the *Antidegradation Implementation Procedure* defines these three terms. The chosen BMP will be the most reasonable and effective management strategy while ensuring the highest statutory and regulatory requirements are achieved and the highest quality water attainable for the facility is discharged. The alternative analysis evaluation must demonstrate why "no discharge" or "no exposure" is not a feasible alternative at the facility. This structured analysis of BMPs serves as the antidegradation review, fulfilling the requirements of 10 CSR 20-7.031(3) Water Quality Standards and *Antidegradation Implementation Procedure*, Section II.B.

- ✓ Applicable: A SWPPP shall be developed and implemented for each site and shall incorporate required practices identified by the Department with jurisdiction, incorporate control practices specific to site conditions, and provide for maintenance and adherence to the plan.

UNDERGROUND INJECTION CONTROL (UIC):

The UIC program for all classes of wells in the State of Missouri is administered by the Missouri Department of Natural Resources and approved by EPA pursuant to section 1422 and 1425 of the Safe Drinking Water Act (SDWA) and 40 CFR 147 Subpart AA. Injection wells are classified based on the liquids which are being injected. Class I wells are hazardous waste wells which are banned by RSMo 577.155; Class II wells are established for oil and natural gas production; Class III wells are used to inject fluids to extract minerals; Class IV wells are also banned by Missouri in RSMo 577.155; Class V wells are shallow injection wells; some examples are heat pump wells and groundwater remediation wells. Domestic wastewater being disposed of sub-surface is also considered a Class V well.

In accordance with 40 CFR 144.82, construction, operation, maintenance, conversion, plugging, or closure of injection wells shall not cause movement of fluids containing any contaminant into Underground Sources of Drinking Water (USDW) if the presence of any contaminant may cause a violation of drinking water standards or groundwater standards under 10 CSR 20-7.031 or other health-based standards or may otherwise adversely affect human health. If the Department finds the injection activity may endanger USDWs, the Department may require closure of the injection wells or other actions listed in 40 CFR 144.12(c), (d), or (e). In accordance with 40 CFR 144.26, the permittee shall submit a Class V Well Inventory Form for each active or new underground injection well drilled, or when the status of a well changes, to the Missouri Department of Natural Resources, Geological Survey Program, P.O. Box 250, Rolla, Missouri 65402. Single family residential septic systems and non-residential septic systems used solely for sanitary waste and having the capacity to serve fewer than 20 persons a day are excluded from the UIC requirements (40 CFR 144.81(9)).

- ✓ Not applicable; this permit does not authorize subsurface wastewater systems or other underground injection. These activities must be assessed under an application for a site specific permit. Certain discharges of stormwater into sinkholes may qualify as UIC. It is important the permittee evaluate all stormwater basins, even those holding water; as sinkholes have varying seepage rates. This permit does not allow stormwater discharges into sinkholes. The facility must ensure sinkholes are avoided in the construction process. The State's online mapping resource <https://modnr.maps.arcgis.com/apps/webappviewer/index.html?id=87ebef4af15d438ca658ce0b2bbc862e> has a sinkhole layer.

VARIANCE:

Per the Missouri Clean Water Law Section 644.061.4, variances shall be granted for such period of time and under such terms and conditions as shall be specified by the commission in its order. The variance may be extended by affirmative action of the commission. In no event shall the variance be granted for a period of time greater than is reasonably necessary for complying with the Missouri Clean Water Law Section 644.006 to 644.141 or any standard, rule, or regulation promulgated pursuant to Missouri Clean Water Law Section 644.006 to 644.141.

- ✓ Not Applicable: This permit is not drafted under premises of a petition for variance.

WASTELOAD ALLOCATIONS (WLA) FOR LIMITATIONS:

Per 10 CSR 20-2.010(78), the amount of pollutant each discharger is allowed by the Department to release into a given stream after the Department has determined total amount of pollutant which may be discharged into the stream without endangering its water quality. Water quality based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's Technical Support Document For Water Quality-based Toxics Control (TSD) (EPA/505/2-90-001).

- ✓ Not applicable; water quality limitations were not applied in this permit.

WATER QUALITY STANDARDS:

Per 10 CSR 20-7.031(4), General Criteria shall be applicable to all waters of the state at all times, including mixing zones. Additionally, 40 CFR 122.44(d)(1) directs the Department to include in each NPDES permit conditions to achieve water quality established under Section 303 of the CWA, including state narrative criteria for water quality.

WHOLE EFFLUENT TOXICITY (WET) TEST:

Per 10 CSR 20-7.031(1)(FF), a toxicity test conducted under specified laboratory conditions on specific indicator organism; and per 40 CFR 122.2, the aggregate toxic effect of an effluent measured directly by a toxicity test. A WET test is a quantifiable method of determining if a discharge from a facility may be causing toxicity to aquatic life by itself, in combination with, or through synergistic responses when mixed with receiving water.

- ✓ Not applicable: At this time, permittees are not required to conduct a WET test. This permit is for stormwater only.

PART IV – EFFLUENT LIMITATIONS DETERMINATION

EPA Construction General Permit (CGP)

The CGP was used to research and support best professional judgment decisions made in establishing technology-based conditions for this general permit which are consistent with national standards. The permit writer determined the standards established by the CGP are achievable and consistent with federal regulations. Additionally, the conditions reflecting the best practicable technology currently available are utilized to implement the ELG.

In this general permit, technology-based effluent conditions are established through the SWPPP and BMP requirements. Effective BMPs should be designed on a site-specific basis. The implementation of inspections provides a tool for each facility to evaluate the effectiveness of BMPs to ensure protection of water quality. Any flow through an outfall is considered a discharge. Future permit action due to permit modification may contain new operating permit terms and conditions which supersede the terms and conditions, including effluent limitations, of this operating permit.

PART V–REPORTING REQUIREMENTS

SAMPLING:

The permittee is not required to sample stormwater under this permit. The Department may require sampling and reporting as a result of illegal discharges, compliance issues related to water quality concerns or BMP effectiveness, or evidence of off-site impacts from activities at the facility. If such an action is needed, the Department will specify in writing the sampling requirements, including such information as location and extent. If the permittee refuses to perform sampling when required, the Department may terminate the general permit and require the facility to obtain a site-specific permit with sampling requirements.

REPORTING:

There are quarterly reporting requirements for MO-R100xxx land disturbance permits. Project specific information is required to be report to the Department through the eDMR system.

PART VI – RAINFALL VALUES FOR MISSOURI & SURFACE WATER BUFFER ZONES

Knowledge of the 2-year, 24-hour storm event is used in this permit for two main reasons:

- 1) The design, installation, and maintenance of effective erosion and sediment controls to minimize the discharge of pollutants.
- 2) If the seven-day inspection frequency is utilized, an inspection must occur within 48 hours after any storm event equal to or greater than a 2-year, 24 hour storm has ceased.

For site-specific 2-year, 24-hour storm event information utilize the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 (NOAA Atlas 14) which is located at https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html. For more information visit; https://www.weather.gov/media/owp/oh/hdsc/docs/Atlas14_Volume8.pdf.

Surface Water Buffer Zones: In order to design controls that match the sediment removal efficiency of a 50-foot buffer, you first need to know what this efficiency is for your site. The sediment removal efficiencies of natural buffers vary according to a number of site-specific factors, including precipitation, soil type, land cover, slope length, width, steepness, and the types of erosion and sediment controls used to reduce the discharge of sediment prior to the buffer. For additional information; https://www.epa.gov/sites/default/files/2017-02/documents/2017_cgp_final_appendix_g_buffer_reqs_508.pdf

PART VII – ADMINISTRATIVE REQUIREMENTS

On the basis of preliminary staff review and applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the permit. The proposed determinations are tentative pending public comment.

PUBLIC MEETING:

The department hosted three public meetings for this permit. The meetings were held on January 27, February 17, and March 9, 2021.

PUBLIC NOTICE:

The Department shall give public notice when a draft permit has been prepared and its issuance is pending. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest or because of water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and facility must be notified of the denial in writing.

The Department must give public notice of a pending permit or of a new or reissued Missouri State Operating Permit. The public comment period is a length of time not less than thirty (30) days following the date of the public notice, during which interested persons may submit written comments about the proposed permit.

For persons wanting to submit comments regarding this proposed permit, please refer to the Public Notice page located at the front of this draft permit. The Public Notice page gives direction on how and where to submit appropriate comments.

- ✓ The Public Notice period for this permit is started March 25, 2022 and ended April 25, 2022. Two comment letters were received.

DATE OF FACT SHEET: 03/2/2022

COMPLETED BY:

SARAH WRIGHT

MS4 & LAND DISTURBANCE PERMITTING COORDINATOR

MISSOURI DEPARTMENT OF NATURAL RESOURCES

WATER PROTECTION PROGRAM

OPERATING PERMITS SECTION - STORMWATER AND CERTIFICATION UNIT

(573) 526-1139

Sarah.wright@dnr.mo.gov, dnr.generalpermits@dnr.mo.gov

SECTION 01580 – PROJECT SIGNS

PART 1 - GENERAL

1.01 SUMMARY

- A. Contractor shall provide all material, labor and equipment necessary for the fabrication, printing and installation of Project signs.
- B. This section covers project sign requirements for all Kansas City, Missouri - Water Services Department projects. Project sign requirements include the following:
 - 1. Project identification sign description.
 - 2. Project sign installation.
 - 3. Maintenance and removal of Project sign.
 - 4. Printing of signs.
 - 5. Installation of signs.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Drawings.

1.03 RELATED SECTIONS

- A. Section 01015 – Specific Project Requirements.
- B. Section 01300 – Submittals.
- C. Section 01581 – Public Communications.

1.04 INFORMATION PROVIDED BY THE CITY

- A. City shall provide the graphic design templates of the Project sign in an electronic format to be used in the printing process.

1.05 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Shop Drawings (not used).
- C. Product Data (not used).
- D. Samples.
- E. Other:
 - 1. Project Sign Locations – submit for review and approval a map of the Project area of marked up Drawings showing the location and orientation of each project sign.
 - 2. Submit for review and approval notifications to homeowners and business adjacent to the location of the Project signs.
 - 3. Re-use of Placards – if the Contractor has salvaged placards from previous projects, they may be re-used if approved by the City. Submit color photographs that accurately show the condition of each placard to be re-used for review and approval.
 - 4. Notice of Removal – submit written notification to City that all Project signs have been removed.

PART 2 - PRODUCTS

2.01 PRINTERS

- A. A list of printing companies that have previous experience with printing signs for the City are included in Section 01015 – Specific Project Requirements.

2.02 FRAME

- A. Metal frame and hardware shall be in conformance with Water Services standard detail D-20142 – Installation Detail for Project Signs (see Figure 3).

2.03 PLACARDS

- A. Upper Placard Size – 6 feet wide by 4 feet tall.
- B. Lower Placard Size – 6 feet wide by 1 foot tall.
- C. Material – Coroplast® corrugated plastic sheeting or approved equal.
- D. Sheeting Thickness – ½ inch.
- E. Sheeting Color – white.
- F. Print Method – direct to Coroplast® with outdoor UV laminate coating.

2.04 PLACARD CONTENT

- A. Construction Phase Upper Placard – for each Project sign the Contractor shall provide an upper placard which will be displayed through construction. An example of the Construction Phase Upper Placard is shown in Figure 1.
- B. Post-Construction Phase Upper Placard – for each Project sign the Contractor shall provide an upper placard which will be displayed post construction. An example of the Construction Phase Upper Placard is shown in Figure 2.
- C. Lower Placard – for each Project sign, the Contractor shall provide a lower placard. Examples of the Lower Placard are shown in Figures 1 and 2.
- D. The City will provide digital files for all placards and graphic images.

2.05 NUMBER OF SIGNS TO BE PROVIDED

- A. The number of project signs to be provided is defined in Section 01015 – Specific Project Requirements. Each Project sign includes the following:
 - 1. One (1) Construction Phase Upper Placard to be displayed during construction.
 - 2. One (1) Post-Construction Phase Upper Placard to be displayed after completion of the Work.
 - 3. One (1) Lower Placard to be displayed during construction and post-construction.
 - 4. Printing of placards.
- B. Frame as shown in Water Services standard detail D-20142 – Installation Detail for Project Signs (see Figure 3).

PART 3 - EXECUTION

3.01 INSTALATION AND PLACEMENT OF SIGNS

- A. Installation – Project signs shall be fabricated and installed in accordance with Water Services standard detail D-20142 – Installation Detail for Project Signs (see Figure 3).

- B. Location – Project signs shall be located within the Site as defined by Section 00700 General Conditions. Project signs shall be erected in a conspicuous place but shall not interfere with the vision of pedestrian or vehicular traffic such as to create a hazard. Signs shall be located in the public right of way or in an easement acquired for the Project. Locations of the signs shall be coordinated with the City prior to installation and submitted accordance with paragraph 1.05 SUBMITTALS.
- C. Notifications – the Contractor shall notify any homeowners or businesses adjacent to the location of the signs at least three (3) days prior to erecting signs.
- D. Project sign(s) shall be erected not less than two (2) days before the start of construction activities. No construction activities are allowed until the Project signs are erected.
- E. Project signs shall remain in place for the duration of the Project and shall be maintained in a true, plumb and neat condition.

3.02 REPLACEMENT OF UPPER PLACARDS

- A. Upon completion of the Work and at the direction by the City, the Contractor shall remove the Construction Phase Upper Placard (Figure 1) on all Project signs and replace them with the Post-Construction Upper Placard (Figure 2).
- B. The Lower Placards are to remain in place.

3.03 REMOVAL OF PROJECT SIGNS

- A. All Project signs shall be maintained for thirty (30) calendar days after completion of the Work or as otherwise directed by the City.
- B. Contractor shall remove all Project signs and restore the area disturbed by construction activities.
- C. Project signs shall be removed from the Project areas and will become property of the Contractor.
- D. The Contractor may dispose of Project signs or salvage and reuse them on future City projects. The City will assess the condition of the signs and determine the appropriateness of reuse.
- E. Within three (3) days of the removal of signs, Contractor shall provide the City written notice that all Project signs have been removed from the Site.



Figure 1 – Example Construction Phase Upper Placard and Lower Placard



Figure 2 – Example Post-Construction Phase Upper Placard and Lower Placard

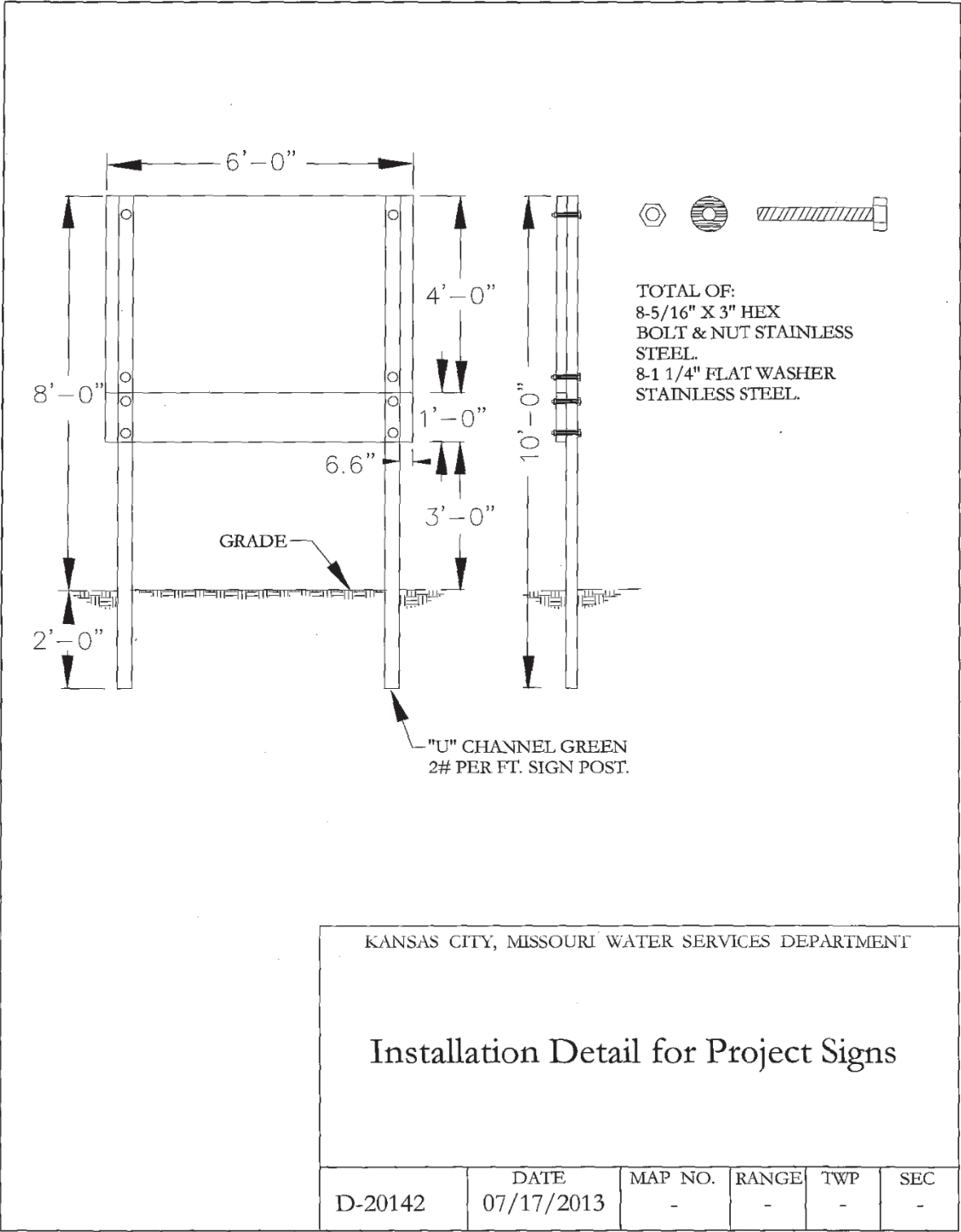


Figure 3 – Installation Detail for Project Signs

END OF SECTION

SECTION 01581 – PUBLIC COMMUNICATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section covers communication procedures between the contractor and the public affected by construction activities.
- B. Any time the contractor is acting on behalf of the City to perform work, the communications material between the contractor and the public shall adhere to these technical standards and is subject to review and approval by the City.

1.02 RELATED SECTIONS

- A. Section 00700 – General Conditions:
 - 1. Article 6, paragraph 6.14 – Safety and Protection.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01300 – Submittals.

1.03 DEFINITIONS

- A. Affected Properties – homeowners, businesses, tenants or other entities whose everyday activities could be affected by the work.

1.04 INFORMATION PROVIDED BY THE CITY

- A. The City will provide the contractor with an electronic file for mailing communications to affected property owners for the purpose of Project communications.
- B. The City will provide the contractor with an electronic copy of approved communications templates to be distributed to affected properties.

1.05 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Notifications – Submit for review and approval all notification materials developed by the Contractor that are to be distributed to affected properties.

1.06 PUBLIC MEETINGS

- A. Description – The contractor shall attend and participate in public meetings held for the project. The contractor's project manager shall attend and present project details. These details include, but are not limited to, the following:
 - 1. Project schedule.
 - 2. Project phasing.
 - 3. Disruptions to the neighborhood.
 - 4. Work hours.
 - 5. Temporary restoration efforts.
 - 6. Final restoration efforts.
 - 7. Field contact information.
- B. The City will provide a location, date and time of the meeting and will facilitate the meeting.
- C. See Section 01015 – Specific Project Requirements for additional meeting requirements.

1.07 DOOR HANGERS AND OTHER PRINTED COMMUNICATIONS

- A. Description – Door hangers and other printed communications (fact sheets, post cards, signs, etc.) used throughout construction shall be distributed to inform homes and businesses of disruptions.
- B. Templates – The City will provide templates for door hangers and other printed communications in an electronic format. See Figures 1 through 5 for an example door hanger.
- C. Template Modification – The contractor may need to annotate the printed door hangers with project specific information. This effort may include describing the work and adding applicable date and time information for the benefit of the resident.
- D. Review communications material – Review and approval of the communication materials by the City is required prior to the contractor's distribution of materials.
- E. Printing and Reproduction – The contractor shall print door hangers, mailers and all other communication materials needed for the project.
- F. Distribution List – The list of affected property owners will be provided by the City.
- G. Mailing and Distribution – The contractor shall distribute the door hangers and other printed communications to the affected property owners. Door hangers are to be hand-delivered and not placed in the mailbox. All other printed communications will be delivered in a manner acceptable to the City.
- H. Costs – All costs to develop, reproduce, deliver or mail notifications shall be included in the contractor's lump sum bid price.

1.08 NOTIFICATION OF UTILITIES

- A. Notify utilities in accordance with Section 00700 – General Conditions, Article 6.

1.09 NOTICES TO PROPERTY OWNERS AND AUTHORITIES

- A. As provided in Section 00700 - General Conditions, Article 6, the Contractor shall notify adjacent property owners and utilities when execution of the work may affect them.
- B. Work Notice:
 - 1. General notice to affected property owners in advance of the work. Notice is required for any work within an easement. Notice shall be given for work within the City's right-of-way, outside of the street.
 - 2. Type of notification shall be a door hanger.
- C. Denial of Access:
 - 1. Notice for when it is necessary to temporarily deny access to property, driveway, sidewalk or other facility.
 - 2. Type of notification shall be a door hanger.
- D. Smoke Testing:
 - 1. Notice for when the Project involves smoke testing.
 - 2. Type of notification shall be a door hanger.
- E. Utility Service Interruption:
 - 1. Notice for when any utility service connection must be interrupted.
 - 2. Type of notification shall be a door hanger.
- F. Street Closures and Changes to Traffic Patterns:
 - 1. Notices to utilities and other concerned agencies prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines.
 - 2. Provide any additional notifications required by the traffic control permit.
 - 3. Type of notification will be written communication prepared and distributed by the Contractor.

- G. Schedule – Notices shall be received by the affected properties no less than two (2) and no more than seven (7) calendar days prior to the work, denial of access, smoke testing, utility service interruption, street closures and changes to traffic patterns or other work that may require notification.

1.10 OTHER COMMUNICATIONS

- A. See Section 01015 – Specific Project Requirements for additional communication requirements not specifically included herein or otherwise required by the Contract Documents.

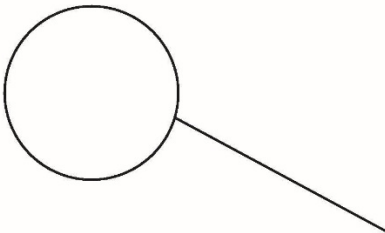
PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

See example templates on pages 4-9.



PROPERTY ACCESS TEMPORARILY RESTRICTED

A KC Water contractor is conducting important infrastructure work at or near your home or business that will require temporary closure of your driveway, sidewalks, or other.

Date(s) of closure: _____


From _____ **to approximately** _____

QUESTIONS:


Contractor supervisor: _____

Phone or text: _____

We greatly appreciate your patience and cooperation.
Thank you for your support as we continue to improve critical infrastructure in your neighborhood and throughout Kansas City.

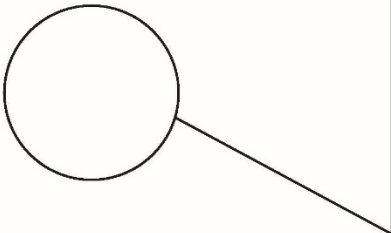


KCWATER
www.kcwater.us



KCW-SC-001 (Rev. 11/19)

Figure 1 – Restricted Access Door Hanger



PIPELINE SMOKE TESTING

A KC Water contractor will be testing sewers in your neighborhood that will include a pipeline smoke test.

Date(s) of smoke testing: _____

From _____ **to approximately** _____

The contractor will blow a non-toxic, non-staining, odorless smoke into sewer lines in order to identify breaks or defects. The smoke is white to gray in color, creates no fire hazards, and is not harmful to pets or humans.


In the unlikely event smoke enters your structure, you can speed dissipation by opening windows and doors. Also, please notify on-site technicians or their supervisor.

QUESTIONS:


Contractor supervisor: _____

Phone or text: _____

We greatly appreciate your patience and cooperation.
Thank you for your support as we continue to improve critical infrastructure in your neighborhood and throughout Kansas City.

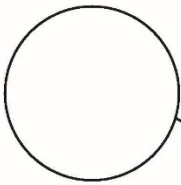


KCWATER
www.kcwater.us



KCW-SC-002 (Rev. 11/19)

Figure 2 – Smoke Testing Door Hanger



TRAFFIC TEMPORARILY INTERRUPTED

A KC Water contractor working in your neighborhood must temporarily close streets or portions of streets near your home or business in order to complete important utility improvements or repairs.

Duration of traffic interruption: _____

From _____ **to approximately** _____


Please follow detour and lane changes, observe barriers and traffic cones, and drive safely and attentively, especially near work crews.


QUESTIONS:

Contractor supervisor: _____

Phone or text: _____

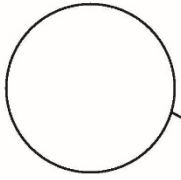
We greatly appreciate your patience and cooperation.
Thank you for your support as we continue to improve critical infrastructure in your neighborhood and throughout Kansas City.

**KCWATER**
www.kcwater.us



KCW-SC-003 (Rev. 11/19)

Figure 3 -Traffic Interruption Door Hanger



WASTEWATER SERVICE TEMPORARILY INTERRUPTED

A KC Water contractor working in your neighborhood must temporarily shut off wastewater service to your home or business in order to complete important utility improvement or repairs.

Date of shut down: _____


From _____ **to approximately** _____


QUESTIONS:

Contractor supervisor: _____

Phone or text: _____

We greatly appreciate your patience and cooperation.
Thank you for your support as we continue to improve critical infrastructure in your neighborhood and throughout Kansas City.

**KCWATER**
www.kcwater.us



KCW-SC-004 (Rev. 11/19)

Figure 4 – Wastewater Service Interruption Door Hanger

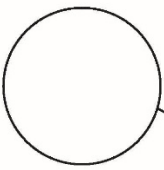


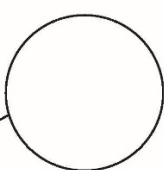


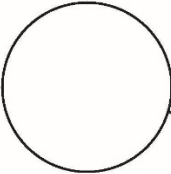
<div></div> <div><h3>WATER SERVICE TEMPORARILY INTERRUPTED</h3><p>A KC Water contractor working in your neighborhood must temporarily shut down water service to your home or business in order to complete important utility improvements or repairs.</p><p>Date of shut down: _____</p><p>From _____ to approximately _____</p><p>The water main will be flushed and tested after the repair is completed. After water service is resumed, you may experience some cloudy or discolored water. If this occurs, open all taps and let them run for 10 or 15 minutes. Screen, aerators, or other filters should be removed, cleaned and left off while running the water.</p><p>QUESTIONS:</p><p>Contractor supervisor: _____</p><p>Phone or text: _____</p><p>We greatly appreciate your patience and cooperation. Thank you for your support as we continue to improve critical infrastructure in your neighborhood and throughout Kansas City.</p><div>KCWATER www.kcwater.us</div></div> <div><div>KCW-SC-005 (Rev. 2/20)</div></div>	<div></div> <div><h3>SERVICIO DE AGUA TEMPORALMENTE INTERRUMPIDO</h3><p>Un contratista de KC Water trabajando en su vecindario tendrá que interrumpir el servicio de agua en su residencia o negocio temporalmente para completar importantes mejoras o reparaciones.</p><p>Fecha de interrupción: _____</p><p>De _____ Hasta _____</p><p>La tubería de agua será drenada y probada después de completar la reparación. Después de que el servicio de agua sea restaurado, puede haber agua descolorada o nublada. Si esto sucede, abra todas las llaves (grifos) y deje correr el agua por 10 o 15 minutos. Cualquier tipo de filtro debe ser removido, limpiado y dejado por fuera mientras el agua corre.</p><p>PREGUNTAS:</p><p>Supervisor Contratista: _____</p><p>Teléfono o texto: _____</p><p>Apreciamos enormemente su paciencia y cooperación. Gracias por su apoyo mientras continuamos implementando y actualizando infraestructura crucial en su vecindario y a través Kansas City.</p><div>KCWATER www.kcwater.us</div></div> <div><div>KCW SC 005 (Rev. 2/20)</div></div>
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Figure 5 – Water Service Interruption Door Hanger



UTILITY WORK IN YOUR AREA

A KC Water contractor working in your neighborhood soon will be conducting important infrastructure work at or near your home or business.

Date(s) of work: _____

From _____ **to approximately** _____


Construction equipment will be used and may create noise and dusty conditions. Any disruption of lawns, landscaping, driveways, or sidewalks will be restored after this necessary work is completed.

QUESTIONS:


Contractor supervisor: _____

Phone or text: _____

We greatly appreciate your patience and cooperation.
Thank you for your support as we continue to improve critical infrastructure in your neighborhood and throughout Kansas City.



KCWATER
www.kcwater.us



KCW-SC-006 (Rev. 11/19)

Figure 6 – Work Notice Door Hanger

CITY OF FOUNTAINS
HEART OF THE NATIONKANSAS CITY
MISSOURI

SUBSTITUTION REQUEST

Project Number _____

Project Title _____

To: _____

Authorization Number: _____

Re: _____

From: _____

Date: _____

Contract For: _____

Specification Title: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone No. _____

Trade Name: _____ Model No. _____

Installer: _____ Address: _____ Phone No. _____

History: ☐ New Product ☐ 2-5 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

☐ Point-by-point comparative data attached – REQUIRED

Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance, service, and availability of replacement parts, as applicable, are available.
- Proposed substitution will not affect or delay Progress Schedule, except as stated below.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances, except as stated below.
- Payment will be made for changes to building design, including architectural or engineering design, detailing, licenses, royalties, and construction costs caused by the requested substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be completed in all respects.

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Design Professional: _____

Address: _____ Owner: _____

Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

Savings to Owner for accepting substitution: _____

Proposed substitution changes Contract Time: ☐ No ☐ Yes; add/deduct _____ days.

Supporting Data Attached:

☐ Product Data ☐ Drawings ☐ Tests ☐ Reports ☐ Samples ☐ _____

Attachments: _____

Submitted by: _____

Signature: _____

Firm: _____

Address: _____

Telephone: _____ Fax: _____ E-Mail: _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ DP ☐ _____

DESIGN PROFESSIONAL'S REVIEW AND ACTION

- ☐ Substitution approved – Make submittals in accordance with Specification Section 01300.
- ☐ Substitution approved as noted – Make submittals in accordance with Specification Section 01300.
- ☐ Substitution rejected – Use specified materials.
- ☐ Substitution Request received too late – Use specified materials.

Signed by: _____ Date: _____

- Distribution:
- ☐ Owner
 - ☐ Design Professional
 - ☐ Contractor
 - ☐ Consultant
 - ☐ Construction Manager
 - ☐ Other

SECTION 01700 – TRAFFIC CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. The Contractor shall provide all materials, labor and equipment (including permits, barricades, cones, drums, construction warning signs, flagmen incidental devices) to protect, warn and guide: vehicular traffic, pedestrian traffic and to protect his personnel and equipment on the site. This specification applies to work being done in conjunction with capital projects and not emergencies or other maintenance related activities.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements, or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. Section 01000 – General Project Requirements.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01300 – Submittals.
- D. Section 01581 – Public Communications.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications referred to within the specification are by the basic designation only.
- B. American Traffic Safety Services Association (ATSSA).
- C. “City of Kansas City, Missouri Public Works Department Construction and Material Specifications” (<http://kcmo.gov/>) (KCMO PW 2305 - Traffic Control – Pedestrian Traffic Control and Sidewalk Closure.)
- D. Manual on Uniform Traffic Control Devices (MUTCD).
- E. MODOT traffic control and regulations and permits.

1.05 DEFINITIONS

- A. City Block – A segment of a street or roadway between two intersections.
- B. Working Hours – The Contractor must conduct construction operations in compliance with the City of Kansas City, Missouri Code of Ordinances, Chapter 46 – NOISE CONTROL which generally defines normal working hours as 7:00 am to 6:00 pm on weekdays. Working hours also include any time period approved in writing by the City (see Section 01000 – General Project Requirements, paragraph TEMPORARY ENVIRONMENTAL PROTECTION).
- C. Non-Working Hours – Any period of time not defined as Working Hours.
- D. Public Works Department – The City of Kansas City, Missouri - Public Works Department.
- E. Traffic Control Supervisor – The qualified employee of the Contractor designated to have overall responsibility of the implementation of the Traffic Control Plan, conformance to the Traffic Control Permit and maintenance of traffic control devices.

- F. Work Zone – An area of active construction activity along a single street that causes temporary disruption to pedestrian traffic, vehicular traffic, access to properties, or on-street parking.
- G. Extended Work Zone – Any work that encompasses more than one city block or street.

1.06 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Shop Drawings:
 - 1. Not applicable.
- C. Product Data:
 - 1. Not applicable.
- D. Samples:
 - 1. Not applicable.
- E. Other Submittals:
 - 1. Traffic Control Plan(s):
 - (a) Submit plan(s) directly to the Public Works Department for review and approval as required for permitting. Approval of the traffic control plan is required prior to submitting permit applications.
 - (b) Submit the final, approved plan(s) in accordance with Section 01300 – Submittals for informational purposes only.
 - (c) Submit changes or revisions to the plans(s) as required by the City’s Traffic Control Permit.
 - (d) Submit changes or revisions to the Traffic Control Plan necessary for construction phasing.
 - 2. Traffic Control Permit – submit a copy of the traffic control permit upon approval from the Public Works Department.
 - 3. Traffic Control Supervisor:
 - (a) Submit name, qualifications and contact information in accordance with Section 01300 – Submittals.
 - (b) Submit name, qualifications and contact information directly to the Public Works Department.
 - 4. Public Works Department standard specifications.
 - 5. Public Works Department standard details.
 - 6. Maintenance records of traffic control devices.

1.07 GENERAL

- A. When the requirements of this section conflict with the requirements of the approved Traffic Control Permit, then the requirements of the Traffic Control Permit shall govern. In all instances, the Contractor shall comply with all KCMO ordinances.
- B. The Contractor shall maintain access for pedestrians, vehicles and all properties served by the streets and sidewalks within the site.
- C. All work shall be coordinated through the City of Kansas City, Missouri - Public Works Department.
- D. Coordination of the traffic control permit shall be conducted during normal business hours (8:00 am through 5:00 pm).

1.08 SPECIFIC PROJECT REQUIREMENTS

- A. Specific traffic control requirements are provided in Section 01015 - Specific Project Requirements.

1.09 RESPONSIBILITY

- A. The Contractor shall designate a Traffic Control Supervisor having the responsibilities defined in paragraph DEFINITIONS.
- B. The Traffic Control Supervisor's name, contact information and qualifications shall be submitted to the City prior to the preconstruction conference.
- C. The Traffic Control Supervisor's name and contact information shall be submitted to the Public Works Department as required by the Traffic Control Permit. The contact information provided shall allow the City (Public Works Department) to contact the Traffic Control Supervisor during both working and non-working hours. This information shall be submitted with the application for the Traffic Control Permit and in accordance with paragraph SUBMITTALS.

1.10 SUBMITTAL OF STANDARD DETAILS AND SPECIFICATIONS

- A. The Contractor shall obtain a copy of all Public Works Department's standard specifications and details to be used as part of the project. Copies shall be submitted in accordance with paragraph SUBMITTALS.

1.11 ACCESS REQUIREMENTS

- A. Unless otherwise stated in Section 01015 – Specific Project Requirements, the Contractor shall maintain access for pedestrians and vehicles to all properties served by streets and sidewalks affected by the Work.
- B. Special Restrictions for Extended Work Zones:
 - 1. A maximum of two (2) consecutive city blocks shall be under construction at any one time.
 - 2. Where construction activities cause disruption (i.e. sidewalk closures and/or temporary restriction of on-street parking) to two (2) consecutive city blocks, the following restrictions shall apply:
 - (a) At a minimum, pedestrian access shall be maintained on one side of the street only if work can be completed in less than 15 days. Sidewalk closures shall be limited and temporary facilities shall be provided as necessary to allow pedestrian access to all occupied properties affected by construction activities.
 - (b) If more than one (1) city block is affected by construction, then construction activities shall be conducted so that on-street parking is maintained on at least one side of the street, on one of the city blocks affected. That is, if on-street parking is eliminated within a city block, the adjacent city block (along the same street) must provide at least on-street parking on one side.
 - (c) If a sidewalk will need to be closed more than 15 days, advance approval of the Bike Pedestrian Advisory Committee is required. If a sidewalk closure is planned for more than 15 days in the Greater Downtown Area Plan region, advance approval is required from the Parking and Transportation Commission.
- C. Access to adjacent properties served by the street(s) within the project shall be maintained at all times.
- D. Traffic shall move through the construction site in accordance with the Traffic Control Permit.
- E. When required, flaggers shall coordinate the movement of traffic through the construction site.

- F. Temporary Restoration of Access during Non-Working Hours:
 - 1. All roadways shall be re-opened to traffic in accordance with the Traffic Control Permit or to normal operating conditions (whichever applies) at the end of each work day.
 - 2. No construction related equipment or material shall be on the roadway outside of normal working hours unless approved by the City (see Section 01000 – General Project Requirements, paragraph CONSTRUCTION SITE PLAN).

1.12 TRAFFIC CONTROL PLAN(S)

- A. Unless otherwise indicated on the Drawings or in Section 01015 – Specific Project Conditions, the Contractor shall be responsible for the development and implementation of the Traffic Control Plan necessary to obtain a Traffic Control Permit(s).
- B. All costs associated with development, revision or finalization of Traffic Control Plan(s) shall be included in the Contractor's Bid.
- C. General Traffic Control requirements shall include but are not limited to the following:
 - 1. MUTCD requirements shall be maintained on all traffic control plan submittals.
 - 2. Plans shall clearly identify all traffic control devices to be placed including the location, spacing and other pertinent data required for the traffic control plan reviews.
 - 3. Plan reviews and resubmittal reviews should be scheduled to be completed with at least two (2) weeks for City staff review on standard traffic control plan submittals. This time may be extended if the plan is complex or of a large volume.
 - 4. All street typologies listed on the Major Street Plan (<https://www.kcmo.gov/city-hall/departments/city-planning-development/other-city-plans>) will be required to maintain a minimum of one twelve foot (12') lane in each direction for traffic at all times.
 - 5. Limited closures on street typologies listed on the Major Street Plan may be allowed but will likely be limited to weeknights and/or weekend work depending on the location of the proposed closure. Full closures may not be possible in some areas of the City.
 - 6. Electronic Message Boards will be required as part of the communication plan for all lane closures or restrictions on street typologies listed on the Major Street Plan. These signs will need to be in place at least one (1) week prior to the lane closure or restriction and will need to be maintained throughout the closure duration.
 - 7. Closures in and adjacent to the Streetcar Corridor will be required to have a Track Access Permit.
 - 8. Residential street traffic control plans will be developed in a way to allow safe travel and maintain access to all properties adjacent to and in the area of the traffic control area.
 - 9. The Contractor is required to maintain the road surface condition on the haul route to the condition that existed at the time of permit issuance. All damage to the pavement on the haul route caused by the contractor shall be repaired by the contractor at no additional cost to the City.

1.13 TRAFFIC CONTROL PERMIT(S)

- A. The Contractor shall not submit Traffic Control Permit applications until the traffic control plan has been approved by the Public Works Department.
- B. The Contractor shall obtain a Traffic Control Permit before any construction activity occurs on any City street. Permits shall be obtained and submitted in accordance with Section 01300 – Submittals shall be made no less than two (2) weeks in advance of the construction activity.
- C. Specific requirements and the application for Traffic Control Permit can be downloaded from the City's web site at <http://kcmo.gov/>.
- D. The associated permit fees, which may be time and street-type-dependent, are to be obtained from the Public Works Department.
- E. All residential, arterial and collector streets require a separate permit and are subject to peak hour restrictions.
- F. All costs associated with the Traffic Control Permit(s) shall be included in the Contractor's Bid.

1.14 NOTIFICATIONS

- A. Advance notification of affected property owners shall be done in accordance with Section 01581 – Public Communications.
- B. Electronic Message Boards are required at least one (1) week in advance of any arterial street closure(s).

PART 2 - PRODUCTS

2.01 TRAFFIC CONTROL DEVICES

- A. All traffic control devices shall conform to Part 6 of the "Manual on Uniform Traffic Control Devices" (MUTCD).
- B. No substitutions for the devices required by MUTCD or changes in the methods of traffic control as outlined herein will be allowed without written approval of the Director of Public Works or their designee.

PART 3 - EXECUTION

3.01 SAFETY PRECAUTIONS

- A. Contractor shall take any and all precautions to guard against injury to persons or damage to property until final acceptance of the work by the City or their representative.
- B. Precautions shall include, but not limited to, protection of vehicular and pedestrian traffic from injury or damage due to open excavations, operation of construction equipment, materials storage, etc. by the proper placement of appropriate safety devices.
- C. The Contractor shall maintain the safety devices and maintain their proper placement throughout the required period.
- D. Construction practices shall be followed that will eliminate all safety hazards.
- E. The roadway shall be kept clean and free of construction related debris at all time.

3.02 DEVICE INSTALLATION AND MAINTENANCE

- A. Traffic control devices shall be installed and maintained in accordance with KCMO Specification 2305 with the exception that the paragraphs for Method of Measurement and Basis for Payment do not apply.
- B. The Contractor shall maintain records of any maintenance required and the date on which it was completed. These records shall be maintained for the duration of the project and submitted in accordance with paragraph SUBMITTALS on a monthly basis.
- C. The contractor's designated Traffic Control Supervisor shall make regular workday inspections of the traffic control devices installed as part of Work.
- D. It shall be the Contractor's responsibility to maintain all traffic control devices in proper working condition and placement at all times.
- E. The Contractor shall immediately correct any deficiencies in traffic control.
- F. Any traffic control device not in use shall be covered, removed, or turned away from the view of oncoming traffic.

3.03 CHANGES TO THE TRAFFIC CONTROL PLAN

- A. Whenever the work area changes, all construction warning signs and traffic channelization devices shall be made current.
- B. The Public Works Department reserves the right to adjust or revise the traffic handling requirements as necessary after construction on the project has started. These changes will be determined based on periodic inspections throughout the duration of the project by both the Water Services and Public Works inspection staff.
- C. Notice of such change will be transmitted to the Contractor and it shall be the Contractor's responsibility to make the necessary changes as soon as practicable, but no more than one (1) calendar day, after receipt of the notification. Immediate changes to the traffic control shall be required in situations that are deemed as a public safety matter by the City representatives.
- D. If the Contractor encounters conditions that would require a change in method of traffic control, the Contractor shall immediately notify the City's representative. At least 48 hours before the start of the proposed change, the City's representative will request approval of the change in method of maintaining traffic from the Public Works Department. The Contractor shall not proceed with the change without the approval of the Public Works Department.

3.04 PEDESTRIAN TRAFFIC CONTROL

- A. Pedestrian traffic control shall conform to KCMO Specification 2305, paragraph Pedestrian Traffic Control.

3.05 VEHICLE PARKING

- A. Parking of construction vehicles, equipment, vehicles of contractor's personnel shall not interfere with public traffic, parking, access by emergency vehicles, or City operations.

3.06 HAUL ROUTES

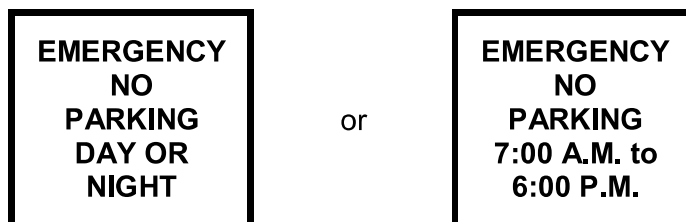
- A. The Contractor shall consult with the City (Water Services Department and Public Works Department) to establish public thoroughfares to be used for haul routes and site access.
- B. Residential streets shall not be used as part of the proposed haul routes.

3.07 EMERGENCY CONDITIONS

- A. Damage to existing utilities during construction of the Project which requires immediate repair may be considered as an emergency and as such may not be subject to all the restrictions contained herein. These shall be reported to Water Services and Public Works immediately. All subsequent emergency traffic control measures or adjustments shall be coordinated with the City representatives.
- B. The Contractor shall immediately contact the utility company whose facilities are involved that may require immediate repair.
- C. Such repair work, once declared an emergency by the utility company, shall be pursued on a continuous (24 hours per day) basis until complete or advanced to such a point that use of the roadway can be returned to normal operation and any subsequent repairs can be completed during regular working hours.
- D. The City reserves the right to determine which utility work will be considered an emergency. Any costs incurred by the Contractor for such emergency utility repair, including the cost of any additional traffic control that may be required, shall be the Contractor's sole responsibility.

3.08 EMERGENCY NO PARKING SIGNS

- A. When it is necessary to eliminate parking on a part of a street to facilitate construction work, the Contractor shall, subject to the approval of the Public Works Department, post "Emergency No Parking" signs.
- B. Signs shall be fabricated with the following dimensions, text sizes and include the follow text:



Placard Height: 24 inches
 Placard Width: 18 inches
 Placard Color: Silver (reflective)

Lettering Height: 3 inches
 Line Spacing: 1.1 inches
 Lettering Color: Red

Border Thickness: 0.625 inches
 Border Margin from Edge of Placard: 0.375 inches
 Border Color: Red

- C. The signs shall be made of aluminum, plastic or plywood panels. Paper or cardboard signs are not allowed.
- D. The signs shall be installed on either steel drive posts or existing utility poles at a height of five (5) feet to the bottom of the sign.
- E. Signs shall be placed on the side of the street where parking is to be eliminated.

- F. The signs are to be installed at the beginning and end of each block and at a maximum of 150-foot intervals in between.
- G. These signs must be installed a minimum of 18 hours and a maximum of 48 hours in advance of the time the Contractor plans to begin work.
- H. The Contractor shall contact the City's representative as soon as the signs are installed. The City's representative will then contact the Public Works Department as soon as the signs are installed, so that a temporary regulation can be written by the Public Works Department and so that the Kansas City, Missouri, Police Department can be notified. The signs cannot be enforced without this notification from the City. The notification to the City must be made by 12 noon for enforcement to be effective the following day.
- I. If there are existing parking signs with a lesser degree of restriction, the Contractor shall install the Emergency No Parking signs as outlined above and shall cover the existing signs with the Emergency No Parking sign or some type of semi-permanent cover (paper and tape will not be accepted).
- J. The Contractor shall immediately remove the Emergency No Parking signs and all semi-permanent sign covers as soon as work on the block has been completed.
- K. If it becomes apparent for any reason that work will cease for more than 72 hours, the same signs and covers shall be removed and must be reinstalled subject to the minimum 18 hours advance-notice before work can proceed.
- L. If work does not begin within 48 hours after the signs are posted, the same procedure must be followed. Failure by the Contractor to abide by all the provisions concerning "Emergency No Parking" signs, shall result in the cancellation of the permit.
- M. The Contractor shall maintain a minimum of one (1) lane of traffic each direction at all times unless otherwise allowed by permit.
- N. The Contractor shall keep residents, schools, businesses, churches and other public entities informed of the work schedule that would interfere with access to their facility. Notification shall be distributed at least 3 weeks in advance of work occurring near a facility.
- O. The Contractor shall coordinate with KCATA, as necessary, on proposed lane closures impacting bus travel routes.

END OF SECTION

SECTION 01900 – CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections of the Contract Documents.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this Section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements, or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. Section 00700 – General Conditions.
- B. Section 00800 – Supplementary Conditions.
- C. Section 01015 – Specific Project Requirements.
- D. Section 01020 – Record Documents.
- E. Section 01300 – Submittals.

1.04 DEFINITIONS

- A. Achievement of Full Operation/Substantial Completion: See Section 00700 – General Conditions, paragraph 1.01.
- B. Substantial Completion: See Section 00700 – General Conditions, paragraph 1.01.

1.05 INFORMATION PROVIDED BY THE CITY

- A. Achievement of Full Operation or Substantial Completion (Section 00700, paragraph 14.04):
 - 1. If applicable, City will provide written notification that the Work does not meet the requirements for Achievement of Full Operation or Substantial Completion
 - 2. Certification of Achievement of Full Operation (Section 01290.12) or Certificate of or Substantial Completion.
 - 3. Written recommendation as to division of responsibilities pending final payment between City and Contractor with respect to security, operation, safety, protection of the Work, maintenance, heat, utilities, insurance and warranties and guarantees.
- B. Partial Utilization (Section 00700, paragraph 14.05):
 - 1. Written request for partial utilization.
- C. Punch list (Section 01290.13).
- D. Final Inspection (Section 00700, paragraph 14.06):
 - 1. Written report of all in which the Final Inspection reveals that the Work is incomplete or defective.

1.06 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Other Submittals:
 - 1. Notification of Achievement of Full Operation or Substantial Complete (Section 00700, paragraph 14.04.A).
 - 2. List of Incomplete Items (Section 00700, paragraph 14.04.A).
 - 3. Notification that the Work is complete and ready for Final Inspection (Section 00700, paragraph 14.06.A).
 - 4. List of Uncompleted Work (paragraph 3.01.C).
 - 5. Certification of Partial Substantial Completion (Section 00700, paragraph 14.05.A.1) if Partial Utilization is requested by City.
 - 6. Closeout Documentation:
 - (a) The following items are required to be submitted prior to the Contractor's application for Final Payment as required by Section 00700 – General Conditions, paragraph 14.07:
 - (i) Maintenance and Operating Instructions.
 - (ii) Schedules.
 - (iii) Guarantees.
 - (iv) Bonds.
 - (v) Certificates or other evidence of insurance.
 - (vi) Certificates of inspection.
 - (vii) Record Documents (Section 01020 – Record Documents).
 - (b) The following items are required to be submitted with the Contractor's application for Final Payment as required by Section 00700 – General Conditions, paragraph 14.07:
 - (i) Contractor Affidavit for Final Payment (Section 01290.14).
 - (ii) Subcontractor Affidavit for Final Payment (Section 01290.15).
 - (c) Authorization to Release a Revenue Clearance Letter (Section 00630).
 - (d) All other documentation necessary for an Application for Progress payment (Section 00700, Article 14).
 - 7. Consent of Surety to Make Final Payment certificate.

PART 2 - PRODUCTS

- A. Not used.

PART 3 - EXECUTION

3.01 ACHEIVEMENT OF FULL OPERATION / SUBSTANTIAL COMPLETION

- A. Refer to Section 00700 – General Conditions, Article 14.
- B. Refer to Section 00800 – (Overflow Control Plan Consent Decree) Supplementary Conditions, paragraph SC-14.04 for additional information to define items of the Work to be included in the definition of Achievement of Full Operation or Substantial Completion.
- C. List of Uncompleted Items: The Contractor shall submit a list of incomplete items that are required for the Work, but not required for Achievement of Full Operations / Substantial Completion. The list shall include a description of the Work, the value of each item, reasons the work is not complete, and a schedule for completion.

- D. The inspection associated with the Achievement of Full Operation / Substantial Completion will be scheduled at a mutually agreed time between the Contractor, Design Professional and the City's Representative.
- E. City will provide a punch list (Section 01290.13) of items that require completion or correction. Items noted on the punch list may not be all-inclusive and the failure to include any items on the list does not alter the responsibility of the Contractor to complete all the Work in accordance with the Contract Documents.
- F. Items identified in the punch list shall be addressed by the Contractor prior to the Final Inspection.

3.02 PARTIAL UTILIZATION

- A. Refer to Section 00700 – General Conditions, paragraph 14.05, Partial Utilization.

3.03 FINAL INSPECTION

- A. Refer to Section 00700 – General Conditions, paragraph 14.06, Final Inspection.
- B. The Final Inspection will be scheduled at a mutually agreed time between the Contractor, Design Professional and City's Representative.
- C. The City will provide the Contractor with the results of the final inspection.
- D. If the Work is incomplete or unacceptable, the City will advise the Contractor of Work that is incomplete or other obligations that have not been fulfilled but are required for final acceptance. The Contractor shall address items that need to be corrected, and then request a re-inspection of the Work.
- E. Re-inspection of the Work:
 - 1. If necessary, the City will re-inspect the Work upon receipt of notice that the Work, including punch list items from the first inspection, has been completed, except for items whose completion is delayed under circumstances acceptable to the City.
 - 2. If necessary, re-inspections will be repeated until all deficiencies have been remedied by the Contractor.
- A. Approval of the Work by the City or Design Professional will not relieve the Contractor of their responsibility under other terms of the Contract.

3.04 FINAL PAYMENT

- A. After Contractor has completed all corrections (after the Final Inspection) to the satisfaction of City, Contractor shall submit the Final Payment request. Refer to Section 00700 – General Conditions, paragraph 14.07, Final Payment.
- B. Documents to be submitted with, or prior to, the application for final payment shall be as required by the Contract Documents. See paragraph 1.06 for a summary.
- C. Authorization to Release a Revenue Clearance Letter: If the Contract exceeds \$160,000 and if Work is performed for a term longer than one (1) year, then in addition to the requirements of Section 00700, the Application for Final Payment shall be accompanied by a clearance letter from the Finance Department, Revenue Division. The Contractor shall keep a copy of all subcontractors' clearance letters in its contract files in accordance with the contract documents. See Section 00630.
- D. For Contracts that include a Green Infrastructure Establishment Period, there will be a Final Payment for the Work associated with construction, and a separate Final Payment for the Work associated with the maintenance of green infrastructure through the establishment period. The Final Payment for Work associated with construction shall exclude the amount for maintenance of green infrastructure indicated in the Schedule of Values.

3.05 LIQUIDATED DAMAGES

- A. If required, liquidated damages shall be assessed in accordance with the Contract Documents. Refer to Section 00700 – General Conditions, paragraph 12.01 and Section 00800. See Supplementary Conditions, paragraph SC-12.01 for additional information.

END OF SECTION

DIVISION II **CONSTRUCTION AND MATERIAL SPECIFICATIONS** **SECTION 2100 CLEARING AND SITE PREPARATION**

Effective this 13 day September of 2021

By Ordinance 210692

KANSAS CITY METROPOLITAN CHAPTER
OF THE AMERICAN PUBLIC WORKS ASSOCIATION

SECTION 2100 CLEARING AND SITE PREPARATION	1
SECTION 2101 CLEARING	1
2101.1 Clearing, Grubbing and Demolition	1
2101.2 Tree Protection	3
2101.3 Vegetative Buffers (Filter Strips)	17
2101.4 Vegetated Stream Buffers.....	19
SECTION 2102 SITE PREPARATION	21
2102.1 Construction Sequence Schedule.....	21
2102.2 Land Grading	21
2102.3 Surface Roughening	24
2102.4 Topsoiling.....	26
2102.5 Temporary Construction Entrance.....	27
2102.6 Construction Details	27
2102.7 Excavation	28
2102.8 Undergrading	29
2102.9 Embankment.....	29
2102.10 Finishing	31
2102.11 Cleanup.....	31
2102.12 Construction Details	31
SECTION 2103 MEASUREMENTS AND PAYMENT.....	41
2103.1 Scope	41
2103.2 General	41
2103.3 Items Not Listed in the Proposal	41
2103.4 Methods of Measurement	41
2103.5 Basis of Payment	42
SECTION 2150 EROSION AND SEDIMENT CONTROL	44
SECTION 2151 GENERAL REQUIRMENTS.....	44
2151.1 Contractor's Responsibilities & Qualifications	44
2151.2 Compliance with Permits.....	44
2151.3 Stormwater Pollution Prevention Plan (SWPPP)	44
2151.4 Inspection and Maintenance of Plan.....	44
SECTION 2152 EROSION CONTROLS (C)	46
2152.1 Seeding and Sodding	46
2152.2 Mulching.....	59
2152.3 Tackifiers, Soil Binders, and Bonded Fiber Matrix.....	61

2152.4	Rolled Erosion Control Products	63
--------	---------------------------------------	----

SECTION 2153 SEDIMENT CONTROLS (P)..... 64

2153.1	Sediment Fence.....	64
2153.2	Sediment Fence Installation Machines	64
2153.3	Super Sediment Fence	64
2153.4	Straw Bale Barrier	65
2153.5	Compost Berm and Tubes	65
2153.6	Log of Wattle Products.....	65
2153.7	Rock Check Dams	66
2153.8	Triangular Silt Dike™	66
2153.9	Geo-Ridge®.....	66
2153.10	Inlet Protection	66
2153.11	Outlet Protection (Energy Dissipation)	69
2153.12	Diversion	69
2153.13	Runoff Conveyance	70
2153.14	Temporary Slope Drain	72
2153.15	Temporary Sediment Trap.....	72
2153.16	Temporary Sediment Basis.....	74
2153.17	Detention/Infiltration Basin	75
2153.18	Temporary Waterway Crossings (Utility and Vehicular).....	75
2153.19	Dewatering	75
2153.20	Turbidity Curtain	75

SECTION 2154 OTHER CONTROLS..... 77

2154.1	Dust Control	78
2154.2	Solid Waste Disposal.....	78
2154.3	Sanitary Waste Disposal.....	78
2154.4	Spill Prevention and Material Management Practice	78

SECTION 2155 MEASUREMENT AND PAYMENT..... 81

2155.1	Scope	81
2155.2	General	81
2155.3	Items not Listed in the Proposal	81
2155.4	Methods of Measurement	82
2155.5	Basis Payment.....	82

TABLES

2101-1	Tree Fertilization for Protection from Construction Activity	10
2151-1	Trouble Shooting Matrix for Erosion, Sediment, and Stormwater Runoff Control in Developing Areas.....	39
2152-1	Temporary Seeding Plan Materials Minimum Seeding Rates.....	41
2152-2	Seeding Dates for Temporary Seeding	41
2152-3	Plant Characteristics	45
2152-4	Species Tolerance for Environmental Conditions	46
2152-5	Optimum and Acceptable Planting Dates.....	47
2152-6	Seeding Rates	48
2152-7	Seeding Mixtures for Critical Areas	49
2152-8	Typical Organic Mulching Materials and Application Rates	54
2154-1	Spray-on Adhesive for Dust Control	70
2155-1	Measurement and Payment.....	75

FIGURES

2101-1 Construction Operations Relative to the Location of Protected Trees 4

2101-2 Fencing and Armoring..... 6

2101-3 Tree Well 7

2101-4 Tree Well Detail 9

2101-5 Tree Well Without Drain Tiles 12

2101-6 Tree Wall Detail 13

2101-7 Trenching vs. Tunneling..... 14

2101-8 Filter Strip..... 17

SECTION 2101 CLEARING

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

ASTM

D638 – Standards Test Method for Tensile Properties of Plastics

D4318 – Method of Test for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

2101.1 CLEARING, GRUBBING, AND DEMOLITION

A. Description:

1. **Clearing:** Clearing shall consist of removing all vegetative matter such as trees, brush, downed timber, and other objectionable materials found on or above the surface of the site. It shall include: removing buildings, fences, and lumber; waste dumps and trash; salvaging of such materials as may be specified; and disposing of the debris as per public entity requirements. Scalping shall include the removal of material such as sod, grass, residue or agricultural crops, and decayed vegetative matter from the surface of the ground without removing more earth than is necessary. Perimeter erosion and sediment controls must be in place before clearing activities occur.
2. **Grubbing:** Grubbing shall consist of removing and disposing of all vegetative matter such as stumps, roots, buried trees, and brush encountered below the surface of the ground or subgrade, whichever is lower, that has not been included in the description of clearing.

In all cases of grubbing, the vegetative matter shall be removed to a minimum depth of 12 inches below ground line or subgrade, whichever is lower, except as provided in the description of demolition and removal.

When deleterious materials are encountered below the ground line which may be detrimental to the proposed improvement, they shall be removed to a depth necessary to provide adequate support for the proposed improvement.

3. **Demolition and Removal:** This work shall consist of demolishing, removing and disposing of all structures and improvements within the construction limits unless included in other items of work as shown on the plans or in the Special Provisions. This work shall apply to all structures and improvements, whether on, above or below the surface of the ground or subgrade.

Demolition and removal shall include but not be limited to items such as buildings, drainage structures, pipes, pavements, fences, retaining walls, guard rails and signs.

Items such as fences and guard rails shall be salvaged and relinquished to the appropriate owner or relocated, where indicated on the plans.

Relocation of signs, fences, guardrails, etc. shall be considered incidental to removal work except where such relocation is listed separately in the Itemized Proposal of the Special Provisions.

All pipes which are to be abandoned shall be removed unless otherwise shown on the plans or approved by the Engineer.

4. **Trees:** Vegetable growth 6 inches (15.24 cm) in diameter and larger, measured 3 feet (91.44 cm) above ground shall be classified as a tree.
5. **Brush:** Vegetable growth less than 6 inches (15.24 cm) in diameter, measured 3 feet (91.44 cm) above ground shall be classified as brush.

B. Construction Specifications:

1. **Limits of Work:** The limits of clearing, grubbing, and demolition shall extend to the construction limits unless otherwise shown on the plans. Clearing should only occur in those areas required for construction within a six month period. Where possible, large projects should be cleared and grubbed as construction progresses. Mass clearing and grubbing should be avoided. An undisturbed strip of not less than 25 feet in width of existing grass or other vegetation should be kept in place around the perimeter of the construction site, where possible, and protected from damage. The Contractor shall scalp only those excavation and embankment areas necessary for construction of the project.

Existing structures within or adjacent to the construction limits which are not to be removed or demolished shall be protected by the Contractor during construction. Any private facilities, such as house sewer laterals, that are disturbed or damaged by the Contractor's work shall be repaired by the Contractor prior to the close of the workday. This repair shall be made in a manner sufficient to restore utility service to that property.

Perimeter Erosion and Sediment Controls: Perimeter controls will be put in place prior to the start of clearing and grubbing of the site. It is possible some clearing and grubbing will need to be done to accommodate the installation of some perimeter controls.

2. **Embankment Areas:** Where undisturbed stumps and roots are encountered where the fill depth will exceed 3 feet, the stumps and roots may be left in place provided they do not extend more than 3 inches above the original ground line.
3. **Borrow Areas:** All stumps, roots, and other objectionable matter shall be removed from the borrow material used for embankment or fill. The borrow area shall be left in a well drained and smooth condition.
4. **Backfilling the Site:** All trenches, holes, pits, and basement areas resulting from clearing, grubbing, demolition, or removal on the site shall be backfilled with suitable material placed and compacted in conformance with Section 2101.2.

5. **Disposal of Materials:** All materials, with the exception of those that are designated for salvage or embankment, shall become the Contractor's property and shall be disposed of by the Contractor, outside the project limits.
6. **Items to be Left in Place:** In removing concrete pavements, curbs, curb and gutter, sidewalks and similar objects where portions of these objects are to be left in place, they shall be removed to an existing or new joint and saved to a minimum depth of 2 inches or $\frac{1}{4}$ the slab thickness, whichever is greater. The joint shall be to true line and vertical face. Sufficient portions of these items shall be removed to provide the proper grade and connection to the new work.

2101.2 TREE PROTECTION

- A. **Description:** Tree protection is the protection of trees from mechanical or other injury during land disturbance and construction activity. These trees are to be left in place and undisturbed during construction.
- B. **Application:** Tree protection ensure the survival of desirable trees where they will be effective for erosion and sediment control, watershed protection, landscape beautification, dust and pollution control, noise reduction, shade, and other environmental benefits.
- C. **Construction Specifications:**

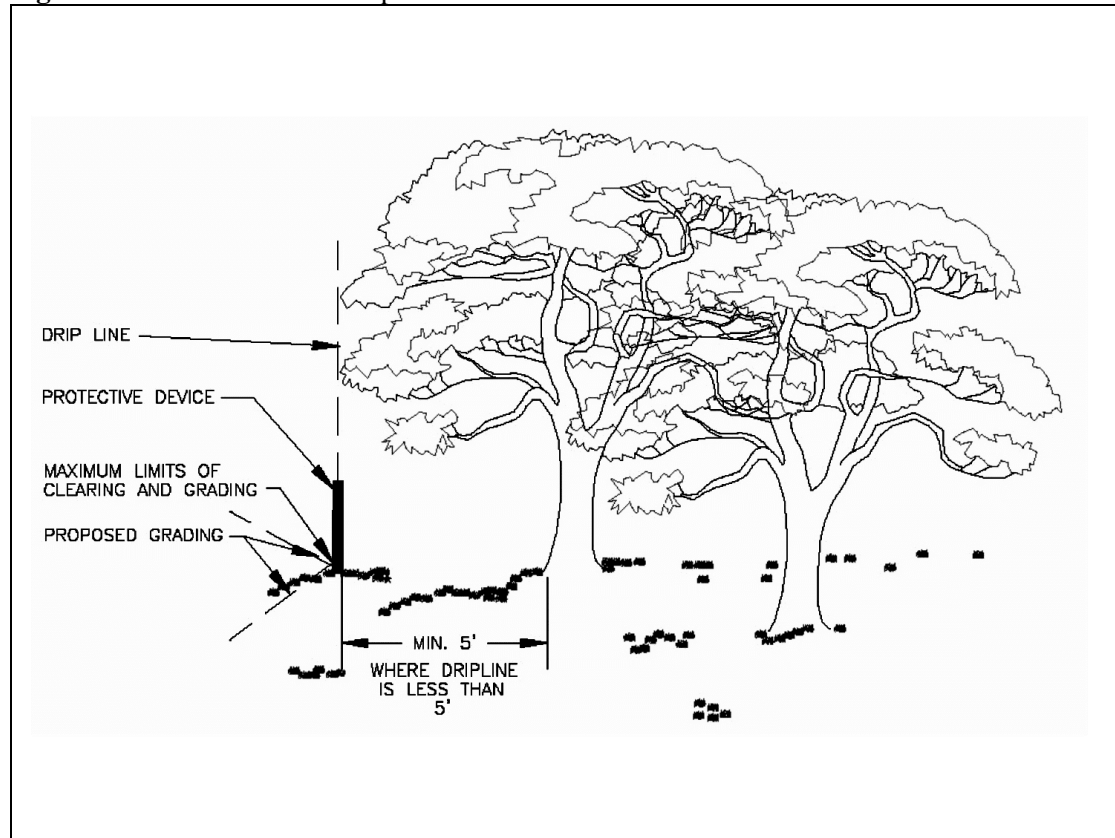
1. **Existing Structures and Private Facilities:** The plans will designate trees, shrubs, or other plants to remain, and the Contractor will take necessary steps to protect this vegetation. Trees may be pruned upon prior approval of the Engineer but only in accordance with the best practices of arboriculture with respect to the individual species' natural form and growth characteristics.

Groups of trees and individual trees selected to remain will be accurately located on the plan and designated as "tree(s) to remain." Individual specimen that are not part of a tree group will also have their species and diameter noted on the plan.

At a minimum the limits of clearing must be located outside the drip line of any tree to remain and in no case closer than 5 feet to the trunk of any tree (Figure 2101-1).

2. **Marking:** Prior to construction, individual trees and stands of trees to remain within the limits of clearing must be marked at a height visible to equipment operators. A diagonal slash of brightly colored paint approximately 8 to 10 inches in length is a common practice in areas where an accidental or purposeful alteration of the proper markings is a concern. In most situations, such as an area to receive formal landscaping, a surveyor's ribbon or a similar material applied at a reasonable height encircling the tree will suffice.
3. **Pre-Construction Conference:** During any pre-construction conference, three preservation and protection measures should be reviewed with the Contractor.

Figure 2101-1: Construction Operations Relative to the Location of Protected Trees



Source: VA. DCR, 1992.

4. **Equipment Operation and Storage:** Heavy equipment, vehicular traffic, and stockpiles of any construction materials (including topsoil) will not be permitted within the drip line of any tree to remain on 5 feet of its trunk, whichever is greater. Trees removed will not be felled, pushed, or pulled into trees being retained. Equipment operators must not clean any part of their equipment by slamming it against the trunks of trees to remain.
5. **Fires:** Fires shall not be permitted within 100 feet of the drip line of any trees to remain. Fires shall be limited in size to prevent adverse effects on trees and kept under surveillance.
6. **Storage and Disposal of Toxic Materials:** No toxic materials will be stored closer than 100 feet of the drip line of any trees to remain. Paint, acid, nails, gypsum board, wire, chemicals, fuels, and lubricants shall not be disposed of in such a way as to injure vegetation.
7. **Fencing and Armoring:** Any device may be used which will effectively protect the roots, trunk, and tops of trees to remain on the site (Figure 2101-2). All trees to remain shall be protected by fencing placed at least 5 feet from trunks if drip line is less than 5 feet wide. Personnel must be instructed to honor protective devices. The devices described are suggested only and are not intended to exclude the use of other comparable devices that will protect trees to remain.

- a. **Snow Fence:** Standard 40-inch high snow fence will be placed at the limits of clearing on standard steel posts set 6 feet apart.
- b. **Board Fence:** Board fencing consisting of 4-inch square posts set securely in the ground and protruding at least 4 feet above the ground shall be placed at the limits of clearing with a minimum of two horizontal boards between posts. If it is not practical to erect a fence at the drip line, a triangular fence shall be constructed nearer the trunk. Regardless of fence location, the limits of clearing shall not extend within the drip line.
- c. **Cord Fence:** Posts with a minimum size of 2 inches set securely in the ground and protruding at least 4 feet above the ground shall be placed at the limits of clearing. Two rows of cord 1/4-inch or thicker at least 2 feet apart shall run between posts with surveyor's ribbon tied securely to the string at intervals no greater than 3 feet.
- d. **Plastic Fencing:** 40-inch high "international orange" plastic (polyethylene) web fencing secured to conventional metal "T" or "U" posts driven 18 inches on 6-foot centers shall be installed at the limits of clearing. The fencing should have the following minimum physical qualities:

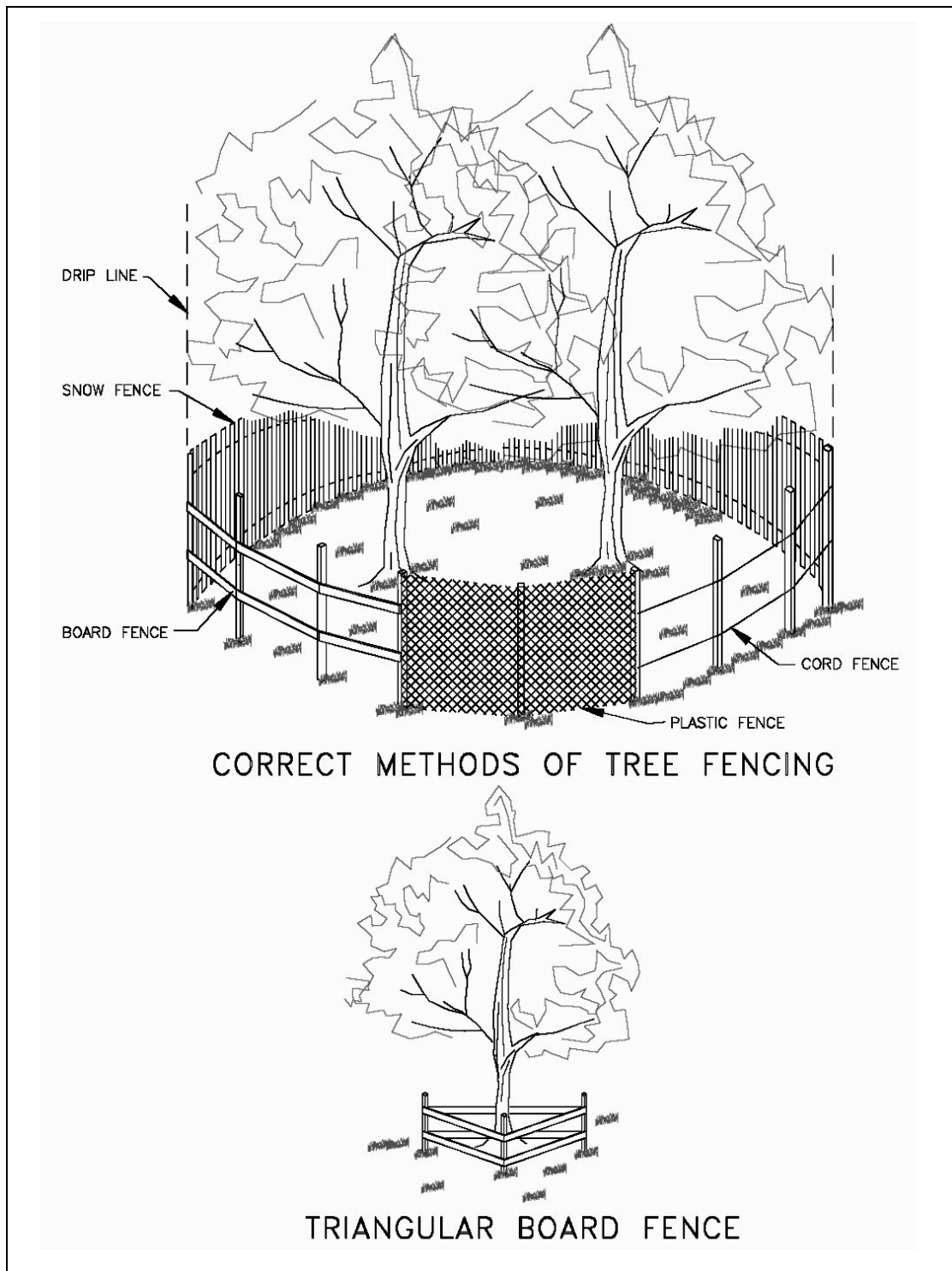
Tensile yield: Average 2,000 lbs. per 4-foot width (ASTM D638)

Ultimate tensile yield: Average 2,900 lbs. per 4-foot width (ASTM D638)

Elongation at break (%): Greater than 1000% (ASTM D638)

Chemical resistance: Inert to most chemicals and acids
- e. **Earth Berms:** Temporary earth berms shall be constructed according to specifications, with the base of the berm on the tree side located along the limits of clearing. Earth berms may not be used to protect trees if their presence will conflict with drainage patterns.
- f. **Additional Trees:** Additional trees may be left standing as protection between the trunks of the trees to remain and the limits of the clearing. However, for this alternative to be used the trunks of the trees in the buffer must be no more than 6 feet apart to prevent passage of equipment and material through the buffer. These additional trees shall be reexamined prior to the completion of construction and shall be given sufficient treatment to ensure survival or removed.

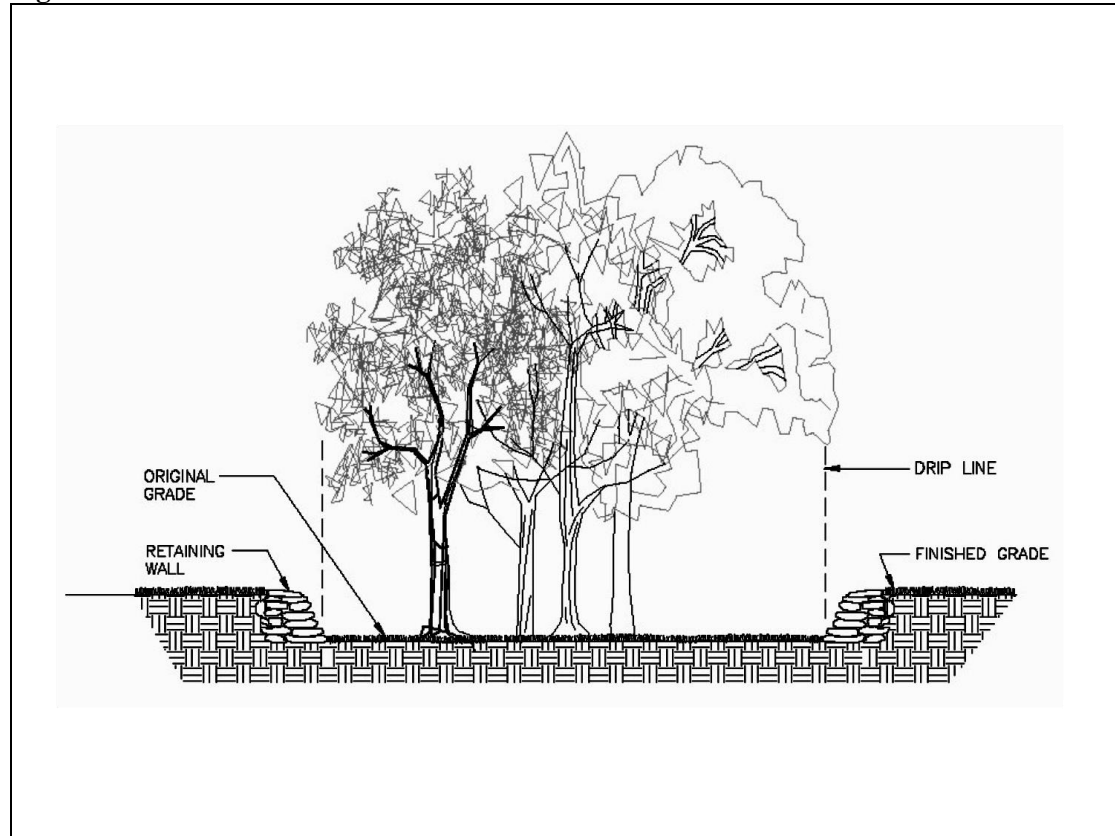
Figure 2101-2: Fencing and Armoring



Source: VA. DCR, 1992.

8. **Raising the grade:** When the ground level must be raised around an existing tree or tree group the following steps shall be taken to adequately care for the effected tree.
 - a. A well may be created around the tree(s) slightly beyond the drip line to retain the natural soil in the area of the feeder roots (Figure 2101-3).

Figure 2101-3: Tree Well

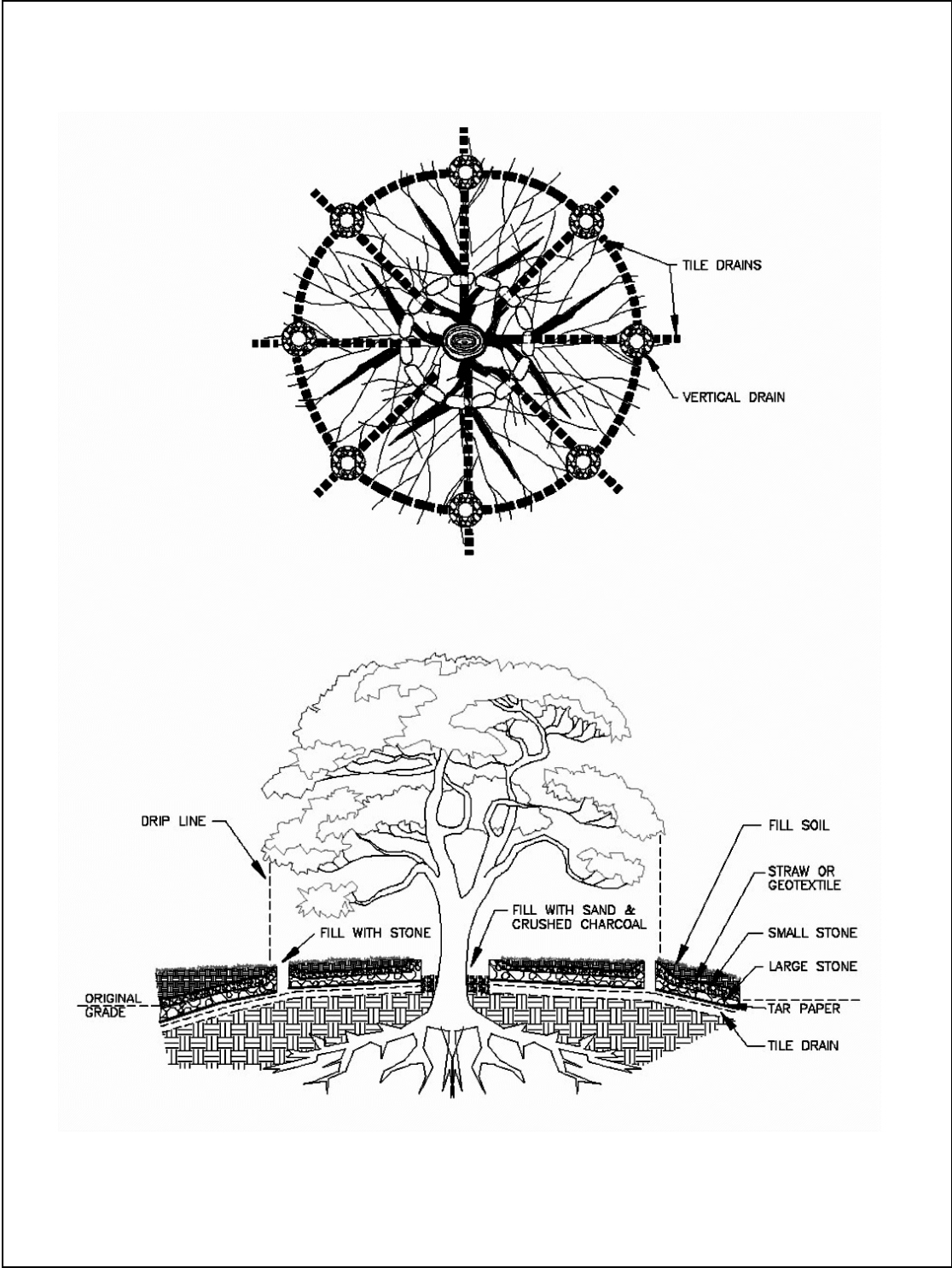


Source: VA, DCR, 1992.

- b. In the case of an individual tree, when the above alternative is not practical or desirable, the following method is recommended to ensure survival of the tree (Figure 2101-4).
 - 1) Before filling, remove the green vegetation, sod, leaf litter, and other organic matter from beneath the tree to a distance of 3 feet beyond the drip line and loosen the surface soil to a depth of approximately 3 inches without damaging the roots.
 - 2) Apply fertilizer in the root area of the tree. Fertilizer formulations and application rates and methods shall conform to the guidelines provided in Table 2101-1.

- 3) The dry well shall be constructed so as to allow for tree trunk diameter growth. A space of at least 1 foot between the tree trunk and the well wall is adequate for large, old, slow growing trees. Clearance for younger trees shall be at least 2 feet.
- 4) The well shall be high enough to bring the top just above the level of the proposed fill. The well wall shall taper slightly away from the tree trunk at a rate of 1 inch per foot of wall height.
- 5) The well wall shall be constructed of large stones, brick, building tile, concrete blocks, or cinder blocks with care being taken to ensure that ample openings are left through the wall of the well to allow for free movement of air and water. Mortar shall only be used near the top of the well and only above the porous fill.
- 6) Drain lines composed of 4-inch, high-quality drain tiles shall begin at the lowest point inside the well and extend outward from the tree trunk in a wheel-and-spoke pattern with the trunk as the hub. These radial drain lines shall slope away from the well at a rate of 1/8 inch per foot. The circumferential line of tiles should be located beneath the drip line of the tree. Vertical tiles or pipes shall be placed over the intersections of the two tile systems if a fill of more than 2 feet is contemplated. These vertical tiles shall be held in place with stone fill. Tile joints shall be tight. A few radial tiles shall extend beyond each intersection and shall slope sharply downward to ensure good drainage.
- 7) Tar paper, non-woven geotextile, or its approved equivalent shall be placed over the tile or pipe joints to prevent clogging, and large stone shall be placed around and over drain tiles or pipes for protection.
- 8) A layer of 2 to 6 inches of stone shall be placed over the entire area under the tree from the dry well outward at least as far as the drip line. For fills up to 2-feet deep, a layer of stone 8 to 12 inches thick should be adequate. A thicker layer of this stone, not to exceed 30 inches, will be needed for deeper fills.

Figure 2101-4: Tree Well Detail



Source: VA, DCR, 1992.

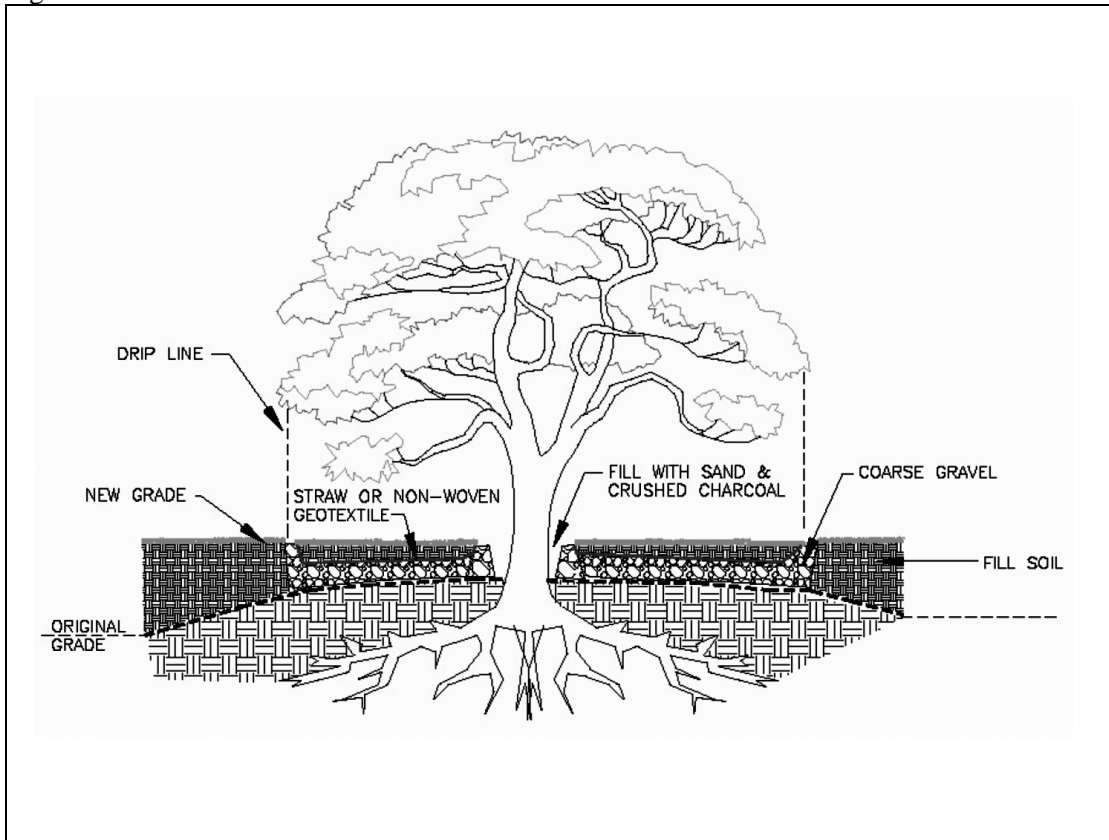
TABLE 2101-1: TREE FERTILIZATION FOR PROTECTION FROM CONSTRUCTION ACTIVITY

TREE TYPE	SPECIAL CONDITIONS	APPLICATION RATE & METHOD		FORMULATION
BROAD-LEAF DECIDUOUS	GREATER THAN 6 INCHES DBH* EXCEPT AMERICAN BEECHES AND CRABAPPLES	NORMAL	2-4 LBS PER INCH DHB; BROADCAST	COMMERCIAL 10-8-6 OR 10-6-4
		GRADE CHANGE	4-5 LBS PER INCH DBH; BROADCAST	COMMERCIAL 10-6-4
	SMALLER THAN 6 INCHES DBH, INCLUDING ALL AMERICAN BEECHES AND CRABAPPLES	NORMAL	1-2 LBS PER INCH DBH; BROADCAST	COMMERCIAL 10-8-6 OR 10-6-4
		GRADE CHANGE	2-3 LBS PER INCH DBH; BROADCAST	COMMERCIAL 10-6-4
NARROW-LEAF EVERGREEN	GREATER THAN 6 INCHS DBH, LOCATED IN GROUPS	2-4 LBS PER 100 SQ. FT. OF BED AREA; BROADCAST		COMMERCIAL 10-6-4
	GREATER THAN 6 INCHES DBH, SINGLE SPECIMENS IN OPEN AREA	2 LBS PER INCH DBH; BROADCAST		COMMERCIAL 10-6-4
	SMALLER THAN 6 INCHES DBH	5 LBS PER 100 SQ. FT. OF BED AREA; INCORPORATED INTO SOIL		TANKAGE OR COTTONSEED MEAL
BROAD-LEAF EVERGREEN	WHERE NITROGEN IN SOIL IS SUFFICIENT	LIBERAL QUANTITIES INCORPORATED INTO SOIL AND APPLIED AS MULCH		ACID PEAT MOSS OR ROTTED OAK LEAF MOLD
	WHERE ADDITIONAL NITROGEN IS NECESSARY	ALSO ADD 5 LBS PER 100 SQ. FT. OF BED AREA INCORPORATED INTO SOIL		TANKAGE OR COTTONSEED MEAL
*DBH: DIAMETER AT BREAST HEIGHT (4.5 FEET ABOVE GROUND LEVEL).				

Source: VA, DCR, 1992.

- 9) A layer of 3/4-inch to 1-inch stone covered by straw or a non-woven geotextile shall be used to prevent soil from clogging the space between stones. Cinders shall not be used as fill material.
- 10) Filling shall be completed with porous soil, such as topsoil, until the desired grade is reached. This soil shall be suitable to sustain specified vegetation.
- 11) To prevent clogging of the drain lines crushed stone shall be placed inside the dry well over the openings of the radial tiles. Vertical tiles shall also be filled with crushed rock and may also be covered with a screen.
- 12) To prevent anyone from falling into the dry well and to prevent leaves and debris from accumulating, the dry well shall be covered by an iron grate or filled with a 50-50 mixture of crushed charcoal and sand. This will also prevent rodent infestation and mosquito breeding.
 - a. Where water drainage through the soil is not a problem, coarse gravel in the fill may be substituted for the tile. This material has sufficient porosity to ensure air drainage. Instead of the vertical tiles or pipes in the system, stones, crushed rock, and gravel may be added so that the upper level of these porous materials slants toward the surface in the vicinity below the drip line (Figure 2101-5).
 - b. Raising the grade on only one side of a tree or group of trees may be accomplished by constructing only half of one of these systems.

Figure 2101-5: Tree Well Without Drain Tiles

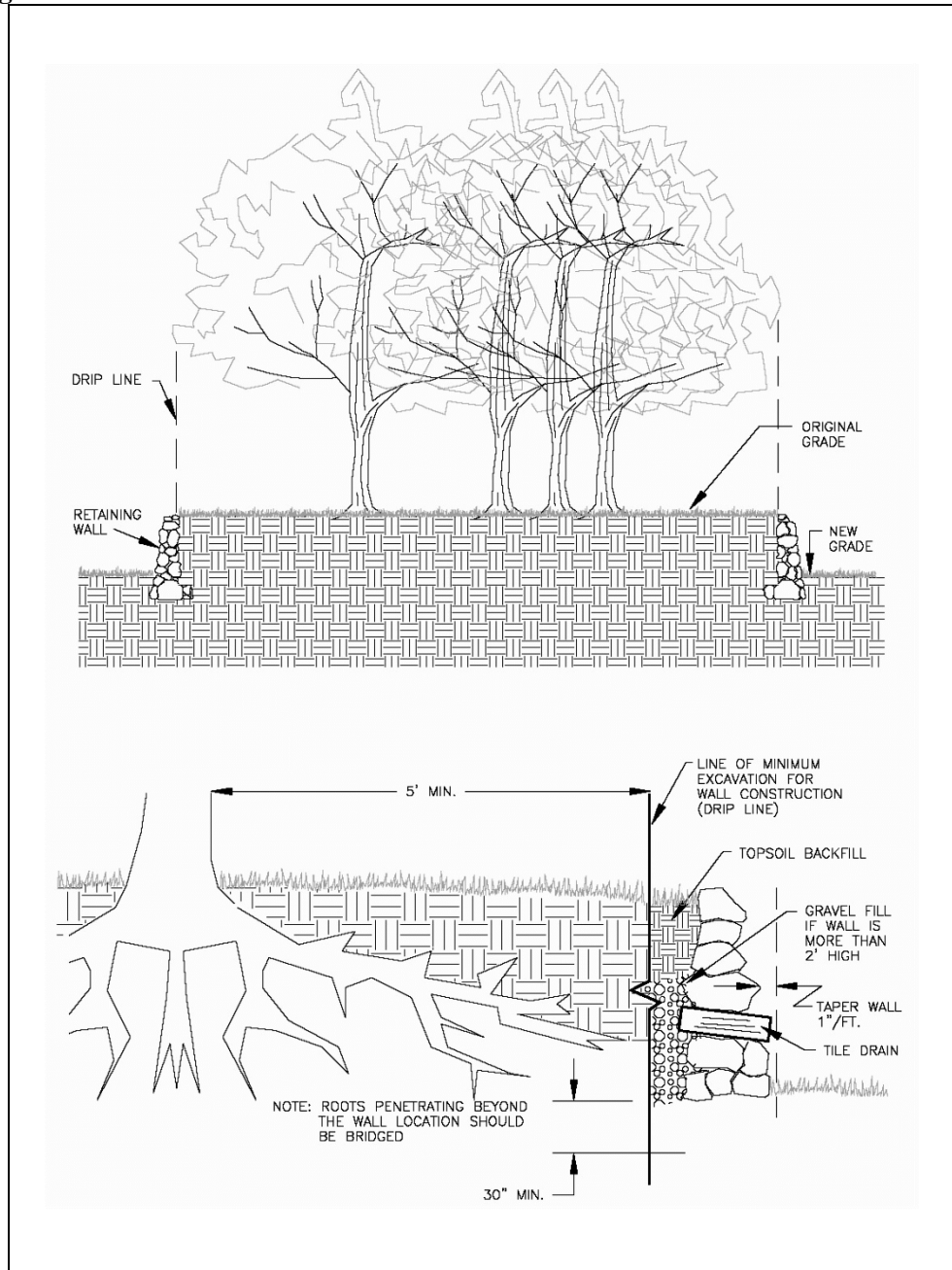


Source: VA. DCR, 1992.

9. **Lowering the grade:** Trees shall be protected from harmful grade cuts by constructing of a tree wall (Figure 2101-6).
 - a. Following excavation, all tree roots that are exposed or damaged shall be trimmed cleanly, painted with tree paint, and covered with moist peat moss, burlap, or other suitable material to keep them from drying out.
 - b. The wall shall be constructed of large stones, brick, building tile, concrete block, or cinder block as indicated.
 - c. The wall shall be backfilled with peat moss or other organic material or with topsoil to retain moisture and aid in root development.
 - d. Apply fertilizer and water thoroughly. Fertilizer formulations and application rates and methods shall conform to the guidelines in Table 2101-1.
 - e. Prune the tree crown, reducing the leaf surface in proportion to the amount of root loss.

- f. Provide drainage through the wall so water will not accumulate behind the wall.
- g. Lowering the grade on only one side of a tree or group of trees may be accomplished by constructing only half of this system.

Figure 2101-6: Tree Wall Detail

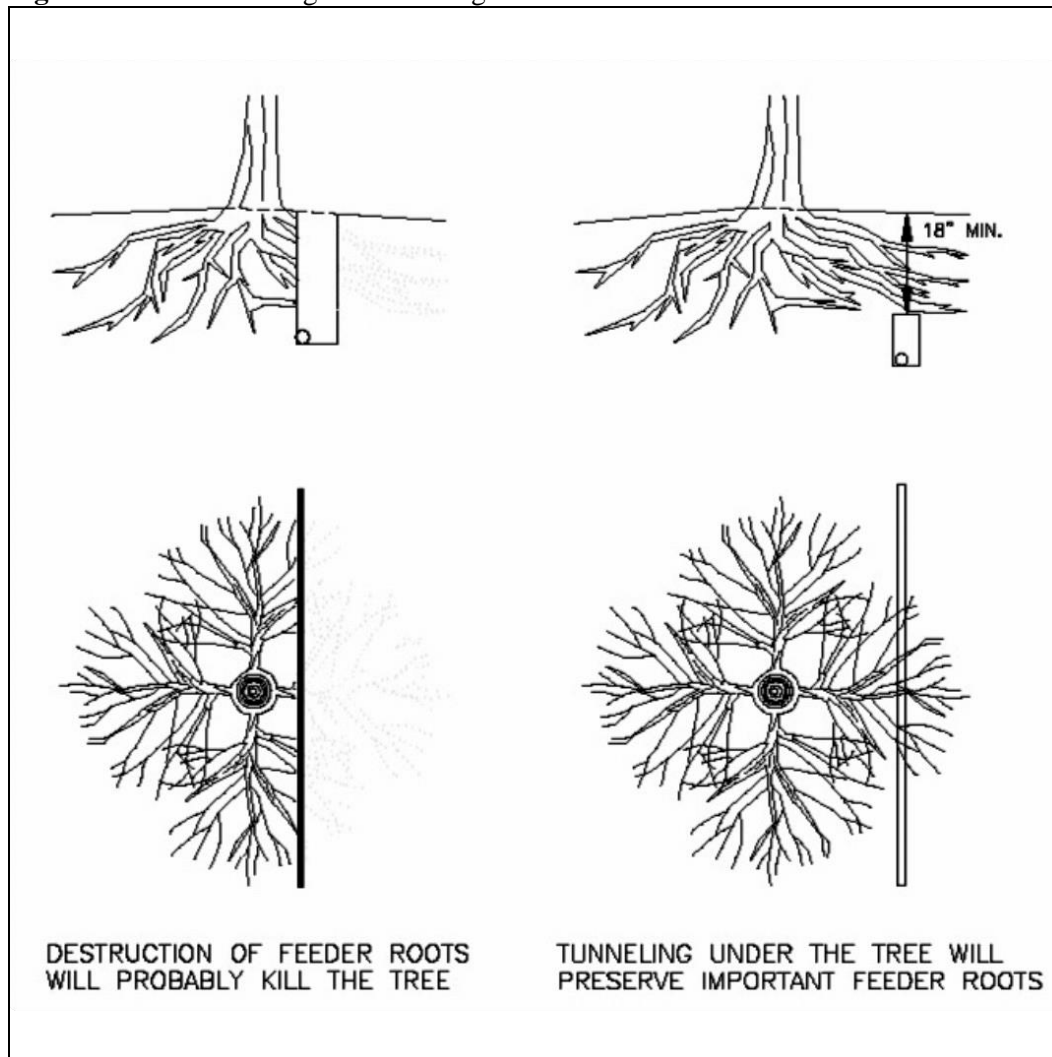


Source: VA. DCR, 1992.

10. Trenching and Tunneling:

- a. Trenching shall be done as far away from the trunks of trees as possible, preferably outside the crown spreads, to reduce the amount of root area damaged or killed by trenching activities.
- b. Wherever possible trenches should avoid large roots or root concentrations. This can be accomplished by curving the trench or by tunneling under large roots and areas of heavy root concentration.
- c. Tunneling is more expensive initially, but it usually causes less soil disturbance and physiological impact on the root system. The extra cost may offset the potential cost of tree removal and replacement should the tree die (Figure 2101-7).

Figure 2101-7: Trenching vs. Tunneling



Source: VA. DCR, 1992.

- d. Tunneling is almost always preferred over trenching. The tunnel should be 18 inches or greater below the ground surface and should not be located under the center of the tree (an off-center tunnel has the least impact on the roots).
- e. Roots shall not be left exposed to the air. They shall be covered with soil as soon as possible or protected and kept moist with wet burlap or peat moss until the trench or tunnel can be filled.
- f. The ends of damaged and cut roots shall be cut off smoothly and protected by prompt painting with a tree-wound dressing.
- g. Trenches and tunnels shall be filled as soon as possible. Air spaces in the soil must be avoided by careful filling and tamping.
- h. Peat moss or other suitable material shall be added to the fill material to aid new root growth.
- i. The tree shall be mulched and fertilized to conserve moisture, stimulate new root growth, and enhance general tree vigor.
- j. If a large amount of the root system has been damaged and killed, the crown leaf surface shall be proportionately reduced to balance the reduced root system. This may be accomplished by pruning 20 to 30 percent of the crown foliage. If roots are cut during the winter, pruning shall be completed before the next growing season. If roots are cut during the growing season, pruning shall be completed immediately.

11. **Removal and Replacement of Damaged Trees:** Should a tree intended to remain be damaged seriously enough that survival and normal growth are not possible, the tree shall be removed. If replacement is desirable or required, the replacement tree shall be of the same or similar species and 2- inch to 2 ½ -inch (minimum) caliper, balled and burlapped nursery stock.

12. **Clean-Up:** Tree damage often occurs during construction. Fences and barriers shall be removed as a last order of work.

D. **Troubleshooting:** All trees to remain and protective fencing shall be inspected weekly. Fencing shall be repaired or replaced as necessary. Damage to trees shall be repaired as dictated below.

E. **Inspection and Maintenance:** In spite of precautions, some damage to protected trees may occur. In such cases, the following maintenance guidelines should be followed:

- 1. **Soil Aeration:** If the soil has become compacted over the root zone of any tree, the ground shall be aerated by punching holes with an iron bar. The bar shall be driven 1 foot and then moved back and forth until the soil is loosened. This

procedure shall be repeated every 18 inches until all of the compacted soil beneath the crown of the tree has been loosened.

2. Repair of Damage:

- a. Any damage to the crown, trunk, or root system of any tree to remain shall be repaired immediately.
- b. Whenever major root or bark damage occurs, remove some foliage to reduce the demand for water and nutrients.
- c. Damaged roots shall immediately be cut cleanly inside the exposed or damaged area. Cut surfaces shall be painted with approved tree paint, and moist peat moss, burlap, or top-soil shall be spread over the exposed area.
- d. To treat bark damage, carefully cut all loosened bark back to the undamaged area, taper the cut at the top and bottom, and provide drainage at the base of the wound.
- e. All tree limbs damaged during construction, or removed for any other reason, shall be cut off above the collar at the preceding branch junction.
- f. Care for serious injuries shall be prescribed by a forester or a tree specialist.

3. Fertilization: Broadleaf trees which have been stressed or damaged shall receive a heavy application of fertilizer to aid their recovery.

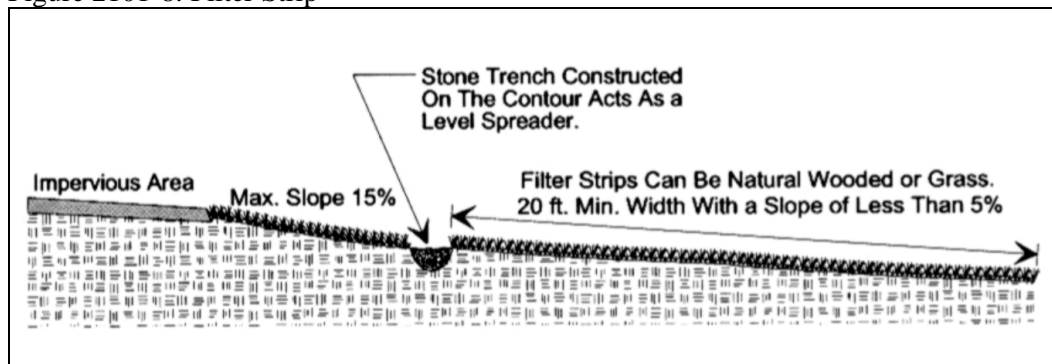
- a. Trees shall be fertilized in late fall (after October 1) or early spring (from last frost until May 1). Fall applications are preferred as the nutrients will be made available over a longer period of time.
- b. Fertilizer shall be applied to the soil over the feeder roots. In no case should it be applied closer than 3 feet to the trunk. The root system of conifers extends some distance beyond the drip line. Increase the area to be fertilized by one-fourth the area of the crown.
- c. Fertilizer shall be applied using approved fertilization methods and equipment.
- d. Formulation and application rates shall conform to the guidelines given in Table 2101-1.

Maintain adequate ground cover of organic mulch around trees to prevent erosion, protect roots, and hold water.

2101.3 VEGETATIVE BUFFERS (FILTER STRIPS)

- A. **Description:** Vegetative buffers are wide belts of vegetation designed to provide infiltration, intercept sediment and other pollutants, and reduce stormwater flow and velocity. Vegetative buffers are designed to accept only overland sheet flow. They cannot treat high velocity flows. Surface runoff must be evenly distributed across the filter strip. Once a channel forms in the filter strip, it is no longer effective.
- B. **Application:** Vegetative buffers can consist of grass, woody vegetation, or other erosion resistant plants. They can be used as a perimeter control or in conjunction with infiltration basins, infiltration trenches, or alongside streams to slow flow velocities so sediment settles out.
- C. **Construction Specifications:**
 1. **Site Preparation:** Natural wooded strips or existing densely covered grass strips. At the start of development, fence off any undisturbed vegetation to be preserved. Avoid storing debris from clearing and grubbing and other construction waste material in these areas during construction.
 2. **Grading:** If the adjacent area does not have a level edge, grade a level swale adjacent to the top edge of the filter strip. The swale should discharge to the filter strip along a level edge. The swale will serve as a level spreader to distribute runoff evenly to the filter strip (Figure 2101-8).
 - a. Line the swale with rock, turf reinforcing mat, or other erosion resistance material.
 - b. Sod or seed, mulch, and fertilize the filter strip area.
 - c. See Section 5106.6 for minimum width of filter strips and constructing a vegetative buffer for perimeter control.
 - d. If the filter strip is used to trap sediment during construction, the top edge should be regraded and reseeded following construction. This will remove sediment trapped during construction and prolong the effective use of the filter strip.

Figure 2101-8: Filter Strip



Source: MDNR Protecting Water Quality, 1998

3. **Erosion Control:** Minimize the size of all disturbed areas and stabilize as soon as each phase of construction is complete.
 - a. Use temporary diversions to prevent surface runoff from being transported to the filter strip unless it is used to trap sediment during construction.
 - b. Direct all overland flow to the filter strip or the level spreading swale at low velocities.
 4. **Safety:**
 - a. Store all construction materials and waste material well away from the filter strip.
 - b. If utility lines are buried beneath the filter strip, do not perform final grading until all trench settlement has taken place. Follow all local, state, and federal guidelines in constructing utility trenches. Overhead utility lines should be located at least 20 feet from the top edge of the filter strip.
 - c. Provide temporary fencing and warning signs until vegetation is established.
- D. **Troubleshooting:** Consult with a design professional if any of the following occur:
1. Variations in topography on the site indicate filter strip will not function as intended.
 2. Design specifications for fill, rock, sod, seed, mulch, or fertilizer cannot be met; substitution may be required. Unapproved substitutions could lead to the filter strip not operating as designed.
- E. **Inspection and Maintenance:**
1. Check for eroded channels in the filter strip after every storm event of ½-inch or greater. Fill with topsoil, prepare seed bed in eroded areas, and reseed, mulch, and fertilize the affected area.
 2. For long-term construction projects, apply a complete fertilizer annually to maintain the desired density of vegetation. After construction, apply fertilizer in accordance with soil test recommendations.
 3. Protect new plantings from livestock or wildlife.
 4. Mow grass strips to a height of 6 to 12 inches, two to three times a year to suppress weeds and woody vegetation unless natural, woody vegetation is planned.
 5. Repair foot paths and traffic ruts.

2101.4 VEGETATED STREAM BUFFERS

A. **Description:** Vegetated stream buffers limit both vegetation removal and grading of the riparian area along flowing waters. They are intended to protect the banks of natural streams from damage due to development, lessen the risk of flooding in developed areas, and provide a buffer between the developed area and the stream. A properly maintained streambank setback will help maintain channel capacity and stability, reduce the sediment load in the channel, and reduce the movement of pollutants into the stream.

B. **Application:** Vegetated stream buffers are setbacks that help preserve natural channel meander and protect homes and other buildings from damage due to bank erosion. They can also be used adjacent to excavated open channels, drainageways, and watercourses that route runoff to streams.

C. Construction Specifications:

1. **Site Preparation:** Follow all federal, state, and local regulations for channel improvements required to increase stream capacity due to development. Open channel cross sections should not be reduced to increase streambank setback. Locate all underground utilities.
2. **Natural channels:** Natural channel side slopes should not be disturbed. When disturbance is necessary to develop a site, reestablish vegetation on channel side slopes as soon as possible after excavation or improvement. Consider the natural zones of a streambank community when placing vegetation. Use native plant materials for establishment and long term success. Lists of suitable species may be obtained from the Missouri
3. **Department of Conservation (MDC) or NRCS.** Existing woody vegetation adjacent to the stream should not be disturbed. Leave any rights-of-way in the best condition feasible consistent with the project purposes and adjacent land uses. Preserve or plant adapted trees to provide shade, prevent thermal pollution in the stream, help stabilize banks, and provide wildlife habitat in those areas of perennial flow or where woody cover exists.
4. **Erosion Control:** Minimize the size of all disturbed areas and stabilize as soon as each phase of construction is complete. Establish vegetation on all disturbed areas immediately after construction. The streambank setback area should be used as a filter strip during construction. Use temporary diversions to prevent lateral surface water from running onto the streambank setback area. After construction, direct all overland flow through the streambank setback area at velocities of 5 feet per second or less.
5. **Safety:** At the completion of each work day, move all construction equipment away from the streambank setback area in anticipation of flooding. Construction materials and waste material should not be stored in the stream channel or streambank setback area. Provide temporary fencing and post warning signs until vegetation is established in areas that are disturbed. Provide site drainage. Vehicle traffic through the setback areas should be avoided. Temporary stream

crossings should be used by construction equipment to prevent destruction of the streambank setback areas. See Details ESC-39 and ESC-40 in Division III in this manual.

6. **Construction Verification:** The alignment and width of the setback should be maintained during all construction activities. The final grades and elevations of the setback area should be checked to ensure compliance with plans and specifications.
- D. **Troubleshooting:** Consult with a qualified design professional if any of the following occur:
1. Variation in topography on the site indicate setback or channel is inadequate or will not function as intended; changes in the plans may be needed.
 2. Design specifications for seed variety, trees, mulch and fertilizer cannot be met; substitution may be required. Unapproved substitutions could result in additional flooding and erosion of the streambank.
- E. **Maintenance:** Check the streambank setback area after every storm event of ½-inch or greater. Fix gaps in the vegetative cover by seeding and mulching or with new plants. Protect new plantings in the streambank setback area from livestock or wildlife. Mulch, spray with a herbicide approved for aquatic use, or chop out undesirable vegetation periodically to prevent its growth. Keep inlets to side drainage structures open. Keep subsurface drain outlet pipes open and protected.

SECTION 2102 SITE PREPARATION

2102.1 CONSTRUCTION SEQUENCE SCHEDULE

- A. **Description:** A construction sequence schedule is a specified work schedule that coordinates the timing of land-disturbing activities and the installation of erosion and sediment control measures.
- B. **Application:** A construction sequence schedule reduces on-site erosion and off-site sedimentation by performing land-disturbing activities and installing erosion and sediment control practices in accordance with a planned schedule.
- C. **Construction Specifications:** Many timely construction techniques can reduce the erosion potential of a site such as shaping earthen fills daily to prevent overflows and constructing temporary diversions ahead of anticipated storms. These types of activities cannot be put on the construction sequence schedule but should be used whenever possible.
- D. Following a planned construction sequence schedule to reduce erosion should help keep field personnel aware of the possibilities of erosion prevention through construction management and reduction in the total area disturbed at any one time.
- E. **Inspection and Maintenance:** Follow the construction sequence throughout project development. When changes in construction activities are needed, amend the sequence schedule in advance to maintain management control.

2102.2 LAND GRADING

- A. **Description:**
 - 1. **Grading:** Grading, as used herein, shall mean the performance of all excavation, embankment, and backfill in connection with the construction of all improvements. Mass grading should be avoided. An undisturbed strip of existing grass or other vegetation should be kept in place around the perimeter of the construction site where possible. The Contractor shall scalp only those excavation and embankment areas necessary for construction of the project.
 - 2. **Excavation:** Excavation is defined as the removal of materials from the construction area to the lines and grades shown on the plans.
 - a. **Unclassified Excavation:** Unclassified excavation is defined as the removal of all material encountered regardless of its nature. All material excavated will be considered as Unclassified Excavation unless the Special Provisions specify Classified Materials.
 - b. **Rock Excavation:** Rock excavation is defined as the removal of all rock ledges 6 inches or more in thickness, detached rock or boulders having a volume of more than 1 ½ cubic yards, and shale occurring in its natural state, hard and unweathered. A rock ledge is defined as a continuous body of rock

that may not include thin interbedded seams of shale or other soft materials less than 12 inches thick. The vertical limit of each ledge shall be defined by interbedded seams of soft materials 12 inches or more in thickness. The beds of soft interbedded material 12 inches or more in thickness shall not be included in the measurement for Rock Excavation but shall be included in the measurement for Earth Excavation.

- c. **Earth Excavation:** Earth excavation is defined as the removal of all material not defined as rock.
3. **Embankment or Backfill:** Embankment or backfill is defined as the placing and compacting of material in the construction area to the lines and grades as shown on the plans.
- a. **Unsuitable Material:** Unsuitable material is defined as muck, frozen material, organic material, top soil, rubbish, and rock with a maximum dimension greater than 24 inches.
 - b. **Suitable Material:** Suitable material is defined as entirely imperishable with that portion passing the No. 40 sieve having a liquid limit not exceeding 40 and a plastic index not exceeding 25 when tested in accordance with ASTM D-4318.
 - 1) **Rock Embankment:** Material for rock embankment shall be free of unsuitable material and shall contain, by volume, greater than 10 percent rock or gravel having a maximum dimension greater than 3 inches, but not greater than 24 inches.
 - 2) **Earth Embankment:** Material for earth embankment shall be free of unsuitable material and shall contain, by volume, less than 10 percent rock or gravel having a maximum dimension greater than 3 inches.
 - 3) **Borrow:** Borrow is defined as approved material excavated from an area outside of the project limits and required for construction of embankments.
 - 4) **Waste:** Waste is defined as excavation material that is not used in embankments and is disposed of outside of the embankment areas.
 - 5) **Structures:** Structures, as used herein, refers to bridges, culverts, storm sewer and sanitary appurtenances, retaining walls, and similar construction.
- A. **Application:** This practice is applicable where grading to a planned elevation is necessary and practical for the proposed development of a site and for proper operation of sediment control practices.
- B. **Construction Specifications:**
- 1. Construct and maintain all erosion and sediment control practices and measures in accordance with the approved erosion and sediment control plan and construction schedule.

2. Remove good topsoil from areas to be graded and filled and preserve it for use in the final grading of all critical areas.
 3. Scarify areas to be topsoiled to a minimum depth of 2 inches before placing topsoil.
 4. Clear and grub areas to be filled to remove trees, vegetation, roots, or other objectionable material that would affect the planned stability of the fill.
 5. Ensure that fill material is free of brush, rubbish, rocks, logs, stumps, building debris, and other materials inappropriate for constructing stable fills.
 6. Place all fill in layers not to exceed *specified thicknesses*, and compact the layers as required to reduce erosion, slippage, settlement, or other related problems.
 7. Do not incorporate frozen or soft, mucky, or highly compressible materials into fill slopes.
 8. Do not place fill on a frozen foundation due to possible subsidence and slippage.
 9. Keep diversions and other water conveyance measures free of sediment during all phases of development.
 10. Handle seeps or springs encountered during construction in accordance with State Agency-approved methods.
 11. Permanently stabilize all graded areas immediately after final grading is completed on each area in the grading plan. Apply temporary stabilization measures within 14 days on all graded areas when work is to be interrupted or delayed for 30 calendar days or longer.
 12. Show topsoil stockpiles, borrow areas, and spoil areas on the plans, and make sure they are adequately protected from erosion. Include final stabilization of these areas in the plan.
- C. **Inspection and Maintenance:** Periodically check all graded areas and their associated erosion and sediment control practices, especially after rainfall events of ½-inch or greater. Promptly remove all sediment from diversions and other control devices. If washouts or breaks occur, repair them immediately.

2102.3 SURFACE ROUGHENING

A. **Description:** Surface roughening provides a rough soil surface with horizontal depressions created by operating a tiller or other suitable implement on the contour or by leaving the slopes in a roughened condition by not fine-grading them. This will aid in establishment of seeded vegetative cover, reduce runoff velocity, increase infiltration, reduce erosion, and provide for sediment trapping. This technique should not be used on slopes intended for erosion control blankets or other rolled products.

B. **Application:**

1. To be stabilized with vegetation, all slopes steeper than 3H:1V require surface roughening by stair-step grading, grooving, furrowing, or tracking.
2. Areas with grades less steep than 3H:1V should have the soil surface lightly roughened and loosened to a depth of 2 to 4 inches prior to seeding.
3. Areas that have been graded and will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
4. Slopes with a stable rock face do not require roughening or stabilization.

C. **Construction Specifications:** Cut slope applications for areas that will not be mowed: Cut slopes with a gradient steeper than 3H:1V shall be stair-step graded or grooved.

1. Stair-step grading may be carried out on any material soft enough to be ripped with a bulldozer. Slopes consisting of soft rock with some subsoil are particularly suited to stair-step grading.

The ratio of the vertical cut distance to the horizontal distance shall be less than 1:1 and the horizontal portion of the step shall slope toward the vertical wall.

Individual vertical cuts shall not be more than 30 inches in soft soil materials and not more than 40 inches in rocky materials.

2. Grooving consists of using machinery to create a series of ridges and depressions that run perpendicular to the slope (on the contour).

Grooves may be made with any appropriate implement that can be safely operated on the slope and that will not cause undue compaction. Suggested implements include discs, tillers, spring harrows, and the teeth on a front-end loader bucket. Such grooves shall not be less than 3 inches deep, nor spaced more than 15 inches apart.

Fill slope applications for areas that will not be mowed: Fill slopes with a gradient steeper than 3H:1V shall be grooved or allowed to remain rough as they are constructed.

- a. Groove according to #2 under the “Cut Slope” section.

- b. As lifts of the fill are constructed, soil and rock materials may be allowed to fall naturally onto the slope surface.

Colluvial materials, soil deposits at the base of slopes or from old stream beds, shall not be used in fills as they flow when saturated.

At no time shall slopes be bladed or scraped to produce a smooth hard surface.

Cuts, fills, and graded areas that will be mowed: Mowed slopes should not be steeper than 3H:1V. Excessive roughness is undesirable in areas where mowing is planned. These areas may be roughened with shallow grooves that remain after tilling, discing, harrowing, raking, or use of a cultipacker-seeder. The final pass of any such tillage implement shall be perpendicular to the slope.

Grooves formed by such implements shall be not less than 1-inch deep and not spaced more than 12 inches apart. Fill slopes that are left as rough as constructed may be smoothed with a dragline or pick chain to facilitate mowing.

Roughening with tracked machinery: Roughening with tracked machinery on clayey soils is not recommended unless no alternatives are available. Undue compaction of surface soil results from this practice. Sandy soils do not compact severely and may be tracked. In no case is tracking as effective as the other roughening methods described.

When tracking is the chosen surface-roughening technique, it shall be done by operating tracked machinery up and down the slope to leave horizontal depressions in the soil. As few passes of the machinery as possible shall be made to minimize compaction.

- D. **Seeding:** Roughened areas shall be seeded and mulched as soon as possible to obtain optimum seed germination and seedling growth. (See Section 2151 of this manual).
- E. **Inspection and Maintenance:** Periodically check the seeded slopes for rills and washes. Fill these areas slightly above the original grade, then reseed and mulch as soon as possible.

2102.4 TOPSOILING

- A. **Description:** Topsoiling is a method of preserving and reusing the surface layer of undisturbed soil, which is often enriched in organic matter, to obtain a more desirable planting and growth medium.
- B. **Application:** Topsoiling provides a suitable growth medium for final site vegetative stabilization.
 - 1. Where the preservation or importation of topsoil is determined to be the most effective method of providing a suitable growth medium.
 - 2. Where the subsoil or existing soil presents the following problems:
 - a. The texture, pH, or nutrient balance of the available soil cannot be modified by reasonable means to provide an adequate growth medium.
 - b. The soil material is too shallow to provide an adequate root zone and to supply necessary moisture and nutrients for plant growth.
 - c. The soil contains substances potentially toxic to plant growth.
 - 3. Where high-quality turf is desirable to withstand intense use or meet aesthetic requirements.
 - 4. Where ornamental plants will be established.
 - 5. Only on slopes that are 2H:1V or flatter unless other measures are taken to prevent erosion and sloughing.
- C. **Construction Specifications:**
 - 1. **Materials:** Field exploration of the site shall be made to determine if there is sufficient surface soil of good quality to justify stripping. Topsoil shall be friable and loamy: loam, sandy loam, silt loam, sandy clay loam, or clay loam. It shall be free of debris, trash, stumps, rocks, root, and noxious weeds and shall give evidence of being able to support healthy vegetation. It shall contain no substance that is potentially toxic to plant growth.
 - 2. **Stripping:** Topsoil operations should not be performed when the soil is wet or frozen. Stripping shall be confined to the immediate construction area. Stripping depth may vary depending on the particular soil. All perimeter dikes, basins, and other sediment controls shall be in place prior to stripping.
 - 3. **Stockpiling:** Topsoil shall be stockpiled in such a manner that natural drainage is not obstructed and no off-site sediment damage results. Side slopes of the stockpile shall not exceed 2H:1V. Stabilize stockpiles as per Section 2151. Perimeter controls must be placed around the stockpile immediately.

4. **Site Preparation:** Before topsoiling, establish needed erosion and sediment control practices such as diversions, grade stabilization structures, berms, dikes, level spreaders, waterways, sediment basins, etc. These practices must be maintained during topsoiling.

Previously established grades on the areas to be topsoiled shall be maintained according to the approved plan. Where the pH of the subsoil is 6.0 or less or the soil is composed of heavy clays, agricultural limestone shall be spread in accordance with the soil test. After the areas to be topsoiled have been brought to grade, and immediately prior to dumping and spreading the topsoil, the subgrade shall be loosened by discing or scarifying to a depth of at least 2 inches to ensure bonding of the topsoil and subsoil.

5. **Applying Topsoil:** Topsoil shall not be placed while in a frozen or muddy condition, when topsoil or subgrade is excessively wet, or in a condition that may otherwise be detrimental to proper grading or proposed sodding or seeding. The topsoil shall be uniformly distributed to a minimum compacted depth of 4 inches. It is necessary to compact the topsoil enough to ensure good contact with the underlying soil and to obtain a level seed bed for the establishment of high maintenance turf. However, undue compaction is to be avoided as it increases runoff velocity and volume and deters seed germination.

2102.5 TEMPORARY CONSTRUCTION ENTRANCE

- A. **Description:** A temporary construction entrance is a stabilized layer of large aggregate that is located at any point where traffic leaves a construction site and move directly onto a public road or other paved area. See Detail ESC-01 (Temporary Construction Entrance) in Division III of this manual.
- B. **Application:** A temporary construction entrance provides a buffer area where construction vehicles can drop their mud to avoid transporting it onto public roads.

For single family residential lots less than ½ acre in size, use specifications in the *Single Family Residential Standard Booklet*.

2102.6 Construction Details - General: *The Contractor shall adhere to any and all statutes regarding the notification of utilities prior to beginning any work within public right-of-way. Relocation or protection of any existing utilities located in street right-of-way shall be governed by Section 1510 and 1511 of the General Provisions and Covenants. The relocation and/or protection of any utility that is shown on the plans, that lies within a utility easement and is endangered by this construction shall be the responsibility of the Contractor.*

The Contractor shall make every reasonable effort to protect private facilities. These facilities may not be shown on the plans. When these facilities are disturbed or damaged by the work, the Contractor shall make necessary arrangements for repairs to the facilities for continuous service prior to the close of that work day.

It shall be the responsibility of the Contractor to protect all property lot corners and control monumentation. Should it be necessary to disturb any such monument, whether stake, pin, bar, disk, box, or other, it remains the responsibility of the Contractor to reference such markers prior to removal, reset, them, and file such relocations or monumentation documents as the law may require. Any such references, removal, replacement and certification of monuments shall be performed by a registered licensed surveyor. A copy of all such certification documents shall be provided to the Engineer prior to final payment. Any monument destroyed or improperly reset by the Contractor may be replaced by the Engineer to the standards required by law at the expense of the Contractor.

Grading, excavation and backfilling for all improvements shall be made to the lines, grades and cross sections indicated by the plans.

In addition, to any erosion control measures shown on the plans, the Contractor shall schedule and conduct his operations in such a manner and shall provide any necessary control facilities to protect downstream and adjacent properties from pollution, sedimentation or erosion caused by the grading operations. Any pollution or damage occurring shall be the responsibility of the Contractor.

During construction, the graded area shall be maintained by the Contractor in such condition that it will be well drained at all times. Roadway ditches, channel changes, inlet and outlet ditches and other ditches in connection with the roadway shall be cut and maintained to the required cross section. All drainage work shall be performed in proper sequence with other operations. All ditches and channels shall be kept free of debris or obstructions.

2102.7 Excavation: This section governs the excavation for all improvements.

All suitable material removed by excavation shall be used as far as practicable in the formation of embankment as required to complete the work. The Contractor shall sort all excavated material and stockpile when necessary, so as to provide suitable materials for embankments.

After removal of the roadway excavation material to the required section, all material between lines 1 foot (30.48 cm) outside of the curbs and within the top 6 inches (15.24 cm) of the subgrade shall be compacted to 95 percent of maximum density for the material as defined in Section 2102.

Rock encountered within the full width of the roadway, toe of slope to toe of slope, shall be undergraded to an elevation of 6 inches (15.24 cm) below the finished subgrade elevation. Care shall be taken to avoid overshooting when blasting. Rock shall be removed in such a manner as to leave no excessive water pockets in the surface.

Areas of undergrading or overbreak in rock between lines 1 foot (30.48 cm) outside of the curbs shall be backfilled with spalls, rock fragments or a granular type material. Backfill materials shall have a plasticity index not to exceed 10 and a gradation such that at least 50 percent of the material will be retained on the No. 4 (4.75 mm) Sieve.

2102.8 Undergrading: Where materials are encountered which are deemed as unsuitable by the Engineer for use in the work, they shall be removed to the depth and limits as ordered by the Engineer. Areas undergraded shall be backfilled with one of the following materials:

- A. Rock fragments or spalls.
- B. A granular type material having a plasticity index not to exceed 10 and a gradation such that at least 50 percent of the material will be retained on the No.4 (4.75 mm) Sieve and not more than 40 percent will pass the No. 10 (2.00 mm) Sieve.
- C. A material meeting the requirements of Section 2102.2.

2102.9 Embankment: This section governs embankment for all improvements. The embankments shall be constructed using suitable materials, as herein defined, procured from excavations made on the project site or from borrow areas as required to complete the grading work.

- A. **Starting the Embankment:** Where embankments, regardless of height, are placed against hillsides or existing embankments, either of which have a slope steeper than 1 vertical to 4 horizontal, the existing slope shall be benched or stepped in approximately 24 inch (60.96 cm) rises as the new fill is brought up in 12 inch maximum (30.48 cm) layers or lifts. The material bladed out, the bottom of the area cut into, and the embankment material being placed, shall be compacted to the required density. Material cut out, bladed into place and compacted shall not be measured and paid for directly but will be considered as incidental work.

The existing surface upon which embankment material is to be placed shall have all unstable and unsuitable material removed before starting the embankment work.

Where embankments 2 feet (60.96 cm) or less in depth are to be placed on areas covered by existing pavement, the existing pavement shall be removed and the cleared ground surface shall be compacted to the specified density. Where embankments greater than 2 feet (60.96 cm) in depth are to be placed on areas covered by existing pavement, the existing pavement shall be broken into pieces not larger than 24 inches (60.96 cm) maximum dimension, left in place and the embankment started thereon.

- B. **Placing Earth Embankment:** Earth shall be placed in successive horizontal layers, wetted or dried as necessary to be within the required moisture range and distributed uniformly over the full width of the embankment area. Each layer of material shall not exceed 12 inches maximum (30.48 cm) in thickness (loose state) and shall be compacted to not less than the required density before the next layer is placed thereon. Compaction equipment shall be approved by the Engineer prior to use. As the compaction of each layer progresses, continuous blading, or dozing will be required to level the surface and to insure uniform compaction. Embankment construction shall not be performed when material contains frost, is frozen or is snow covered.

- C. *Placing Earth and Rock Embankment: When earth and stone or rock fragments are mixed in the embankment, all stones or rock fragments exceeding the thickness of the compacted lift shall be disposed of by being incorporated into the embankment outside the limits of the proposed surfaced areas. The thickness of the layer in these areas may be increased if necessary to accommodate the rocks, but shall not exceed 24 inches (60.96 cm) in thickness (loose state). The stones or rock fragments are to be placed so there will be no nesting. Compaction equipment shall be approved as required on Section 2102.9.B.*
- D. *Consolidated Rock Embankment: When the excavated material consists predominantly of stone or rock fragments of such size that the material cannot be placed in layers of the thickness prescribed, such material shall be placed in the embankment in layers having a thickness of the approximate average size of the larger rocks but not to exceed 24 inches (60.96 cm). Rocks or boulders too large to permit placing in a 24 inch (60.96 cm) layer shall be reduced in size as necessary to permit placement. Rock shall not be dumped in place but shall be distributed by blading or dozing in a manner to insure proper placement in final position in the embankment. The spalls and smaller stone fragments shall be left on the surface of each layer as formed. Each layer shall be thoroughly consolidated before the next layer is placed.*

The top 12 inches (30.48 cm) of the embankment shall not contain material having a maximum dimension greater than 3 inches (7.62 cm). The rock fragments or crushed stone shall be well graded to form a dense mass when compacted.

- E. *Compacting the Embankment: Before placing any embankment, the surface of the existing ground shall be prepared as heretofore specified, moistened as required, and the top 6 inches (15.24 cm) compacted to a density of 90 percent as prescribed by the following paragraph.*

All embankment shall be compacted to a density of at least 90 percent of the maximum density for the material used as determined by ASTM D-698 and within a tolerance of minus 3 percent and plus 2 percent of the optimum moisture at maximum density as determined by the Moisture Density Curve obtained. In addition to the above required compaction, the subgrade between lines 1 foot (30.48 cm) outside of the curbs and within the top 6 inches (15.24 cm) of the subgrade shall be compacted to a density of at least 95 percent of the maximum density for material used as determined by ASTM D-698 and with a tolerance of minus 3 percent and plus 2 percent of the optimum moisture at maximum density as determined by the Moisture Density Curve obtained.

All the work involved in either adding moisture to or removing moisture from embankment materials to within these moisture limits shall be considered incidental to the completion of the grading operation.

- F. *Moisture - Density Determination: In-place density and moisture content of the embankment will be determined by the Standard Method of Test for Density of Soil in Place by the Sand-Cone Method, ASTM D- 1556; or by the Rubber Balloon Method, ASTM D-2167; or by Nuclear Methods, ASTM D-2922.*

2102.10 Finishing: *In areas where sodding or seeding is proposed, the upper 12 inches (30.48 cm) of the surface area shall be earth material. The top 6 inches (15.24 cm) shall be suitable for sustaining grass. Except where other permit or utility work is in progress, the graded surface shall be made free of rock, concrete, and brick, or fragments thereof, or rubbish and shall be finished to the lines, grades, and cross-section indicated on the plans, including shoulder, berm and sidewalk spaces.*

The Contractor shall repair any damaged surface, and shall not use any finishing equipment that will leave a marred surface. When the subgrade preparation is included as a part of the finishing, the work shall be accomplished according to the requirements of Section 2201 entitled "Subgrade Preparation", and shall be considered incidental to finishing the grading work.

2102.11 Cleanup: *Cleanup shall follow the work progressively and final cleanup shall follow immediately behind the finishing. The contractor shall remove from the site of the work all equipment, tools and discarded materials, and other construction items. The entire right-of-way or easement shall be left in a finished and neat condition. Cleanup shall be considered as incidental to the completion of the grading work.*

2102.12 Construction Details:

A. Trench Excavation: Prior to excavation of the trench in fill areas, fill shall be compacted to a minimum 90% of maximum density (as determined by ASTM D 698) up to a minimum height of 18 inches above the top of the proposed pipe. Trenches shall be excavated to the width and depth as necessary to lay the pipe to the grade line as indicated on the Contract Drawings. Deviation from the indicated alignment will not be permitted except under special circumstances, subject to approval of the Engineer. Excavated materials are to be deposited beside trenches and excavations, beyond the reach of slides, transported to the spoil banks, or used for backfilling.

The length of trench excavation opened at one time shall be limited depending on the nature of the soil or other safety considerations. Trenches shall be excavated to a width that will provide adequate working space and pipe clearances for proper pipe installation, jointing, and embedment. However, the limiting trench widths must comply with the bedding class requirements set forth in Section 2102.12.D. Over-excavation shall be replaced with granular bedding material, or CLSM.

- 1. Unclassified Excavation:** Unclassified excavation is defined as the removal of all material encountered regardless of its nature. All material excavated will be considered as Unclassified Excavation unless the Special Provisions specify Classified Materials.
- 2. Rock Excavation:** Rock excavation is defined as the removal of all rock ledges 6 inches or more in thickness, detached rock or boulders having a volume of more than 1-1/2 cubic yards, and shale occurring in its natural state, hard and unweathered.

A rock ledge is defined as a continuous body of rock; which may include

interbedded seams of shale or other soft materials. Such interbedded soft material seams less than 12 inches in thickness will be included in the measurement of rock excavation. Such seams 12 inches or greater in thickness will be included only in the measurement of earth excavation.

No soft or disintegrated rock which can be removed with a pick or digging machine, no loose, shaken or previously blasted rock, no broken stones, and no rock which may fall into the trench from outside the limits of excavation will be considered as rock excavation. When solid rock is *unexpectedly discovered* in the trench, it shall be stripped of earth, and the Engineer notified.

When blasting is permitted by the Engineer, the Contractor shall use the utmost care to protect life and property. The Contractor shall comply with all laws, ordinances, and applicable safety code requirements and regulations relative to the handling, storage and use of explosives and protection of life and property and shall be responsible for all damage thereto caused by *them* or *their* subcontractor's operations.

The Contractor shall provide insurance as required by the General Provisions and Covenants and Special Provisions before performing any blasting. The governing agency shall be notified at least 24 hours before blasting operations begin.

3. **Earth Excavation:** Earth excavation is defined as the removal of all material not defined as rock.
4. **De-watering:** The Contractor shall remove any water that may accumulate, or be found in the trenches and other excavations made under the Contract.

The Contractor shall form all dams, flumes or other works necessary to keep them clear of water while the sewers and their foundations, and other foundation works, are being constructed. All water shall be removed from such excavation in a manner to avoid damage to property.

5. **Cribbing and Sheeting:** The Contractor shall furnish, install, and maintain such sheeting, bracing, and other components, as may be required to support any excavation and to prevent any movement which could in any way injure or delay the work or endanger adjacent pavement, building, or other structures. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed they shall be immediately filled and consolidated.

For the purpose of preventing injury or property damage, contractor may leave in place all sheeting or bracing, and other items to be embedded in the backfill of the trench. No sheeting or bracing, however, shall be left in place within 5 feet of the surface without the written permission of the Engineer.

- 6. Unstable Foundation:** Where materials encountered in the bottom of the trench are deemed as unsuitable by the Engineer to afford a sufficiently stable pipe foundation, the materials shall be removed to the depth and limits as ordered by the Engineer. Areas undergraded shall be backfilled with approved granular material or materials meeting the requirements of Section 2102.8 entitled "Undergrading."

- B. Granular Bedding Material:** Granular bedding material shall be crushed *clean limestone aggregate meeting one of the following gradations:*

Bedding Material Gradation Limits, % Passing

<i>Sieve Size</i>	<i>3/4"</i>	<i>1/2"</i>	<i>3/8"</i>
<i>1"</i>	<i>100</i>		
<i>3/4"</i>	<i>90-100</i>	<i>100</i>	
<i>1/2"</i>		<i>80-100</i>	
<i>3/8"</i>	<i>20-55</i>	<i>40-70</i>	<i>100</i>
<i>No. 4</i>	<i>0-10</i>	<i>0-15</i>	<i>30-40</i>
<i>No. 8</i>	<i>0-5</i>	<i>0-5</i>	<i>0-4</i>

In areas where the pipe trench is below the potential high point of the water table, only three-eighths (3/8") inch bedding may be used.

- C. Flowable Backfill: Controlled Low Strength Material (CLSM):**

- 1. Description:** This item shall govern the backfilling of *storm sewer structures and pipe trenches. When crossing existing utilities, the bedding requirements of the affected Utility shall apply.*

2. Materials:

a. CLSM Control and Quality:

- 1. Proposed Materials:** *No material shall be used until it has been checked or tested for compliance with the specifications of this Section and approved by the Engineer. Representative samples of all materials proposed for use in the CLSM shall be submitted to a private laboratory by and at the expense of the Contractor for compliance testing to these Specifications. All tests shall be performed and all materials shall fully comply. A determination of compliance with these Specifications shall be ascertained by a private laboratory prior to submitting a request for approval to the Engineer for the use of the materials and proposed mix design. Acceptable materials proposed for use shall have test results that accompany the request for approval of the proposed mix design.*

2. **Mix Design Strength Testing:** *Compressive strength shall be tested at 7 and 28 days in accordance with ASTM C- 39. The test cylinders shall be 3" in diameter by 6" in height.*

Flowable backfill shall have a maximum and minimum 28-day design compressive strength of 125 psi and 50 psi, respectively. The final set shall be a maximum of 2 hours when tested in accordance with ASTM C 266.

3. **Cost of Testing:** *All tests necessary for determining conformance with the requirements specified herein will be at the Contractor's expense.*

b. CLSM Materials Requirements: *The CLSM materials proposed for use in construction shall conform to the following requirements:*

1. Cement shall conform to ASTM C 150, Type I or Type II.
2. Fly Ash shall conform to ASTM C 618, Class C.
3. Fine Aggregate shall conform to ASTM C 33.
4. Mixing water shall conform to ASTM C 94.
5. Admixtures shall only be used when specified by the Engineer.

*The CLSM Flowable Backfill shall be transit mix, or from a mobile mixer. The elapsed time from when the water is added for batching until the CLSM is placed shall not exceed **two** hours.*

The slurry mixture shall be mixed between 70 to 100 revolutions of the ready-mixed truck. To minimize segregation, all flowable fill material shall be re-mixed at the project site at mixing speed in the ready-mix truck for approximately two (2) minutes immediately prior to discharge of the slurry mixture.

4. Construction:

The CLSM shall be constructed to the configuration and the lines and grades shown on the Contract Drawings, or as directed by the Engineer.

No CLSM shall be placed on frozen ground. When the ambient temperature either falls or is forecasted to fall below 35 degrees F within 24 hours of its proposed placement time, a set accelerator shall be used.

D. Backfill of Trenches:

General: All trenches and excavations shall be backfilled with suitable material placed and compacted in conformance with this Section and Section 2102.9 entitled "Embankment."

The bedding material area identified as Zone "A" in Figures "1" through "3" in this Section shall consist of approved granular material for all storm sewer conduits. The bedding rock shall be consolidated by vibratory or manual "chinking" action to provide uniform support – beneath and up to the Springline of the conduit.

*In the areas above Zone "A", the placement, consolidation, compaction, and moisture content of all backfill materials shall be done in accordance with the following specifications and cross-section details of Figures "1 thru 4." Controlled low strength material (CLSM), or flowable fill as it is commonly known, **shall be used** for all trenches under street or alley pavements up to the level of the pavement subgrade unless heavy compaction equipment is utilized or **unless otherwise approved by Engineer**. The pavement subgrade is a six to twelve-inch thick layer that consists of uniformly compacted material (as specified in Section 5200 and the Standard Drawings). **Compaction tests shall be performed, at the Contractors expense, by an approved testing laboratory to ensure the compaction requirements are met. One compaction test will be done for every 20', or part thereof, of trench under pavement and one set of tests will be done for every three feet, or part thereof, of backfill placed. A copy of the compaction test results shall be provided to the City prior to final inspection. Compaction testing is not required on flowable fill.***

*Figure 1: The cross-sectional details in Figure "1" describe the minimum requirements for trench backfilling in areas within street and alley pavements **where heavy compaction equipment is utilized**. The backfill shall be placed in accordance with section 2102.9.*

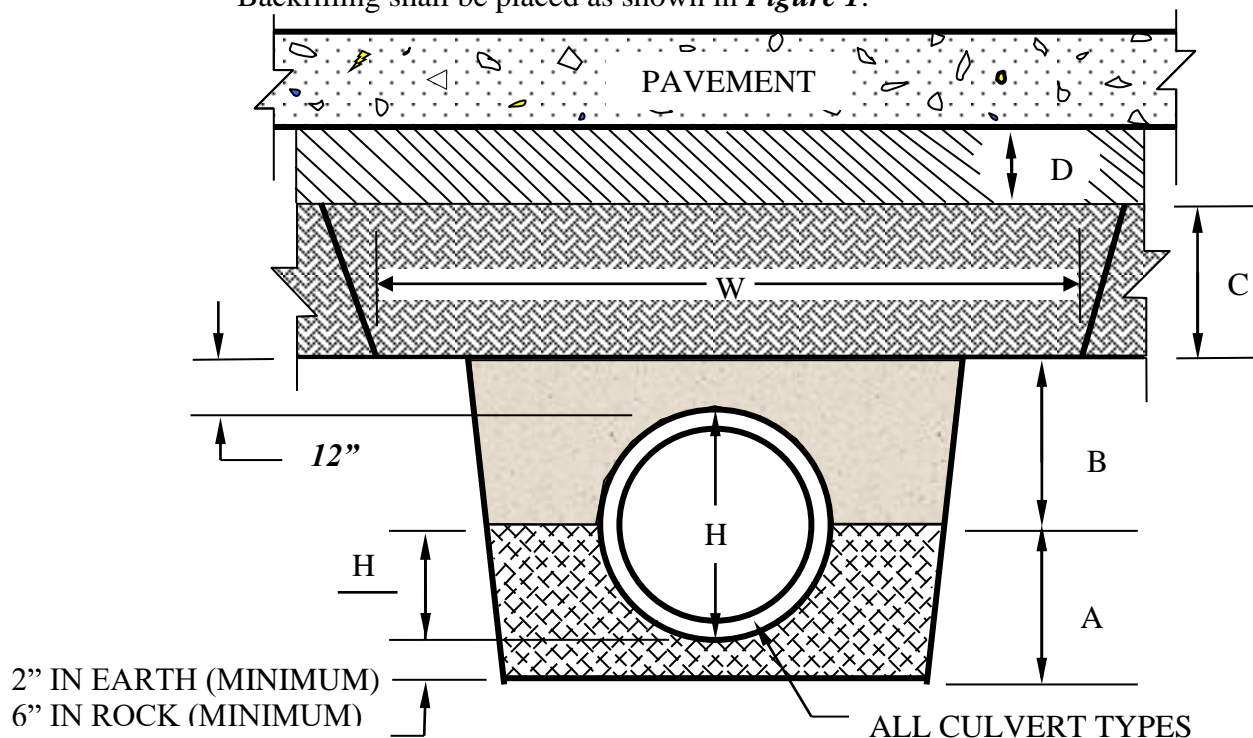
Figure 2: The cross-sectional details in Figure "2" describe the minimum requirements for trench backfilling in areas within street and alley pavements that do not allow for placement of the backfill material in accordance with 2102.9.

Figure 3: The cross-sectional detail of Figure "3" prescribes the minimum requirements for trench backfilling in areas that are outside of street and alley pavements.

2102.12.D

1. Backfilling under street and alley pavements where heavy compaction equipment is utilized.

Backfilling shall be placed as shown in **Figure 1**.



A – Consolidated granular bedding material or flowable fill. This zone may be extended up to a maximum of 12" above the top of the pipe if compacted in accordance with Section 2102.9 and tested as previously described.

B – Flowable Fill (CLSM). If zone A is extended to encompass zone B then no flowable fill will be required.

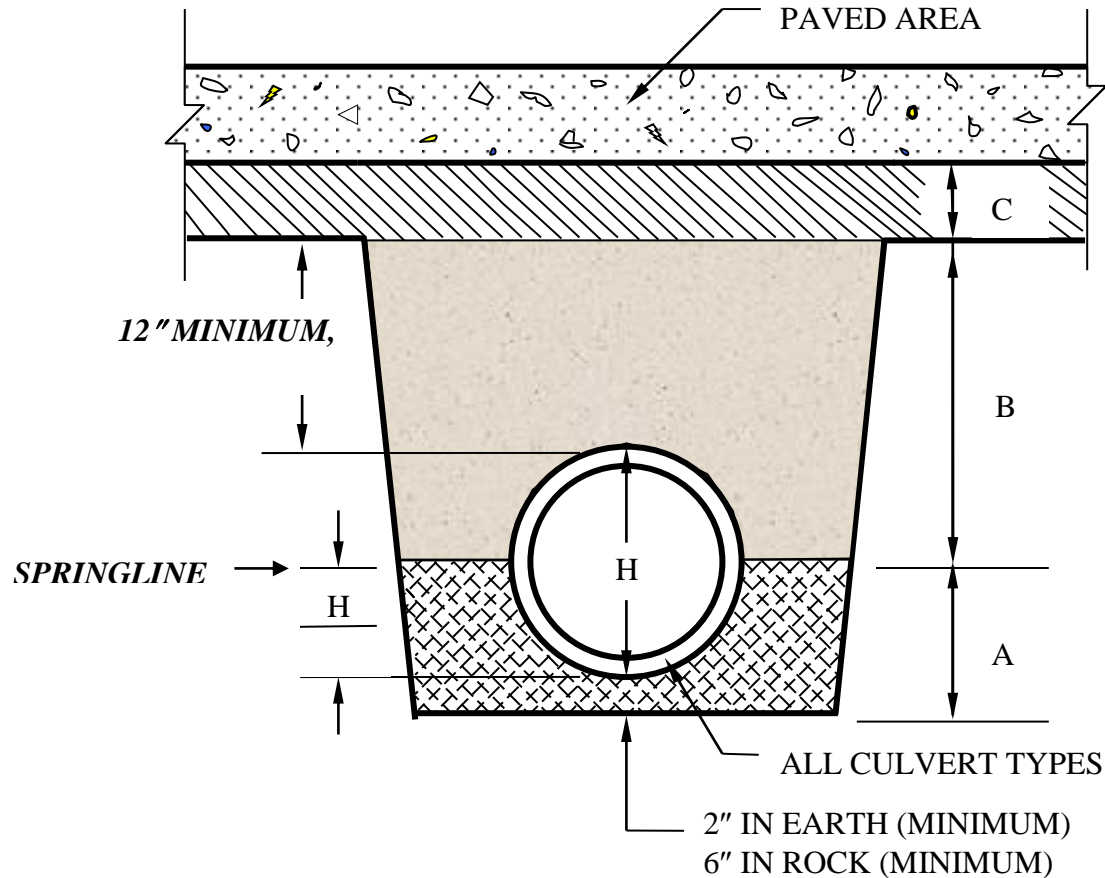
C – Compacted Embankment - Shall be constructed in accordance with Section 2102.9. Lift thickness shall not exceed the capability of the equipment being utilized to achieve the proper density and consolidation, and in no case shall a lift exceed twelve inches for soil. The minimum width, W, shall be two feet wider than the width of the required compaction device.

D – Compacted Subgrade - Subgrade thickness shall be as specified in Table 1 of Section 5206 and as directed by the engineer. Subgrade preparation shall be done in accordance with Section 2201 and shall consist of untreated compacted aggregate, stabilized aggregate base, or compacted soil – in accordance with the associated Sections 2201, 2202, and 2203.

FIGURE 1
(Trench Lines Using Earth Compaction Equipment)

2. *The following cross-sectional view of typical trench construction under street and alley pavements, Figure 2, shall apply to all backfill areas where trenches are not widened to allow heavy roadway compaction equipment.:*

Backfilling shall be placed as shown in **Figure 2**.



A – Consolidated granular bedding material.

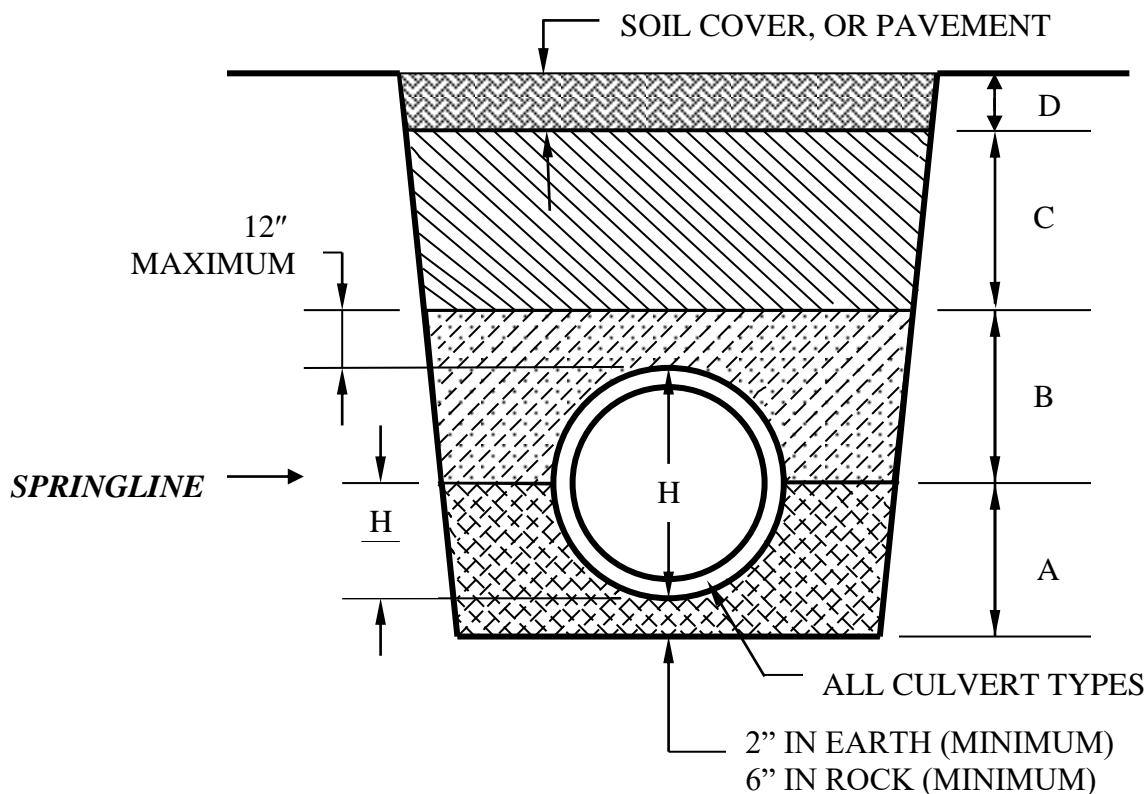
B – Flowable Fill (CLSM).

C – **Compacted Subgrade** - Subgrade thickness shall be as specified in Table 1 of Section 5206 and as directed by the engineer. Subgrade preparation shall be done in accordance with Section 2201, and shall consist of untreated compacted aggregate, stabilized aggregate base, or compacted soil – in accordance with the associated Sections 2201, 2202, and 2203.

FIGURE 2
(For Trenches Without Roadway Compaction Equipment)

3. Trench backfilling in areas other than street and alley pavements where the near edge of trench is behind the back of curb:

Backfilling shall be placed as shown in **Figure 3**.



A – Consolidated granular bedding material.

B – Consolidated granular bedding material, flowable fill (CLSM), or compacted soil – compacted to 90% of maximum density using ASTM D 698. Maximum lift thickness for the granular or soil materials shall be six inches.

C – Untreated compacted aggregate, flowable fill (CLSM), or compacted soil – compact to approximate density of adjacent soil but not less than 90% of maximum density using ASTM D 698. Lift thickness shall not exceed the capability of the equipment being utilized to achieve the proper density and consolidation; however, in no case shall it exceed twenty-four inches for soil.

D – Soil Cover – Soil cover shall be as specified in Section 2102.7. The top twelve inches shall be consolidated soil; the top six inches shall be topsoil suitable for sustaining grass.

FIGURE 3
(Trenches Outside of Street Pavements)

SECTION 2103 MEASUREMENT AND PAYMENT

2103.1 SCOPE

This section covers the methods of measurement and the basis of payment for the furnishing of all labor, equipment, tools, and materials and for the performance of all related work necessary to complete any construction covered in Section 2100.

2103.2 GENERAL

Unless specifically altered by the Contract Special Provisions, the methods of measurement and payment will be as specified herein.

2103.3 ITEMS NOT LISTED IN THE PROPOSAL

There will be no measurement or separate payment for any items of work not specifically identified and listed in the Proposal, and all costs pertaining thereto will be included in the contract unit prices for other items listed in the Proposal.

2103.4 METHODS OF MEASUREMENT

The quantities of accepted work will be measured and determined as follows:

A. Clearing, Grubbing, and Demolition:

1. Clearing may be listed in the Proposal and measured per acre or hundredth part thereof.
2. Grubbing may be listed in the Proposal and measured per acre or hundredth part thereof.
3. Demolition may be included as clearing or may be listed in the Proposal as a separate item and measured per each, and as such shall include all work as defined in Section 2101.2C.
4. Tree removal may be included in clearing or may be listed as a separate item in the Proposal and measured as per each.

B. Tree Protection:

1. Protection fence may be listed in the Proposal and measured per linear foot.
2. Fertilizer may be listed in the Proposal and measured per 100 pounds.
3. Concrete block, brick, or stone for tree wells or walls may be listed in the Proposal and measured per piece.

- C. **Buffers:** There will be no measurement of payment for buffers or construction sequence schedule.

D. Grading:

1. Unclassified Excavation may be listed in the Proposal and measured to determine the quantity in cubic yards or tenth part thereof.
2. Rock excavation may be included as Unclassified Excavation or may be listed in the Proposal as a separate item and measured to determine the quantity in cubic yards or tenth part thereof. No measurement will be made for rock overbreak in excess of 12 inches below the subgrade elevation.
3. Earth Excavation may be included as Unclassified Excavation or may be listed in the Proposal as a separate item and measured to determine the quantity in cubic yards or tenth part thereof. No measurement will be made for embankment performed in rock overbreak areas where the overbreak is in excess of 12 inches below the subgrade elevation.
4. Embankment may be listed in the Proposal and measured to determine the quantity in cubic yards or tenth part thereof.
5. Undergrading may be listed in the Proposal and measured to determine the quantity in cubic yards or tenth part thereof.

E. Topsoiling:

1. Topsoiling may be listed in the Proposal and measured in cubic yards.

F. Construction Entrance:

1. Rock may be listed in the Proposal and measured in cubic yards or ton.
2. Geotextile may be listed in the Proposal and measured in square yards.

2103.5 BASIS OF PAYMENT

Payment for the quantities of accepted work will be made as follows:

A. Clearing, Grubbing, and Demolition:

1. Clearing, grubbing, or clearing and grubbing may be included in the Proposal as separate items or as one item and will be paid for by one of the following:
 - a. Payment will be made at the contract unit bid price.
 - b. Payment will be made at the contract lump sum bid price.
2. Demolition, if listed as a separate item in the Proposal and not included as a part of Clearing or Clearing and Grubbing, will be paid for by one of the following:
 - a. Payment will be made at the contract unit bid price.

- b. Payment will be made at the contract lump sum bid price.
- 3. Tree Removal, if listed in the Proposal as a separate item and not included as a part of Clearing or Clearing and Grubbing, will be paid for by one of the following:
 - a. Payment will be made at the contract unit bid price.
 - c. Payment will be made at the contract lump sum bid price.

B. Tree Protection:

- 1. Payment will be made at the contract unit bid price.
- 2. Payment will be made at the contract lump sum bid price.

C. Grading:

- 1. Unclassified Excavation, Rock Excavation, or Earth Excavation may be included in the Proposal as separate items or as one item and will be paid for by one of the following:
 - a. Payment will be made at the contract unit bid price.
 - b. Payment will be made at the contract lump sum bid price.
- 2. Embankment may be included in the Proposal and will be paid for by one of the following:
 - a. Payment will be made at the contract unit bid price.
 - b. Payment will be made at the contract lump sum bid price.
- 3. Undergrading may be listed in the Proposal and will be paid for at the contract unit bid price.

D. Topsoiling:

- 1. Payment will be made at the contract unit bid price.
- 2. Payment will be made at the contract lump sum bid price.

E. Temporary Construction Entrance:

- 1. Payment will be made at the contract unit bid price.
- 2. Payment will be made at the contract lump sum bid price.

SECTION 2150 EROSION AND SEDIMENT CONTROL

SECTION 2151 GENERAL REQUIREMENTS

2151.1 CONTRACTOR'S RESPONSIBILITIES & QUALIFICATIONS

Contractors must take all measures necessary to reduce erosion and sedimentation from occurring on the project. Contracts should include the installation, inspection, and maintenance of erosion and sediment control measures. Contractors should have the proper education, training, and qualifications necessary as stated in Section 5102 of these standards to properly install and maintain all temporary erosion and sediment control measures.

2151.2 COMPLIANCE WITH PERMITS

All construction projects disturbing one or more acres will have obtained a National Pollutant Discharge Elimination System (NPDES) permit from the state. Other Federal, State, or local permits may also need to be obtained for the project. The Contractor is required to conform to and comply with all permits and follow the Storm Water Pollution Prevention Plan (SWPPP) developed for the site.

2151.3 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

The Storm Water Pollution Prevention Plan will be developed as a requirement of the NPDES permit and local municipal ordinance and permit. Before any construction activities begin on the project, the Contractor and any Subcontractor, who will implement any measures identified in the SWPPP, must verify that they understand the terms and conditions of the permits and plan. The name Erosion and Sediment Control Plan can be substituted for Storm Water Pollution Prevention Plan (SWPPP).

2151.4 INSPECTION AND MAINTENANCE OF PLAN

The Contractor and Subcontractors must maintain the integrity of the temporary erosion and sediment control measures as long as they are in place and necessary. The devices should be inspected immediately after each rainfall of ½ inch or greater and as often as the permits require. Devices should be maintained as dictated in the SWPPP and devices that are not functioning properly should be corrected or replaced. A troubleshooting matrix is included in Table 2151-1 to guide the Contractor to the information necessary to keep the devices working in order to reduce sediment pollution. All pipes that are to be abandoned shall be removed unless otherwise shown on the plans or approved by the Engineer.

Table 2151-1: Troubleshooting Matirx for Erosion, Sediment, and Stormwater Runoff Control in Developing Areas

Problem:	Solution:	Types of Protection:	Control Practice:	Section:
Soil Erosion Sediment (off-site) Dust Drying Grass Unstable Slopes	Soil Protection & Stabilization	Vegetative	Tree Protection	2101.2
			Temporary Seeding	2151.1.1
			Permanent Seeding	2151.1.2
Sediment Flowing into Drains Sediment (off-site)	Sediment Control	Non-Vegetative & Combined Vegetative and Non-Vegetative	Sodding	2151.1.3
			Land Grading	2102.2
			Surface Roughening	2102.3
			Topsoling	2102.4
			Temporary Construction Entrance	2102.5
			Mulching	2151.2
			Tackifiers, Soil Binders, and Bounded Fiber	2151.3
			Matix	2151.4
			Roller Erosion Control Products	2153.1
			Dust Control	2153.1
Sediment (on or off-site) Erosion on Slopes Erosion Channels Localized Flooding Wet, Soft Ground Erosion at Outlets	Stormwater Runoff Control	Storm Drain Inlet Protection	Drop and Curb Storm Inlet Protection	2152.10.1
			Culvert Inlet Protection	2152.10.2
		Sediment Barriers	Vegetated Buffer (Filter Strip)	2101.3
			Sediment Fence	2151.1
			Super Sediment Fence	2152.3
			Straw Bale Barrier	2152.4
			Log or Wattle Products	2152.6
			Rock Check Dam	2152.7
			Triangular Silt Dyke™	2152.8
			GeoRidge®	2152.9
			Turbidity Curtain	2152.20
Sediment (on or off-site) Flooding (on or off-site) Erosion (on or off-site) Stream Erosion Pollutants in Runoff	Stormwater Management	Surface Runoff Control	Temporary Fill Diversion	2152.12.1
			Temporary Diversion Dike	2152.12.2
		Runoff Conveyance	Right-of-Way Division	2152.12.3
			Grass-lined Channel	2152.13.1
		Outlet Protection	Temporary Slope Drain	2152.14
			Dewatering	2152.19
		Sediment & Stormwater Traps	Outlet Protection (Energy Dissipation)	2152.11
			Temporary Sediment Trap	2152.15
		Infiltration	Temporary Sediment Basis	2152.16
			Vegetated Stream Buffers	2104.4
			Compost Berm or Tubes	2152.5
			Infiltration Trench	2152.13.2
			Detention/Infiltration Basin	2152.17

SECTION 2152 EROSION CONTROLS (C)

2152.1 SEEDING AND SODDING

- A. **Description:** The most efficient and economical means of controlling sheet and rill erosion is to establish vegetative cover. Seeding and sodding are two methods to provide for vegetative cover. Depending on the type of seed chosen, the vegetative cover can be either temporary, lasting approximately one season, or permanent.

Seeds: Seeds for cover crops shall comply with the requirements of the applicable state seed laws and shall be the mixture of seeds specified in the Erosion and Sediment Control Plan. Seeds shall be free of prohibited weed seeds and shall not have more than 1 percent of noxious weed seeds. Seeds shall be delivered to the site in convenient containers, each fully labeled, bearing the name trade name, or trade mark, warranty of the producer, and a certificate of the percentage of the purity and germination of each kind of seed specified.

Pure Live Seed: The following formula shall be used to determine the amount of commercial seed required to provide each kind of seed for the specified quantities of pure live seeds:

$$\text{Pounds of Commercial Seed Required} = \frac{10,000 \times \text{Pure Live Seed (lbs per acre)}}{\text{Purity (percent)} \times \text{Germination (percent)}}$$

- B. **Fertilizer:** Fertilizer shall be inorganic 12-12-12, 13-13-13, or 10-20-5 grade; uniform in composition; free flowing and suitable for application with approved equipment; and delivered to the site in convenient containers, each fully labeled and conforming to the applicable state fertilizer laws, bearing the name, trademark or trade name, and a warranty of the producer.

1. Temporary Seeding:

- A. **Description:** Temporary Seeding is the establishment of fast growing annual vegetation to provide economical erosion control for up to 12 months. Annual plants, which sprout rapidly and survive for only one growing season, are suitable for establishing temporary vegetative cover.
- B. **Application:** Temporary Seeding applies where short-lived vegetation can be established before final grading or in a season not suitable for permanent seeding. It helps reduce costly maintenance operations on other erosion and sediment control systems such as sediment basin clean-out. Temporary or permanent seeding is necessary to protect earthen structures such as dikes, diversions, and dams of sediment basins.

C. Installation:

- 1) **Planting Seeds:** Apply seed evenly with a broadcast seeder, drill, cultipacker seeder, or hydroseeder. Plant small grains such as oats, rye, and wheat no more than 1½ inch deep. Plant grasses and legumes no more than ½ inch deep. Prior to mulching, harrow, rake, or drag a chain to lightly incorporate broadcast seed and enhance germination. Cover

broadcast or drilled seed with mulch (See *Mulching*), on bare soils, firm lightly with a roller or a cultipacker.

- 2) **Planting Dates:** Plant according to the design plan. In absence of a plan, choose a recommended temporary species or mixture appropriate for the season from Table 2152-1.

Table 2152-1: Temporary Seeding Plant Materials and Minimum Seeding Rates *

Species	Seeding Rate		Plant Characteristics
	lbs. per Acre	lbs. per 1,000 sq.ft.	
Oats	80 lbs.	2 lbs.	Not cold tolerant, height up to 2 feet
Cereals: Rye/Wheat	90 / 120	2.0 / 2.5	Cold tolerant, height up to 2 feet, low pH tolerant
Millet, Sudan grass	45 / 60	1.0 / 1.5	Warm season annual, aggressive growth, height up to 5 feet
Annual Ryegrass	75	2	May be added to mix, not heat tolerant, height up to 16 inches
Annual Lespedeza** Plus Tall Fescue	15 plus 45	0.5 plus 1.0	Warm season annual legume, makes own nitrogen, tolerates low pH

Source: MDNR, 1998.

* If site may not be developed for more than one year consider using permanent species in Table 2152-7.

** If there is any possibility that the seeding will be required to control erosion for more than one year, then consider the addition of fescue or another permanent species as part of a mixture when seeding.

Plant during optimum seeding dates from Table 2152-2 if possible. Use mulch as a cover after planting. Roll and cultipack broadcast seed for good soil-to-seed contact. Use high quality seed. For best results use certified seed. When using uncertified seed, use the highest recommended seeding rate.

- 3) **Compaction:** Immediately following the completion of seeding operations, the entire area should be compacted by a roller weighing between 60 and 90 pounds per linear foot.

Table 2152-2: Seeding Dates for Temporary Seeding

Species	Seeding Dates Optimum & Acceptable											
	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Oats												
Cereals: Rye/Wheat												
Millet, Sudan grass												
Annual Ryegrass												
Annual Lespedeza plus Tall Fescue												

Source: MDNR, 1998.

	Optimum Seeding Dates
	Acceptable Seeding Dates

- D. **Troubleshooting:** Consult with a qualified design professional if: design specifications for seed variety, seeding dates, or mulching cannot be met;

substitutions may be required. Unapproved substitutions could lead to failure of vegetation establishment.

- E. **Inspection & Maintenance:** Check temporary seedings within 2 to 4 weeks of planting to ensure stands cover more than 50% of the ground surface. Stands should be uniform and dense for best results. Fertilize, reseed, and mulch bare and sparse areas immediately to reduce erosion potential.

Water area of temporary seeding if rainfall is inadequate for proper germination or growth. Mowing is not recommended for cereals seeded alone. Cereals seeded with grass can be mowed when height is greater than 12 inches. However, to prevent damage to grasses, do not mow shorter than 4 inches.

Millets and sudangrass should be mowed before height is greater than 6 inches to allow regrowth and continued erosion protection. Annual lespedeza and tall fescue may be mowed after height exceeds 8 inches. Do not mow shorter than 4 inches.

Replant temporary or permanent vegetation within 12 months as annual plants die off and no longer provide erosion control. Consider no-till planting where possible.

2. **Permanent Seeding:**

- A. **Description:** Permanent seeding is the establishment of perennial vegetation on disturbed areas for periods longer than 12 months. Permanent vegetation provides economical, long-term erosion control.
- B. **Application:** Permanent seeding is used when vegetation is desired to permanently stabilize the soil. It is necessary to protect earthen structures such as dikes, channels, and embankments. Particular care is required to establish a good, thick cover of permanent grass.
- C. **Installation:** During final grading, take soil samples from the top 6 inches in each area to be seeded. Submit sample to a soil testing laboratory for liming and fertilizer recommendations.
 - 1) **Seedbed Preparation:** Seedbed preparation is essential for the seed to germinate and grow. For broadcast seeding and drilling, loosen the soil to a depth of approximately 3 inches. For no-till drilling, the soil surface does not need to be loosened unless it has been compacted. Loosen compacted, hard or crusted soil surfaces with a disk, ripper, chisel, harrow, or other tillage equipment. Avoid preparing the seedbed under excessively wet conditions.
 - 2) **Liming:** Follow the design plan. Apply ground agricultural limestone unless a soil test shows a pH of 6.0 or greater. If a soil test or plan is not available, use 2 tons of ground agricultural lime per acre. Incorporate lime into the top 3 to 6 inches of soil.

- 3) **Fertilizer:** For establishment and long-term growth, apply a complete fertilizer at rates recommended by soil tests or as specified in the design plan. In the absence of soil tests, use the following as a guide:
 - a. **Cool Season Grasses:** Apply 90 pounds (lbs.) each of actual Nitrogen, Phosphorus, and Potassium per acre.
 - b. **Cool Season Grass/Legume Mixtures:** Apply 60 lbs. actual Nitrogen, 90 lbs. actual Phosphorus, and 90 lbs. actual Potassium per acre.
 - c. **Warm Season Grasses:** Apply 20 lbs. actual Nitrogen, 60 lbs. actual Phosphorus, and 30 lbs. actual Potassium per acre.
 - d. **Cool/Warm Season Grass Mixtures:** Apply 30 lbs. actual Nitrogen, 60 lbs. actual Phosphorus, and 30 lbs. actual Potassium per acre.

Note: Fertilizer can be blended to meet exact fertilizer recommendations. Take soil test recommendations to local fertilizer dealer for bulk fertilizer blends. This may be more economical than bagged fertilizer.

Incorporate lime and fertilizer to a depth of 3 to 6 inches by disking or chiseling on slopes of 3H:1V or flatter.

Grade the soil to a smooth, firm surface to enhance rooting of seedlings and reduce rill erosion.

- 4) **Plant Selection:** If not specified in the design plan, choose a suitable species of grass or a grass/legume mixture from Tables 2151-3 and 2151-4 appropriate for the season that planting will occur. Consider site conditions including soils, plant characteristics, region of the state, and desired level of maintenance. The species shown are adapted for lawns and erosion control. If there are questions about species selection and how they may be adapted in wildlife habitat or wetland applications, contact your local NRCS or County Extension office.
- 5) **Developing a Mixture:** A pure stand of grass provides the best erosion control. The advantage of a grass/legume mix is that the legume provides nitrogen for the grass and often grows during hotter and drier months when a cool season grass is usually dormant. Usually one or two grasses and one legume is sufficient in a mixture. Refer to Tables 2151-3 and 2151-4 for information about each grass and legume to determine the correct species for your site.
- 6) **Nurse Crops:** Nurse crops such as wheat, rye, and oats are sometimes used in a seeding mixture. These winter annuals can reduce weeds, control erosion, and provide winter protection to young seedlings. Nurse crops should be planted about 1 inch deep, however, nurse seed can be mixed with permanent seed mix and planted shallower. Most permanent

grasses and legumes are sown ¼ inch deep. Permanent seedings should not be planted deeper than ½ inch.

- 7) **Aesthetic Plantings:** A wide variety of native forbs and grasses are available that add diversity and beauty to permanent plantings (e.g. switchgrass as an accent). Contact your local NRCS office for species selection and seeding rates.

Table 2152-3: Plant Characteristics

Species		Kansas Adaptation ¹	Missouri Adaptation ²	Maintenance L - M - H ³	Fertility Needs L - M - H ⁴	Establishment Ease P - M - G ⁴
Cool Season Grasses	Perennial ryegrass	E, C, W *	N, S	L	M	M
	Canada wild rye	E, C, W	N, S	M	L	G
	Tall fescue	E, C, W *	N, S	M	L - H	G
	Crested wheatgrass	E, C, W	N	M	L	M - G
	Kentucky bluegrass	E, C, W *	N, S	H	M - H ⁵	M - G
	Bromegrass	E, C, W *	N, S	M	M - H ⁵	M - G
	Rice cutgrass	E, C, W *	N, S	L	L	M
	Bluejoint Keedgrass	E, C, W	N, S	L	L	G
	Redtop	S1/2 E	N, S	L	L	M
	Common Bermuda	S1/2 E, C	S	L	L - M	M
Warm Season Grasses	Hybrid Bermuda	S1/2 E, C	-	L	L - M	M
	Buffalograss ⁶	E, C, W	N, S	L	L	M
	Blue grama	E, C, W	N, S	L	L	M
	Zoysia ⁷	S1/2 E, C	-	M	M - H	M
	Sideoats grama	E, C, W	N, S	M	L	G
	Little bluestem	E, C, W	N, S	M	L	M
	Big bluestem	E, C, W	N, S	M	L	M
	Indiangrass	E, C, W	N, S	M	L	M
	Switchgrass	E, C, W	N, S	M	L	M
	Birdfoot trefoil	E, C, W *	N, S	L	M	P - M
Legumes ⁸	Annual lespedeza ⁹	E, C, W *	N, S	M	M	P - M
	Red clover	E, C, W *	N, S	M	M	G
	White clover	E, C, W *	N, S	L	L	M - G
	Alfalfa	E, C, W *	N, S	M	M	P
	Wheat				M	M
	Rye (cereal)				M	M
	Oats				M	M
	Companion Crops/Cereal Grains					

Source: MDNR, 1998.

¹ Adaptation limited to areas in western Kansas which receive additional moisture enhancement by irrigation, subirrigation or overland flow.

² E=East, C=Central, W=West

³ N=North, S=South (Separation is the Missouri River)

⁴ L=low, M=moderate, H=high

⁵ P=poor, M=moderate, G=good in a mixture.

⁶ Will be high maintenance in lawn-type or low rainfall (<30") settings.

⁷ Usually sprigged, plugged or sodded.

⁸ Legumes alone will not provide adequate erosion protection; use with a grass

⁹ Will reseed each year if not mowed until after seed shatter in September.

Table 2152-4: Species Tolerance for Environmental Conditions

Species	Tolerance					
	Shade	Drought	Flooding	Traffic	Soil Wetness	
			L - M - H		P - M - G	
Cool Season Grasses	Perennial Ryegrass	L	L	M	M	M
	Canada Wildrye	M	M	L	M	P
	Tall Fescue	M	M	M	M	P
	Crested Wheatgrass	L	H	M	M	G
	Kentucky Bluegrass	L	L	M	H	G
	Brome grass	L	M	L	H	M
	Redtop	L	L	M	H	G
	Rice Cutgrass	L	L	H	L	G
	Bluejoint Reedgrass	L	L	H	L	G
	Common Bermuda	L	H	H	H	M
Warm Season Grasses	Hybrid Bermuda	L	H	H	H	M
	Buffalograss	L	H	H	H	G
	Blue Gama	L	H	L	M	P
	Zoysia	L	H	M	H	P
	Sideoats Gama	L	H	M	H	M
	Little Bluestem	L	H	L	L	P
	Big Bluestem	L	H	M	L	M
	Indiangrass	L	M	L	M	P
	Switchgrass	L	M	M	M	G
	Birdsfoot Trefoil	L	H	L	M	G
Legumes ¹	Annual Lespedeza ²	L	L	M	L	M
	Red Clover	L	L	M	L	M
	White Clover	L	L	L	H	M
	Alfalfa	L	L	L	L	P

Source: MDNR, 1998.

Key: P = poor, L = low, M = moderate, G = good, H = high

¹Legumes alone will not provide adequate erosion protection: use with grass in a mixture

- 8) **Planting Dates:** If seeding dates are not specified in the design plan, use the seeding calendar shown in Table 2151-5.

Plant during optimum seeding dates if possible. Use mulch if planting during acceptable or dormant seeding dates. For dormant seeding dates, broadcast seed and immediately roll and cultipack for good soil-to-seed contact.

If unable to seed according to schedule, use temporary seeding until preferred date for permanent seeding.

Table 2152-5: Optimum and Acceptable* Planting Dates

Species	Seeding Dates Optimum & Acceptable											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Turf Fescue												
Tall Fescue												
Kentucky Bluegrass												
Perennial Ryegrass												
Rice Cutgrass												
Redtop												
Bermuda - Common												
Bermuda - Hybrid												
Buffalograss ¹												
Zoysia ²												
Birdsfoot Trefoil												
Common Lespedeza												
Red Clover												
White Clover												
Wheat/Rye ³												
Oats ⁴ , ⁵												

Source: MDNR, 1998.

Optimum Seeding Date

Acceptable/Dormant Seeding date (*with mulch over)

¹Can also be sprigged

²Usually sprigged. Space plugs every 6, 8, 12 inches; with 4,000, 2,250 or 1,000 springs/100 sq.ft. respectively

³Nurse crop only

⁴Provides a quick temporary cover or nurse crop even if planted in the fall

- 9) **Seeding Rates:** If seeding rates are not specified in the design plan, use rates in Table 2152-6 for grasses alone. Use rates in Table 2152-7 for a grass/legume mixture. These rates are based on the poor growing conditions that typically exist on a development site, a need for dense growth, and high germination rates.

For best results use certified seed. When using uncertified seed, use the highest recommended seeding rate. Higher seeding rates will not compensate for seedbed preparation.

Table: 2152-6: Seeding Rates

Species		Kansas: Full Seeding Rate ¹	Missouri: Full Seeding Rate ²
		lbs/acre (PLS) ²	lbs/acre (PLS) ²
Cool Season Grasses	Perennial Ryegrass	80	80
	Canada Wildrye	21	24
	Tall Fescue	80	80
	Crested Wheatgrass	20	16
	Kentucky Bluegrass	50	50
	Bromegrass	100	100
	Redtop	8	8
	Rice Cutgrass	8	8
	Bluejoint Reedgrass	4	4
Warm Season Grasses	Common Bermuda	2	4
	Hybrid Bermuda	20 bu*/acre	-
	Buffalograss	8 (grain)	8 (grain)
	Blue Gama	3	6
	Zoysia	20 bu/acre	-
	Sideoats Gama	15	15
	Little Bluestem	9	13
	Big Bluestem	17	16
	Indiangrass	12.5	16
	Switchgrass	8	9
Legumes ¹	Birdsfoot Trefoil	5	10
	Annual Lespedeza	14	16
	Red Clover	8	12
	White Clover	3	4
	Alfalfa	9	9
Nurse Crops	Wheat	1 bu/acre	1 bu/acre
	Rye (cereal)	1 bu/acre	1 bu/acre
	Oats	1 ½ bu/acre	1 ½ bu/acre
Source: MDNR, 1998.			
*Note: Rates based on typical construction site conditions where seedbed is normally less than ideal. Planned future use or specific site conditions may dictate an increase or a decrease in rates. Contact your local NRCS office or consulting agronomist for specific seeding rates within your county.			
¹ PLS or Pure Live Seed = the amount of seed guaranteed to grow.			
² Legumes alone will not provide adequate erosion protection: use with a grass in a mixture.			
*Bu = bushel			

Table 2152-7: Seeding Mixtures for Critical Areas

Grass-Legume Mixture	Seeding Rate (PLS*)	
	lbs/1000 ft ² ***	lbs/acre
Rice Cutgrass/Bluejoint Reedgrass	-	8 + 4
Tall Fescue**/Birdsfoot Trefoil	10 + ¼	80 + 2
Tall Fescue**/White Clover	10 + 0.1	80 + 1
Tall Fescue**/Lespedeza	10 + ½	80 + 4
Tall Fescue**Lespedeza/White Clover	10 + ½ + 0.1	80 + 4 + 1
Tall Fescue**/Red Clover	10 + ¼	80 + 2
Tall Fescue**/Red Clover/White Clover	10 + ¼ + 0.1	80 + 2 + 1
Kentucky Bluegrass/White Clover	3 + 0.1	25 + 1
Kentucky Bluegrass/Red Clover	3 + ¼	25 + 2
Kentucky Bluegrass/Birdsfoot Trefoil	3 + ¼	25 + 2
Kentucky Bluegrass/Lespedeza	3 + ½	25 + 4
Perennial Ryegrass/Red Clover	8 + 1	70 + 10
Perennial Ryegrass/Birdsfoot Trefoil	8 + ½	70 + 5
Perennial Ryegrass/Lespedeza	8 + 3	70 + 25
Big Bluestem/Indiangrass/ Switchgrass/Sideoats Grama/Western Wheatgrass	-	3.4 + 2.5 + 2 + 3 + 4
Wheat/Rye (as nursery crop)	1.5	60
Oats (as nursery crop)	0.75	30

Source: MDNR, 1998

*PLS or Pure Live Seed = the amount of seed guaranteed to grow. To calculate amount of bulk seed needed: Read seed tag and multiply % purity X % germination = % PLS; then divide lbs of PLS recommended by % PLS.

**Turf Fescue may be substituted for fescue at the same rates.

***Note: Use lbs/1000 ft² rate to establish dense vegetation for lawns.

- 10) **Seeding:** Apply seed uniformly using a cyclone seeder, drop-type spreader, drill, cultipacker seeder, or hydroseeder. When using a drill seeder, plant rye or other grains about 1 inch deep; plant grasses and legumes no more than ½ inch deep. Calibrate equipment in the field. Cover seed by raking or dragging a chain, brush, or mat. Then firm the soil lightly with a roller. Seed can also be covered with hydro mulched wood fiber and tackifier.
- 11) **Legumes:** Legumes require inoculation with nitrogen-fixing bacteria to ensure good growth. Purchase inoculum from seed dealer and mix with seed prior to planting.
- 12) **Mulching:** Mulching is recommended to conserve moisture and reduce erosion. Cover at least 75% of the area with approved mulch materials. Crimp, tack, or tie down mulch with netting or use a rolled erosion control product instead of mulching. Mulching is extremely important for successful seeding. See Section 2152.2 for mulch rates.
- 13) **Watering:** The seeded area must be watered if adequate rainfall does not occur for germination or vegetation establishment.

14) **Construction Verification:** Check materials and installation for compliance with specifications.

D. **Troubleshooting:** Consult with design professional if: design specifications for seed variety, seeding dates, or mulching cannot be met; substitutions may be required. Unapproved substitutions could lead to failure of vegetative establishment.

1) **Common Problems:**

- a. Inadequate seedbed preparation results in poor stand
Prepare well-tilled, limed, and fertilized seedbed and reseed.
- b. Unsuitable choice of plant materials (e.g. seeding Bermuda grass in the north or in the fall) results in stand failure. Select an appropriate species based on plant characteristics in Tables 2152-3 and 2152-4 and time of seeding in Table 2152-5.
- c. Nurse crop rate too high in mixture results in perennial being out-competed. Limit rates to those shown in Table 2152-7; eliminate old nurse crop, prepare seedbed, and reseed.
- d. Seeding at the wrong time of the year results in inadequate stand. Consult Table 2152-5 and reseed. If timing is not right, use temporary seeding to stabilize soil until preferred seeding dates.
- e. Inadequate mulching results in inadequate stand, bare spots, or eroded areas. Prepare seedbed, reseed, cover seed evenly, and tack or tie down mulch, especially on slopes, ridges, and in channels (see Section 2152.4).

E. **Maintenance & Inspection:** Expect emergence of grasses within 4 to 28 days and legumes 5 to 28 days after seeding, with legumes following grasses.

1) **Check permanent seedings within 4 to 6 weeks after planting to ensure:**

- a. Vigorous seedlings;
- b. Uniform density with at least 75% of the ground surface covered;
- c. Uniformity with nurse plants, legumes, and grasses well intermixed; and

- d. Green, not yellow, leaves. At a minimum, perennial plant bases should remain green throughout the summer.
- 2) **Reseeding:** Inspect seedlings for erosion or die-out for a minimum of one year. To repair bare and sparse areas, fill gullies, re-fertilize, reseed, and mulch. Consider no-till planting where possible.

If stand is inadequate or plant cover is patchy, identify the cause of failure and take corrective action. Possible causes of failure include choice of plant materials, lime or fertilizer quantities, poor seedbed preparation, and weather. If vegetation fails to grow, have the soil tested to determine whether pH is in the correct range or if nutrient deficiency is a problem. Depending on stand conditions, repair with complete seedbed preparation, then over-seed or reseed. If seasonal constraints prohibit planting the desired species, use temporary seeding or over-seed with cereal grain or millets to thicken the stand until the desired perennials may be planted.

- 3) **Fertilization:** Satisfactory establishment may require re-fertilizing the stand in the second growing season.
- a. Do not fertilize cool season grasses from late May through July.
 - b. Grass that looks yellow may be nitrogen deficient. An application of 50 lbs of N-P-K per acre in early spring will help cool season grasses compete against weeds or grow more successfully. Remember to convert actual pounds of nutrient needed when determining how many pounds of commercial fertilizer to buy.
 - c. Do not use nitrogen fertilizer if stand contains more than 20% legumes.
- 4) **Mowing:** Consider mowing after plants reach a height of 6 to 8 inches. Mow grasses to not less than 3 inches in height and minimize compaction during mowing process. Monitor the late winter and early spring growth of nurse crops to be sure that they do not smother the permanent seeding. Mowing in April may reduce the competitiveness of the nurse crop and open the canopy to allow more sunlight to permanent seedlings that are beginning to grow. Vegetation of elements such as embankments and grass-lined channels needs to be mowed only to prevent woody plants from invading.

2. Sodding

- A. **Description:** Sodding is established turfgrass grown to be cut in strips of some leaf, crown, root mass, and soil then transported to a new site and reestablished to provide vegetative cover and protect the soil from erosion. See Detail ESC-02, Sodding, in Division III of this manual.
- B. **Application:** Sodding is well suited for stabilizing erodible areas such as grass-lined channels, stormwater detention basins, diversions, swales, slopes and filter strips. Disturbed areas which require immediate and permanent vegetative cover, or where sodding is preferred to other means of grass establishment. Locations particularly suited to stabilization with sod include:
- 1) Waterways and channels carrying intermittent flow at acceptable velocities. See Detail ESC-03, Sodded Waterways in Division III of this manual,
 - 2) Areas around drop inlets, when the drainage area has been stabilized,
 - 3) Residential or commercial lawns and golf courses where prompt use and aesthetics are important, and
 - 4) Steep critical areas.

2152.2 MULCHING

- A. **Description:** Mulching is the application of plant residues such as straw, hay, wood cellulose, or other suitable materials to the soil surface. Mulch protects the soil surface from the erosive force of raindrop impact and reduces the velocity of overland flow. It helps seedlings germinate and grow by conserving moisture, protecting against temperature extremes, and controlling weeds. Mulch also maintains the infiltration capacity of the soil.

- B. **Application:** Mulch can be applied to seeded areas to help establish plant cover. It can also be used in unseeded areas to protect against erosion over the winter or until final grading and shaping can be accomplished.
 - 1. Areas which have been permanently seeded should be mulched immediately following seeding.
 - 2. Areas which cannot be seeded because of the season should be mulched to provide some protection to the soil surface. An organic mulch should be used and the area then seeded as soon as weather or seasonal conditions permit. It is not recommended that fiber mulch be used alone for this practice; at normal application rates it does not provide the protection that is achieved using other types of mulch.
 - 3. Mulch may be used together with plantings of trees, shrubs, or certain ground covers which do not provide adequate soil stabilization by themselves.
 - 4. Mulch shall be used in conjunction with temporary seeding operations as specified in Temporary Seeding.
 - 5. Mulch can be used for dust control if adequately anchored.

- C. **Construction Specifications:** Prior to start of construction, mulch requirements should be designed by a qualified professional. Plans and specifications should be referred to by field personnel throughout the construction process.
 - 1. **Material:** As specified in the approved site plan. If not specified, select from mulch materials listed in Table 2152-8. The choice should be based upon soils, slope steepness and length, flow conditions, and time of year.
 - 2. **Coverage:** At least 75% of the soil surface.
 - 3. **Anchoring:** Light materials such as hay and straw should be anchored mechanically, or with tackifiers or netting. Heavy material mulches such as wood chips will not require anchoring unless installed on a slope steeper than 2H:1V.

Table 2152-8: Typical Organic Mulching Materials and Application Rates

Material	Rate per Acre	Requirements	Installation/Uses
Straw	2 – 3 tons	Dry, unchopped, unweathered; free of weed, seeds and rot;	Spread by hand or machine 1.5 to 2.5 inches deep; must be tacked or tied down.
Wood fiber, wood cellulose, recycled newsprint, bonded fiber matrix	1 – 2 tons	Double the application rate for erosion control on critical mass.	Use with power mulcher or hydroseeder; may be used to tack straw on steep slopes. Do not use in hot, dry weather.
Wood chips	10 – 20 tons	Air dry. Add Nitrogen fertilizer. 20 to 25 lbs. of actual Nitrogen per ton of mulch.	Apply with blower, chip handler or by hand. Not for fine turn areas. Most effective around trees and shrubs. Not recommended for mowed areas.
Bark	35 yd ²	Air dry, shredded or hammermilled or chips. Add Nitrogen fertilizer, 20 to 25 lbs. of actual Nitrogen per ton of mulch.	Apply with mulch blower, chip handler or by hand. Do not use asphalt tack. Resistant to wind blowing. Most effective around trees and shrubs. Not recommended for mowed areas.

Source: MDNR, 1998

D. Installation:

1. **Site Preparation:** Divert runoff water from areas above the site that will be mulched. Remove stumps, roots, and other debris from the construction area. Grade area as needed to permit the use of equipment for seeding, mulching, and maintenance. Shape area so that it is relatively smooth. If the area will be seeded, follow seeding specifications in the design plan and apply mulch immediately after seeding.
2. **Mulching:** Spread straw or cereal grain mulch uniformly over the area with a power blower or by hand. Not more than 25% of the ground surface should be visible after spreading.

Apply at the rates shown in Table 2152-8. Use higher rates for steep slopes, channels, and other erosive areas.

Anchor straw or wood cellulose mulch by one of the following methods:

- a. Crimp with a weighted, straight, notched disc or use a mulch anchoring tool to punch the straw into the soil.

- b. Tack with a liquid tackifier designed to hold mulch in place. Use suitable spray equipment and follow manufacturer's recommendations.
 - c. Cover with netting, using a degradable natural or synthetic mesh to hold mulch materials in place in more erosive areas. The netting should be anchored according to manufacturer's specifications.
 - d. Use heavy natural nets without additional mulch, synthetic netting with additional mulch, or rolled erosion control products (Section 2152.4) to control erosion on steep slopes and in areas needing a higher degree of protection such as waterways, swales, and diversion channels. These commercial materials vary greatly in longevity, strength, weight, and tolerable shear stress.
- E. **Construction Verification:** Check materials and installation for compliance with specifications.
- F. **Troubleshooting:** Consult with a qualified design professional if any of the following occur:
 - 1. Variations in topography on the site indicate the mulching materials will not function as intended; changes in plan may be needed.
 - 2. Design specifications for mulching materials or seeding requirements cannot be met; substitutions could result in erosion or seeding failure.
- G. **Maintenance & Inspection:** All mulches and soil coverings should be inspected periodically and after rainstorms of ½-inch or greater to check for erosion. Where erosion is observed in mulched areas, additional mulch should be applied after any damage is repaired. Nets should be inspected after rainstorms for dislocation or failure. If washouts or breakage occur, re-install netting as necessary after repairing damage to the slope or ditch. Inspections should take place until grasses are firmly established. Where mulch is used in conjunction with ornamental plantings, inspect periodically throughout the year to determine if mulch is maintaining coverage of the soil surface; repair as needed.

2152.3 TACKIFIERS, SOIL BINDERS, AND BONDED FIBER MARIX

A. Description:

- 1. **Tackifiers** - The tackifier for straw, paper, and wood mulch cover shall consist of a guar gum, plantago, starch, or other organic substance. It shall be mixed with water and distributed over the mulch at the manufacturer's recommended rate for that substance and site condition. Application of mulches is found in Section 2152.2.
- 2. **Soil Binders** - Soil binders are chemical soil stabilizers used for temporary soil stabilization. There are many soil binder products available. Anionic

Polyacrylamide (PAM) is a product that is land-applied as a temporary soil binding agent to reduce erosion.

- a. This temporary practice is not intended for direct application to surface waters of the state.
- b. Never add water to PAM, add PAM slowly to water.
- c. Not all polymers are PAM. Only the anionic form of PAM shall be used. Cationic PAM is toxic and shall not be used.
- d. Anionic PAM in pure form shall have less than or equal to 0.05 percent acrylamide monomer by weight, as established by the Food and Drug Administration and the Environmental Protection Agency.
- e. To maintain less than or equal to 0.05 percent of acrylamide monomer, the maximum application rate of PAM, in pure form, shall not exceed 200 pounds/acre/year. Do not over apply PAM. Excessive application of PAM can lower infiltration rate or suspend solids in water, rather than promote settling.
- f. Users of anionic PAM shall obtain and follow all Material Safety Data Sheets and manufacturer's recommendations.
- g. The manufacturer or supplier shall provide written application methods for PAM and PAM mixtures. The application method shall ensure uniform coverage of the target and avoid drift to non-target areas including waters of the State. The manufacturer or supplier shall also provide written instructions to ensure proper safety, storage, and mixing of the product.

- 4. **Bonded Fiber Matrix (BFM)** – BMF is a classification of erosion control products designed to stay in place on steep slopes. It is a continuous layer of elongated fiber strands held together by a water-resistant bonding agent. BFMs eliminate direct raindrop impact on soil. Once dry, the BFM forms a water-absorbent protective cover that is porous and breathable and secures soil and seed to enhance establishment of vegetation.
- B. **Application:** Follow manufacturer's specifications for mixing and application rates of each product. These products should be installed by a Contractor certified by the manufacturer and trained in the proper procedures for mixing and application of the product. Product should be applied as a uniform blanket on 100 percent of the soil surface to ensure the integrity of the material bonding together. It should not be applied if air temperature is below 40°F, if rain is expected within 24 hours of application, or in high wind situations.
- C. **Inspection and Maintenance:** The site where these products are used should be inspected within 48 hours of application to check for 100 percent coverage of the product and proper bonding of the material to the soil. The area should also be inspected periodically and after every rain event to ensure effective performance.

Additional product should be applied to areas that require additional stabilization or where bare soil is visible.

2152.4 ROLLED EROSION CONTROL PRODUCTS

- A. **Description:** The rolled erosion control products in this manual are broken up into two distinct groups: erosion control blankets and turf reinforcement mats. Erosion control blankets are temporary protection blankets made of organic materials such as straw, wood, coir, or coconut fibers and held together with single or double netting of cotton string or polypropylene. Turf Reinforcement Mat (TRM) is a permanent protection blanket made of polypropylene woven blanket and netting, which may have additional organic fibers woven between the top and bottom netting.
- B. **Application:** Erosion control blankets should be used on bare soils with slopes flatter than 2H:1V; in areas that need erosion control for between 8 months and 1 year; in areas where winds prevent standard mulching practices from remaining in place until vegetation becomes established; and in concentrated flow areas where shear stress is within the manufacturer's recommended limits for the specific product. TRMs should be used on slopes steeper than 2H:1V where erosion hazard is high and planting is likely to be too slow to provide adequate protective cover; in vegetated channels; and on stream banks where moving water is likely to wash out new plantings. The shear stress must be calculated and within the limits of manufacturer's recommendations for the specific product used.
 - 1. Rolled erosion control products provide a protective covering or additional soil stabilization on a prepared planting area with slopes greater than 8 percent, in channels, and along shorelines. They aid in controlling erosion on critical areas. They may also raise the maximum permissible velocity and shear stress on turfgrass stands in channelized areas by reinforcing the vegetation.
 - 2. Before installation of these products, the area should be final graded to a smooth and uniform surface free of debris. Topsoil should be incorporated as needed. Seed and fertilize as shown on the plan. The erosion control blankets and TRMs should be installed in accordance with the manufacturer's recommendations and specifications. All products should be anchored firmly with continuous contact to the soil surface. The product should be anchored following the manufacturer's recommended stapling pattern for that specific application. Details for these products are found in Division III, Details ESC-04 through ESC-09.

SECTION 2153 SEDIMENT CONTROLS

2153.1 SEDIMENT FENCE

A. **Description:** Sediment fence is a temporary sediment barrier consisting of synthetic fabric stretched across and attached to supporting posts and entrenched or sliced in place. See Detail ESC-10, Sediment Fence, in Division III of this manual.

B. **Application:**

1. Sediment fence intercepts and detains small amounts of sediment from disturbed areas during construction operations in order to prevent sediment from leaving the site.
2. Sediment fence decreases the velocity of sheet flows and low-to-moderate channel flows.

2153.2 SEDIMENT FENCE INSTALLATION MACHINES

A. **Description:** Sediment fence installation machines insert a narrow custom-shaped blade at least 10 inches into the ground while simultaneously pulling sediment fence fabric into the opening created as the blade is pulled through the ground. See Detail ESC-11, Sediment Fence Installation Slicing Method, in Division III of this manual.

B. **Application:** Sediment fence installation machines install sediment fence by inserting sediment fence fabric while slicing the ground. No trenching is required and there is little soil disturbance.

2153.3 SUPER SEDIMENT FENCE

A. **Description:** Super sediment fence is a temporary barrier of geotextile over wire fence used to intercept sediment-laden runoff from small drainage areas. See Detail ESC-12, Super Sediment Fence, in Division III of this manual.

B. **Application:** Super sediment fence reduces runoff velocity and allows the deposition of transported sediment to occur.

1. Super sediment fence provides a barrier that can collect and hold debris and soil preventing the material from entering sensitive areas, streams, streets, etc.
2. Super sediment fence can be used where the installation of a dike would destroy sensitive areas, woods, wetlands, etc.
3. Super sediment fence should be placed as close to the contour as possible. No section of sediment fence should exceed a grade of 5% for a distance of more than 50 feet.

2153.4 STRAW BALE BARRIER

A. **Description:** Straw bale barriers are temporary sediment barriers consisting of a row of entrenched and anchored straw bales. See Detail ESC-13, Straw Bale Barrier, in Division III of this manual.

B. **Application:**

1. Straw bale barriers intercept and detain small amounts of sediment from disturbed areas of less than one acre in order to prevent sediment from leaving the site.
2. Straw bale barriers decrease the velocity of sheet flows.

2153.5 COMPOST BERM AND TUBES

A. **Description:** Compost berms and tubes consist of finely chipped wood blown in place or blown into tubular mesh material. See Detail ESC-14, Compost Berm, in Division III of this manual.

B. **Application:** Compost berms and tubes can function as a perimeter control for areas of surface runoff less than one-quarter acre. They can also be used as diversions above a construction site to direct stormwater that does not need to be treated with a Best Management Practice around the site in order to reduce the total volume of stormwater flowing across the disturbed site.

2153.6 LOG OR WATTLE PRODUCTS

A. **Description:** Log or wattle products are tubes of open weave containment material filled with straw, rice or wheat, excelsior, coir, or coconut. They come in a variety of diameters and lengths.

B. **Application:** Logs or wattles can be used as perimeter control for disturbed areas less than one-quarter acre, along contours as slope breaks, and for inlet protection, ditch checks, and streambank protection.

C. **Installation:**

1. Logs or wattles should be installed in shallow trenches 2-4 inches deep depending on soil type and slope steepness. Dig a deeper trench for soft, loamy soils and steep slopes. Dig a shallower trench for hard, rocky soils and gentler slopes.
2. Lay the log or wattle in the trench and stake with 1" x 1" x 18" or 24" wood stakes depending on soil type. Use one at each end and every four feet. Logs or wattles should be butted firmly and staked securely together to prevent leakage. Do not overlap.

- D. **Inspection and Maintenance:** Logs or wattles should be inspected after every rain event of ½ inch or greater. Accumulated sediment should be removed behind the logs or wattles. If they have been displaced or damaged they should be reinstalled or replaced as necessary.

2153.7 ROCK CHECK DAMS

- A. **Description:** Rock check dams are small temporary stone dams constructed across a swale or drainage ditch. See Detail ESC-15, Rock Check Dam, in Division III of this manual.
- B. **Application:** Rock check dams reduce the velocity of concentrated stormwater flows thereby allowing sediment to settle out. Rock dams perform more effectively than sediment fence or straw bales in stabilizing “wet-weather” ditches.

2153.8 TRIANGULAR SILT DIKE™

- A. **Description:** Triangular Silt Dike™ shall be triangular shaped having a height of at least eight to ten inches. The triangular shaped inner material shall be urethane foam. The outer cover shall be a woven geotextile fabric placed around the inner material and allowed to extend beyond both sides of the triangle by two or three feet. See Detail ESC-16, Triangular Silt Dike™, in Division III of this manual.
- B. **Application:** Triangular Silt Dike™ should be used to contain sediment along a perimeter or as a ditch check to minimize sediment movement through the waterway.

2153.9 GEO-RIDGE®

- A. **Description:** Geo-Ridge® is a light-weight, durable alternative to straw bales and sediment fence as a ditch check in stormwater channels. It attenuates flows rather than blocking them completely, allowing a smoother and less damaging release of water through the berm as opposed to cascading over it.
- B. **Application:** Geo-Ridge® can be used in swales, ditches, or other channels as a treatment for stormwater that travels through a channel. It reduces stormwater velocity thereby allowing sediment to settle out within the channel before the stormwater leaves the site. See Detail ESC-17, Geo-Ridge®, in Division III of this manual.

2153.10 INLET PROTECTION

- A. **Description:** Inlet protection is accomplished by gravel, sediment-impounding area constructed around a storm drain drop inlet, curb inlet, or culvert inlet.
- B. **Application:** Inlet protection reduces the amount of sediment entering a storm drainage system prior to permanent stabilization of the disturbed area.

1. Drop and Curb Inlet Protection

- a. **Description:** Drop and curb inlet protection consists of a sediment impounding area around a drop inlet or curb inlet to slow the velocity of the stormwater and settle out sediment before the stormwater enters the storm drain system.
- b. **Application:** Drop and curb inlet protection reduces the amount of sediment entering storm drainage systems prior to permanent stabilization of the disturbed area. There are many types of inlet protection for different applications.
- c. **Silt Saver®** - This product is a manufactured frame and geotextile installed over a round or square inlet. It has an additional safety feature in that the top of the cloth is orange or green for easy visual identification of the inlets. The woven, high-visibility top also provides a more open weave for higher flow volumes during unexpected flash flood events. See Detail ESC-18, Silt Saver®, in Division III of this manual.
- d. **Sediment Fence Drop Inlet Protection** – This is applicable where an inlet drains an area sloping no more than 5% and where inlet flows less than 1 cfs are typical. This method shall not apply to inlets receiving concentrated flows such as those in street or highway medians. See Detail ESC-19, Sediment Fence Drop Inlet Protection, in Division III of this manual.
- e. **Gravel and Wire Mesh Drop Inlet Sediment Trap** – This method is applicable where heavy concentrated flows are expected but not where ponding around the structure might cause excessive inconvenience or damage to adjacent structures and unprotected areas. See Detail ESC-20, Gravel and Wire Mesh Drop Inlet Sediment Trap, in Division III of this manual.
- f. **Block and Gravel Drop Inlet Sediment Trap** – This method is applicable where heavy flows are expected and where an overflow capacity is necessary to prevent excessive ponding around the structure. See Detail ESC-21, Block and Gravel Drop Inlet Sediment Trap, in Division III of this manual.
- g. **Excavated Drop Inlet Sediment Trap** – This method is applicable where heavy flows are expected and where an overflow capability and ease of maintenance are desirable. See Detail ESC-22, Excavated Drop Inlet Sediment Trap, in Division III of this manual.
- h. **Sod Drop Inlet Sediment Trap** – This method is applicable only at the time of permanent seeding to protect the inlet from sediment and mulch material until permanent vegetation has become established. See Detail ESC-23, Sod Drop Inlet Sediment Trap, in Division III of this manual.
- i. **GUTTERBUDDY™** - This product prevents sediment, debris, and other pollutants from entering the stormwater system. The product allows water to freely flow through the fibrous material while stopping sediment and debris. The GUTTERBUDDY™ is installed in front of the curb inlet at a length so that there is approximately a 12-inch overlap at each end of the curb opening.

The GUTTERBUDDY™ is reusable. Once construction is complete and it is no longer needed for sediment control, remove, clean, and store it out of the sunlight until reuse is desired. The GUTTERBUDDY™ must be inspected regularly and after each rain event. It must be cleaned when sediment and debris build up around it. Ponding is likely if sediment is not removed.

- j. **Gravel Curb Inlet Sediment Trap** – This method is applicable at curb inlets where ponding in front of the structure is not likely to cause inconvenience or damage to adjacent structures and unprotected areas. See Detail ESC-24, Gravel Curb Inlet Sediment Trap, in Division III of this manual.
 - k. **Wooden Weir Curb Inlet Protection** – This method is applicable to curb inlets where a sturdy, compact installation is desired. Emergency overflow capabilities are minimal so significant ponding may occur. See Detail ESC-25, Wooden Weir Curb Inlet Protection, in Division III of this manual.
 - l. **Block and Gravel Curb Inlet Protection** – This method is applicable at curb inlets where an overflow capability is necessary to prevent excessive ponding in front of the structure. See Detail ESC-26, Block and Gravel Curb Inlet Protection, in Division III.
 - m. **Beaver Dam® or True Dam®** - These products allow suspended solids to settle out of the slowed flow and be captured prior to entering the inlet. These products shall be installed as per manufacturer's recommendations. Maintenance should occur after each rain event. Remove all accumulated sediment and debris from surface and vicinity of unit. These products are reusable.
2. **Culvert Inlet Protection**
- a. **Description:** Culvert inlet protection reduces flow at culvert inlets and allows sediment to settle out of stormwater runoff. There are two types of culvert inlet protection details in Division III: Detail ESC-27, Culvert Inlet Sediment Trap and Detail ESC-28, Sediment Fence Culvert Inlet Protection device.
 - b. **Application:**
 - 1) Culvert inlet protection prevents sediment from entering, accumulating in, and being transferred by a culvert and associated drainage system prior to permanent stabilization of a disturbed project area.
 - 2) Culvert inlet protection provides sediment control at culvert inlets when elevation and drainage patterns may change causing original control measures to be ineffective or in need of removal.

2153.11 OUTLET PROTECTION (ENERGY DISSIPATION)

- A. **Description:** Outlet protection is designed to prevent erosion and scour at the outlet of a channel or conduit dissipating the flow energy. Energy dissipaters usually consist of a riprap-lined apron, a reinforced concrete flume with concrete baffles, or a reinforced concrete box with chambers or baffles.
- B. **Application:** Outlet protection shall be used when the discharge velocity of a pipe, box culvert, diversion, open channel, or other water conveyance structure exceeds the permissible velocity of the receiving channel or disposal area.
- C. **Inspection and Maintenance:** Inspect riprap outlet structures, after heavy rains, to ensure no erosion around or below the riprap has taken place or stones have been dislodged. Immediately make all needed repairs to prevent further damage.

2153.12 DIVERSION

- A. **Description:** A diversion is a channel constructed perpendicular to a slope with a supporting earthen ridge on the lower side. See Detail ESC-29, Diversions, in Division III of this manual for many types of diversions.
- B. **Application:** Diversions reduce slope length and intercept and divert stormwater runoff to stabilized outlets at non-erosive velocities. Diversions may be used in the following locations:
 - 1) Where runoff from areas of higher elevation may damage property, cause erosion, or interfere with the establishment of vegetation on lower areas.
 - 2) Where surface or shallow subsurface flow is damaging sloping upland.
 - 3) Where the slope length needs to be reduced to minimize soil loss.

1. Temporary Fill Diversion

- a. **Description:** A temporary fill diversion is a channel with a supporting ridge of soil on the lower side constructed along the top of an active earth fill.
- b. **Application:** Temporary fill diversions divert storm runoff away from the unprotected slope of the fill to a stabilized outlet or sediment-trapping facility.
- c. **Inspection and Maintenance:** Since these channels are temporary and under most situations will be filled the next workday, the maintenance required should be low. If the diversion is to remain in use for more than one day, an inspection will be made at the end of each workday and repairs made if needed. The Contractor should avoid the placement of any material over the diversion while it is in use. Construction traffic should not be permitted to cross the diversion.

2. Temporary Diversion Dike

- a. **Description:** A temporary diversion dike is a temporary ridge of compacted soil constructed at the top or base of a sloping disturbed area.
- b. **Application:**
 - 1) Temporary diversion dikes divert storm runoff from upslope drainage areas away from unprotected disturbed areas and slopes to a stabilized outlet.
 - 2) Temporary diversion dikes divert sediment-laden runoff from a disturbed area to a sediment-trapping facility such as a sediment trap or sediment basin.
- c. **Inspection and Maintenance:** Facilities shall be inspected after every storm and repairs made to the dike, flow channel, outlet, or sediment trapping facility, as necessary. Once every two weeks, whether a storm event has occurred or not, the facility shall be inspected and repairs made if needed. Damages caused by construction traffic or other activity must be repaired before the end of each working day.

3. Right-of-Way Diversion

- a. **Description:** A right-of-way diversion is a ridge of compacted soil or loose rock or gravel constructed across disturbed rights-of-way and similar sloping areas.
- b. **Application:** Right-of way diversions shorten the flow length within a sloping right-of-way, thereby reducing the erosion potential by diverting storm runoff to a stabilized outlet.
- c. **Inspection and Maintenance:** Diversions shall be inspected after every rainfall and repairs made if necessary. At least once every two weeks, whether a storm has occurred or not, they shall be inspected and repairs made if needed. Right-of-way diversions, which are subject to damage by vehicular traffic, should be reshaped at the end of each workday.

2153.13 RUNOFF CONVEYANCE

- A. **Description:** Runoff conveyance is any ditch, swale, or channel constructed to collect overland stormwater flow and direct it to a specific containment device or offsite waterway.
- B. **Application:** Runoff conveyance facilities collect stormwater and reduces the flow volume and velocity to settle out sediment and other pollutants before the stormwater leaves the site.

1. Grass-Lined Channels

- a. **Description:** A grass-lined channel is a channel with vegetative lining constructed to design cross sections and grades for conveyance of runoff. These channels convey and dispose of concentrated surface runoff without damage from erosion, deposition, or flooding. See Detail ESC-30, Trapezoidal Grass-Lined Channel, in Division III of this manual.
- b. **Application:** Grass-lined channels can be applied to construction sites where:
 - 1) Concentrated runoff will cause damage from erosion or flooding;
 - 2) A vegetative lining can provide sufficient stability for the channel cross section and grade;
 - 3) Slopes are generally less than 5%;
 - 4) Space is available for a relatively large cross section. Typical uses include roadside ditches, channels at property boundaries, outlets for diversions and other channels, and drainage of low areas. Turf Reinforcement Mats (TRMs) can be used with a specified vegetation to increase the permissible velocity and shear stress of the grass-lined channel. Permissible velocities and shear stresses of TRMs range from 10-20 feet per second and 6-10 pounds per square foot respectively.

2. Infiltration Trench

- a. **Description:** An infiltration trench is a shallow excavated trench that has been backfilled with stone designed to filter pollutants from stormwater runoff and allow runoff to infiltrate back into the groundwater. Infiltration trenches are effective in removing pollutants from stormwater runoff in urban settings. Sediments must be screened before runoff enters the trench to prevent the trench from becoming clogged. Infiltration trenches provide for groundwater recharge in areas with permeable soils and bedrock well below the bottom of the trench. They require careful construction and regular maintenance.

Infiltration trenches are normally constructed 3 to 8 feet deep, lined with filter fabric or a sand filter, and backfilled with clean stone or gravel. Grass filter strips or inlets can be designed to filter sediments before entering the trench.

- b. **Application:** Infiltration trenches cut off the flow of subsurface drainage and work well in areas where there is not sufficient land available for infiltration basins. See Detail ESC-31, Infiltration Trench, in Division III of this manual.

2153.14 TEMPORARY SLOPE DRAIN

- A. **Description:** A temporary slope drain is a flexible tubing or conduit extending from the top to the bottom of a cut or fill slope. See Detail ESC-32, Temporary Slope Drain, in Division III of this manual.
- B. **Application:** Temporary slope drains temporarily convey concentrated stormwater runoff safely down the face of a cut or fill slope without causing erosion on or below the slope. On cut or fill slopes where there is a potential for upslope flows to move over the face of the slope causing erosion and preventing adequate stabilization.

2153.15 TEMPORARY SEDIMENT TRAP

- A. **Description:** A temporary sediment trap is a temporary ponding area formed by constructing an earthen embankment with a stone outlet. See Detail ESC-33, Temporary Sediment Trap, in Division III of this manual.
- B. **Application:** Temporary sediment traps detain sediment-laden runoff from small, disturbed areas long enough to allow the majority of the sediment to settle out.
 - 1. Below disturbed areas where the total contributing drainage area is less than 3 acres.
 - 2. Where the sediment trap will be used no longer than 18 months. The maximum useful life is 18 months.
 - 3. The sediment trap may be constructed either independently or in conjunction with a temporary diversion dike.

2153.16 TEMPORARY SEDIMENT BASIN

- A. **Description:** A temporary sediment basin is a temporary barrier or dam constructed across a drainageway or at other suitable locations to intercept sediment-laden runoff. This barrier may be combined with excavation to achieve the required storage.
- B. **Application:** Sediment basins protect downstream properties and drainageways by trapping sediment and controlling the release of stormwater runoff.

Sediment basins detain sediment-laden runoff from disturbed areas in “wet” and “dry” storage long enough for the majority of the sediment to settle out. Sediment basins shall be located below disturbed areas where the total contributing drainage area is equal to or greater than three (3) acres. There must be sufficient space and appropriate topography for the construction of a temporary impoundment. It is recommended that these measures, by virtue of their potential to impound large volumes of water, be designed by a qualified professional.

- C. **Construction Specifications:**

- 1. **Site Preparation:** Areas under the embankment or any structural works related to the basin shall be cleared, grubbed, and stripped of topsoil to remove trees,

vegetation, roots, or other objectionable material. In order to facilitate cleanout and restoration, the area of most frequent inundation, measured from the top of the principal spillway, will be cleared of all brush and trees.

2. **Cutoff Trench:** For earth embankments, a cutoff trench shall be excavated along the centerline of the dam. The trench must extend at least 1 foot into a stable, impervious layer of soil and have a minimum depth of 2 feet. The cutoff trench shall extend up both abutments to the riser crest elevation. The minimum bottom width shall be 4 feet, but also must be wide enough to permit operation of compaction equipment. The side slopes shall be no steeper than 1H:1V. Compaction requirements shall be the same as those for the embankment. The trench shall be drained during the backfilling/compacting operations.
3. **Embankment:** The fill material shall be taken from approved borrow areas. It shall be clean mineral soil, free of roots, woody vegetation, stumps, sod, oversized stones, rocks, or other perishable or objectionable material. The material selected must have enough strength for the dam to remain stable and be tight enough, when properly compacted, to prevent excessive percolation of water through the dam. Fill containing particles ranging from small gravel or coarse sand to fine sand and clay in desired proportion is appropriate. Using the Unified Soil Classification System, SC (clayey sand), GC (clayey gravel) and CL ("low liquid limit" clay) are among the preferred types of embankment soils. Areas on which fill is to be placed shall be scarified prior to placement of fill. The fill material should contain the proper amount of moisture to ensure that 95% compaction will be achieved. Fill material will be placed in 6-inch continuous layers over the entire length of the fill. Compaction shall be obtained by routing the hauling equipment over the fill so that the entire surface of the fill is transversed by at least one wheel or tread track of the equipment, or by using a compactor. Special care shall be taken in compacting around the anti-seep collars to avoid damage and achieve desired compaction. The detail for anti-seep collars is Detail ESC-34, Anti-Seep Collar, located in Division III of this manual. The embankment shall be constructed to an elevation 10% higher than the design height to allow for settlement if compaction is obtained with hauling equipment. If compactors are used for compaction the overbuild may be reduced to not less than 5%.
4. **Principal Spillway:** The riser of the principal spillway shall be securely attached to the barrel by a watertight connection. The barrel and riser shall be placed on a firmly compacted soil foundation. The base of the riser shall be firmly anchored according to design criteria to prevent its floating. Pervious materials such as sand, gravel, or crushed stone shall not be used as backfill around the barrel or anti-seep collars. Special care shall be taken in compacting around the anti-seep collars. Fill material shall be placed around the pipe in 4-inch layers and compacted until 95% compaction is achieved. A minimum of 2 feet of fill shall be hand-compacted over the barrel before crossing it with construction equipment.
5. **Emergency Spillway:** Vegetative emergency spillways shall not be constructed over fill material. Design elevations, widths, and entrance and exit channel slopes are critical to the successful operation of the spillway and should be adhered to

closely during construction.

6. **Vegetative Stabilization:** The embankment and emergency spillway of the sediment basin shall be stabilized with temporary or permanent vegetation immediately after installation of the basin.
7. **Erosion and Sediment Control:** The construction of the sediment basin shall be carried out in a manner such that it does not result in sediment problems downstream.
8. **Safety:** All state and local requirements shall be met concerning fencing and signs warning the public of the hazards of soft, saturated sediment and flood waters.

D. Inspection and Maintenance:

1. Inspect the sediment basin after each storm event.
2. Remove and properly dispose of sediment when it accumulates to one-half the design volume.
3. Periodically check the embankment, emergency spillway and outlet for erosion damage, piping, settling, seepage, or slumping along the toe or around the barrel and repair immediately.
4. Remove trash and other debris from the riser, emergency spillway and pool area.
5. Clean or replace the gravel around the riser if the sediment pool does not drain properly.
6. Remove the basin after the drainage area has been permanently stabilized, inspected, and approved. Do so by draining any water, removing the sediment to a designated disposal area, and smoothing the site to blend with the surrounding area; then stabilize.

2153.17 DETENTION/INFILTRATION BASIN

- A. **Description:** An infiltration basin is a dam designed to detain stormwater allowing it to slowly filter through the soil. Infiltration basins can be constructed to reduce the peak flow rate from the design storm, recharge groundwater in the vicinity of the basin, filter contaminants, and increase flows during low-stream flow conditions. The basins are effective in removing pollutants from stormwater runoff in urban settings. Their usage is best suited to larger, more intensively developed sites. See Detail ESC-35, Detention/Infiltration Basin, in Division III of this manual.
- B. **Application:** Infiltration basins should be considered at sites where the soil is permeable and the groundwater elevation is well below the soil surface. Disadvantages of infiltration basins include standing water, mosquitoes in summer, frequent maintenance, and the possibility of transporting soluble pollutants to the groundwater.

2153.18 TEMPORARY WATERWAY CROSSING (UTILITY AND VEHICULAR)

- A. **Description:** A temporary waterway crossing is a strategy for crossing small waterways when in-stream utility construction is involved or a temporary structural span is installed across a flowing watercourse for use by construction vehicles.
- B. **Application:** Temporary waterway crossings are generally applicable to flowing streams with drainage areas less than one square mile. Structures or methodology for crossing streams with larger drainage areas should be designed by methods which more accurately define the actual hydrologic and hydraulic parameters which will affect the functioning of the structure.
1. To help protect sediment from entering the stream from construction within approach areas.
 2. To minimize the amount of disturbance within the stream itself.
 3. To provide a means for construction traffic to cross flowing streams without damaging the channel or bank.

For utility crossings through a waterway see the following Details in Division III of this manual: ESC-36, Diversion Channel Crossing; ESC-37, Flume Pipe Crossing; and ESC-38, Cofferdam Crossing. For vehicular crossings, see Details ESC-39, Temporary Culvert Crossing, and ESC-40, Temporary Bridge Crossing.

2153.19 DEWATERING

- A. **Description:** Dewatering is a temporary settling and filtering device for water which is discharged from dewatering activities.
- B. **Application:** Dewatering allows sediment-laden water to be filtered prior to being discharged off-site. Wherever sediment-laden water must be removed from a construction site by means of pumping. Methods include a straw bale/sediment fence pit as shown in Detail ESC-41, a dewatering box as shown in Detail ESC-42, or a Dirtbag® as shown in Detail ESC-43 in Division III of this manual.

2153.20 TURBIDITY CURTAIN

- A. **Description:** Turbidity curtains are floating barriers of synthetic fabric suspended in the water from a floatation section and held in a vertical position by a weighted chain on the lower edge. Turbidity curtains work by slowing, containing, and directing the flow of runoff from disturbed earth and allowing the sediment to settle out before spreading into surrounding water courses. See Details ESC-44 and ESC-45 in Division III of this manual.
- B. **Application:** Turbidity curtains are applicable to rivers, streams, lakes, and ponds where intrusion into the watercourse by construction activities and sediment movement is unavoidable. They are not designed to act as dams and should not be placed across channel flows. In general, they should not be extended to the bottom of

the watercourse. They are installed to trap sediment, not to significantly impede the flow of water. A special type of barrier in which sections of the geotextile are replaced with filter fabric can be used when the volume of water within the curtain must be allowed to change with current flow. Staked barriers are a type of turbidity curtain which are installed above grade or in very shallow water and are used only in calm, protected areas having bottoms with a high rate of performability. Details for the types and installation of turbidity curtains can be found in Details ESC-45 and ESC-46 in Division III of this manual.

SECTION 2154 OTHER CONTROLS

2154.1 DUST CONTROL

- A. **Description:** Dust control reduces surface and air movement of dust during land disturbing, demolition, and construction activities.
- B. **Application:** Dust control prevents surface and air movement of dust from exposed soil surfaces and reduces the presence of airborne substances which may present health hazards, traffic safety problems, or harm animal or plant life. In Missouri, the Contractor is required by State law to control fugitive dust blown from the site. Kansas does not have specific regulations for fugitive dust emissions; however, the Kansas Department of Health and Environment (KDHE) encourage Contractors to implement measures to reduce such emissions. Dust can be minimized by stabilizing areas with mulch as soon as possible. Watering should be provided in unstabilized areas. Contact MDNR Air Pollution Control Program at (573) 751-4817 or KDHE Bureau of Air and Radiation at (785) 296-1550 for guidance.
- C. **Construction Specifications:**
1. **Vegetative Cover:** For disturbed areas not subject to traffic, vegetation provides the most practical method of dust control.
 2. **Mulch (including gravel mulch):** When properly applied, mulch offers a fast, effective means of controlling dust. Not recommended for areas within heavy traffic pathways. Binders or tackifiers should be used to tack organic mulches.
 3. **Spray-On Adhesive:** These coherics are derived from a variety of compounds, both organic and synthetic based. Many of the adhesives will withstand heavy traffic loads. The organics include derivatives from pine tar and vegetable gum; synthetics may be acrylic or petroleum based. Examples of spray-on adhesives for use on mineral soils are present in Table 2154-1.

Table 2154-1: Spray-on Adhesive for Dust Control

	Water Dilution	Type of Nozzle	Apply Gallons/Acre
Anionic asphalt emulsion	7:1	Coarse Spray	1,200
Latex emulsion	12.5:1	Fine Spray	235
Resin in water	4:1	Fine Spray	300
Acrylic Emulsion (Non-Traffic)	7:1	Coarse Spray	450
Acrylic Emulsion (Traffic)	3.5:1	Coarse Spray	350

Source: VA DCR, 1992.

4. **Calcium Chloride:** This chemical may be applied by a mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist, but not so high as to cause water pollution or plant damage. Application rates should be strictly in accordance with suppliers' specified rates.
5. **Watering:** The site may be sprinkled until the surface is wet. Sprinkling is especially effective for dust control on haul roads and other traffic routes.

6. **Stone:** Stone can be used to stabilize roads or other areas during construction by using crushed stone or coarse gravel.
 7. **Barriers:** A board fence, wind fence, sediment fence, or similar barrier can help to control air currents and blowing soil. Place barriers perpendicular to prevailing air currents at intervals about 15 times the barrier height. Where dust is a known problem, existing windbreak vegetation should be preserved.
 8. **Tillage:** Deep plow large open disturbed areas and bring clods to the surface. This is a temporary emergency measure that can be used as soon as soil blowing starts. Begin plowing on the windward edge of the site.
- D. **Troubleshooting:** Reapply material if dust is not adequately controlled.
- E. **Inspection and Maintenance:** Maintain dust control measures through dry weather periods until all disturbed areas have been stabilized.

2154.2 SOLID WASTE DISPOSAL

The General Contractor is responsible for disposing all solid waste from the site in accordance with State laws. Dumpsters or other collection facilities must be provided as needed. Solid waste may not be buried on the site.

2154.3 SANITARY WASTE DISPOSAL

The General Contractor is responsible for providing sanitary facilities on the site. Sanitary waste may be disposed of only in locations having a State permit.

2154.4 SPILL PREVENTION AND MATERIAL MANAGEMENT PRACTICES

- A. **Petroleum Products:** All vehicles kept on the site need to be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products should be stored in tightly-sealed containers which are clearly labeled. Any asphalt substances used on site should be applied according to the manufacturer's recommendations.
- B. **Fueling & Servicing:** No fueling, servicing, maintenance, or repair of equipment or machinery should be done within 50 feet of a stream or within 100 feet of a classified stream, losing stream, or sinkhole.
- C. **Concrete Trucks:** Concrete trucks should be allowed to wash only in locations where discharge is directed to a permitted sediment basin. It is not permissible to discharge concrete wash directly to streams or storm drains. Alkalinity and chemical additives could be harmful to fish, stream bottom macro invertebrates, and wildlife.
- D. **Disposal of Oil:** No fuels, oils, lubricants, solvents, or other hazardous materials can be disposed of on the site. All hazardous material must be properly disposed of in accordance with State laws. For guidance contact 1-800-361-4827 in Missouri or 1-785-296-1667 in Kansas.

E. **Spill Controls:** An Erosion & Sediment Control Officer will be designated as the spill prevention and cleanup coordinator. In addition to the good housekeeping practices and material management practices listed previously, the following practices need to be followed for spill prevention and clean-up:

1. Manufacturer's recommended methods for spill cleanup need to be clearly posted and site personnel need to be made aware of the procedures and the location of the information and cleanup supplies. Refer to Material Safety Data Sheets (MSDS).
2. Materials and equipment necessary for spill cleanup need to be kept in the secured material storage area on site. Equipment and materials include but are not limited to: brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
3. All spills need to be cleaned up immediately after discovery and properly containerized for proper disposal. Burial is not acceptable.
4. The spill area must be kept well ventilated and personnel need to wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
5. Spills of toxic or hazardous material must be reported immediately to the appropriate State or local government agency regardless of the size. Each county should have a Local Emergency Planning Committee (LEPC). If you are unable to access your local LEPC directly, contact your local fire department, city hall, or county courthouse. When permits are applicable, the permittee or his authorized representative is required to notify the MDNR or KDHE Environmental Emergency Response in accordance with 40CFR117 and CFR302 as soon as he has knowledge of the discharge of any hazardous substance or petroleum product in excess of the reportable quantity. In Missouri, contact the MDNR emergency spills hotline at 1-573-634-2436. In Kansas, contact the KDHE 24-hour spill hotline at 1-785-296-1679.
7. The spill prevention plan needs to be adjusted to include measures to prevent this type of spill from being repeated, and the plan needs to show how to clean up the spill if another one does occur.

F. **Hazardous Products:**

1. Products must be kept in their original containers unless they are not resealable. If a product is transferred to a new container, it must be properly labeled.
2. Original labels and MSDS should be retained.
3. If surplus product must be disposed of, disposal must be done in accordance with State law. For local disposal information contact your solid waste district or EPC. In Missouri call 1-800-361-4827 or in Kansas call 1-785-296-1667.

G. Other Good Housekeeping Practices: In addition to the foregoing, the following good housekeeping practices need to be followed during the construction of the project:

1. An effort should be made to store only enough product to do the job.
2. All materials stored on site should be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other secured enclosure.
3. Products should be kept in their original containers with the original manufacturer's label.
4. Whenever possible, all of the product should be used before disposing of the container.
5. Manufacturer's recommendations for proper use and disposal must be followed See the MSDS.
6. The site superintendent should inspect daily to ensure proper usage, storage, security of storage area, and disposal of materials.
7. Fertilizers need to be applied only in the minimum amounts recommended by the manufacturer.
8. All paint containers need to be tightly sealed and stored when not required for use. Excess paint should not be dumped into the storm sewer system but should be properly disposed of according to manufacturer's instructions and State regulations.

SECTION 2155 MEASUREMENT AND PAYMENT

2155.1 SCOPE

This section covers the methods of measurement and the basis of payment for the furnishing of all labor, equipment, tools, and materials and for the performance of all related work necessary to complete any construction covered in Section 2150.

2155.2 GENERAL

Unless specifically altered by the contract Special Provisions, the methods of measurement and payment will be as specified herein.

2155.3 ITEMS NOT LISTED IN THE PROPOSAL

There will be no measurement or separate payment for any items of work not specifically identified and listed in the Proposal, and all costs pertaining thereto will be included in the contract unit prices for other items listed in the Proposal.

2155.4 METHODS OF MEASUREMENT

The quantities of accepted work will be measured and determined as follows:

Table 2155-1: Measurement and Payment Units

Measurement Item	Measurement Unit
Seeding	Acres covered
Sodding	Square yard
Lime	Ton
Fertilizer	Pound
Mulch – Straw	Ton
Mulch – Hydro	Bag/Ton
Compost Berms or Tubes	Linear foot
Log or Wattle Products	Linear foot
Tackifiers, Soil Binders, BFM	Bag/Case
Rolled Erosion Control Products	Square yard
Sediment Fence	Linear foot
Diversion Ditch	Linear foot
Triangular Silt Dike™	Linear foot
Rock Ditch Checks	Cubic yard/ton
Straw Bale Ditch Checks	Bale
Rock	Ton
Sediment Basin (installation, clean-out, or removal)	Cubic yard
Pipe	Linear foot
Geotextiles	Square foot
GUTTERBUDDY®	Linear foot
Silt Saver®	Per device
Geo-Ridge®	Per device
Dirtbag®	Per device
Siltsack	Per device
Turbidity Curtain	Per device
Beaver Dam® or True Dam®	Per device

2155.5 BASIS OF PAYMENT

Payment for the quantities of accepted work will be made as follows: the activity completed, accepted, and measured as provided above will be paid for at the contract unit price bid for the material. Said price shall be full compensation for soil preparation, furnishing the material, hauling, applying, building or installing the product, and for all labor equipment, tools, and incidentals necessary to complete the work. Payment will be made under the units in Table 2155-1.

SECTION 02200 – EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. This section covers earthwork associated with general excavation, backfill and compaction required for the Work.
- B. This section also covers the handling, storage, transportation and disposal of all excavated material; sheeting and shoring, subgrade preparation, dewatering as necessary or required, protection of adjacent property, construction of fills and embankments, surfacing and grading; and other appurtenant work.
- C. Additional requirements for excavation, backfill and compaction for trenching can be found in Section 02250 – Trenching, Pipe Embedment and Backfill.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. Section 00700 – General Conditions.
- B. Section 01000 – General Project Requirements.
- C. Section 01015 – Specific Project Requirements.
- D. Section 02180 – Clearing and Grubbing.
- E. Section 02190 – Demolition.
- F. Section 02250 – Trenching, Pipe Embedment and Backfill.
- G. Section 02230 – Geotextiles.
- H. Section 02930 – Seeding.
- I. Section 02931 – Sodding.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft ³).
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
ASTM D4546	Standard Test Method for One-Dimensional Swell or Collapse of Soils.
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

- C. City of Kansas City, Missouri Department of Public Works, Construction and Material Specifications (<http://kcmo.gov/publicworks/design-construction-standards/>) KCMO PW 2202, Subsection 2202, Untreated Compacted Aggregate.
- D. Kansas Department of Transportation, Standard Specification and Construction Manual, Division 1100, Aggregates.
- E. Missouri Department of Transportation, Missouri Standard Specifications for Highway Construction, Division 1000, Materials Details.

1.05 DEFINITIONS

- A. Paved Areas – Areas for which the final surfacing will be street pavement, shoulders, driveways, parking lots, curbs, gutters, sidewalks, gravel roads or other surface features.
- B. Unpaved Areas – Areas for which the final surfacing will be in a green space.

1.06 INFORMATION PROVIDED BY THE CITY

- A. As provided in the Contract Documents.

1.07 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Shop Drawings:
 - 1. Sheeting and Shoring Plan – Prior to excavation, the Contractor shall submit a shoring design that is signed and sealed by a registered professional engineer in the State of Missouri for all excavations greater than twenty (20) feet in depth (in accordance with 29 CFR Part 1926 - OSHA Subpart P - Excavations and Trenches). Submittal will be for informational purposes only.
- C. Testing Reports:
 - 1. Laboratory testing results for proposed Borrow Materials.
 - 2. Laboratory testing results and quarry control reports for Granular Material.
 - 3. Laboratory testing results for and quarry control reports Granular Bedding.
 - 4. Moisture-density (Proctor) test results.
 - 5. In-Place Density test results.
- D. Other Submittals:
 - 1. Commercial Laboratory – submit name, contact information and certification of the commercial testing laboratory required by paragraph 1.08.
 - 2. Blasting (as applicable):
 - (a) Pre-blast survey.
 - (b) Monitoring Plan.
 - (c) Permit for blasting.
 - (d) Post-blast survey.

1.08 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. Sampling and Testing:
 - 1. Tests to determine conformance with all requirements of this Specification for quality and properties of all Contractor-secured materials, including borrow materials proposed for use, shall be performed by an independent, state-certified, commercial laboratory retained and compensated by the Contractor and approved by the City/Design Professional.

2. All work associated with QUALITY ASSURANCE shall be included in the Bid Price and will be incidental to the Work. No separate measurement or payment will be made.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. The City will furnish the Site in accordance with Section 00700 – General Conditions.
- B. See Section 01000 – General Project Requirements, paragraph EASEMENTS AND RIGHT-OF-WAY for use of private property for delivery, storage and handling.
- C. Perform in a manner to prevent contamination or segregation of materials.

1.10 EXISTING UTILITIES

- A. The Contractor shall notify utilities prior to excavation in accordance with Section 00700 – General Conditions, Article 6 – Contractor's Responsibilities, paragraph NOTIFICATION OF UTILITIES.
- B. Movement of construction machinery and equipment over pipes and utilities during construction is at the Contractor's sole risk.
- C. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand, start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured.
- D. Support uncovered lines or other existing work affected by the excavation until approval for backfill is granted by the City.
- E. Report damage to utility lines or subsurface construction immediately to the City.

PART 2 - PRODUCTS

2.01 MATERIALS ENCOUNTERED

- A. Suitable Materials – Materials suitable for use in backfill, fill and embankment include job excavated or borrow material that is free of debris, roots, organic matter, frozen matter and shale particles/rock/stone or gravel with all dimensions less than 2 inches:
 1. Cohesion-less materials include gravels, gravel-sand mixtures, sands and gravelly sands; generally exclusive of clayey and silty material with the following properties:
 - (a) Free-draining.
 - (b) Impact compaction will not produce a well-defined moisture-density relationship curve.
 - (c) Maximum density by impact methods will generally be less than by vibratory methods.
 - (d) Generally less than 15% by dry weight of soil particles pass a No. 200 sieve.
 2. Cohesive materials include materials made up predominately of silts and clays generally exclusive of sands and gravel with the following properties:
 - (a) Impact compaction will produce a well-defined moisture-density relationship curve.
 - (b) Are not free draining.
- B. Unsuitable Materials – Materials unsuitable for use in backfill, fill and embankment include all material that contains debris, roots, organic matter, frozen matter, shale particles/rock/stone or gravel with any dimension greater than 2 inches.

Additionally, as determined by the City/Design Professional, any other materials that are too wet or otherwise unsuitable for providing a stable subgrade or stable foundation for structures or trenches.

C. Material used for embankment or fill:

1. For soils used below structural elements (such as: footings, slabs, pavements and mats), the portion of material passing the No. 40 sieve shall have a liquid limit not exceeding 40 and a plasticity index not exceeding 25 when tested in accordance with ASTM D4318.

2.02 TOPSOIL

- A. On-Site Topsoil – Surface soil stripped and stockpiled on site and modified as necessary to meet the requirements specified herein. When available, topsoil must be existing surface soil stripped and stockpiled on the Site.
- B. Off-Site Topsoil – Conform to requirements specified herein. Additional topsoil must be furnished by the Contractor.
- C. Composition – Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than 1- inch diameter, brush, weeds, toxic substances and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.
- D. Topsoil shall be of a quality at least equal to the existing topsoil in adjacent areas, free from trash, stones, debris and well suited to support plant growth.

2.03 SOIL CONDITIONS

- A. All Materials encountered, regardless of type, character composition and condition shall be considered "unclassified" for the purpose of payment. Determine quantity of various materials to be excavated prior to submitting Bid. Rock encountered shall be handled at no extra cost to City.

2.04 WASTE MATERIALS

- A. Waste materials, as described for purposes of this Section, consist of unsuitable materials such as: rock, surplus excavated material, demolition debris and other materials considered unacceptable for use as fill.
- B. Waste materials shall not include environmental pollutants, hazardous substances, contaminated products, by-products, samples or waste materials of any kind that are regulated under environmental laws.
- C. Dispose of Demolition Debris in accordance with Section 02190 – Demolition. Dispose of other waste materials in accordance with Paragraph DISPOSAL OF EXCAVATED MATERIALS.

2.05 BORROW MATERIALS

- A. Suitable fill materials, granular materials and topsoil obtained from locations arranged for by Contractor (off the Site) are required to the extent sufficient suitable materials cannot be obtained from excavation and trenching.
- B. Borrow materials shall not exhibit characteristics of high shrink or swell potential as determined from Atterberg limit tests (ASTM D4318) and/or swell tests (ASTM D4546) unless otherwise specified herein.

2.06 GRANULAR FILL MATERIAL

- A. Granular fill material shall consist of crushed stone, sand and gravel or reclaimed asphalt or concrete. The aggregate shall not contain more than 15 percent deleterious

rock and shale. The fraction passing the No. 40 sieve shall have a plasticity index not to exceed six. Any sand, silt, clay and any deleterious rock and shale shall be uniformly distributed throughout the material.

- B. Reclaimed asphalt or concrete materials meeting the requirements of aggregate must be approved for use by the City.
- C. Granular fill material shall be in accordance with the following gradation requirements defined in Table 1 below:

Table 1. Gradation for Granular Fill Material

Sieve Size	Mass Percent Passing		
	MoDOT Type 5	KDOT Type AB-3	KCMO PW 2202**
2 inch		100	
1 ½ inch		95 to 100	
1 ¼ inch			100
1 inch	100		72 to 100
¾ inch		70 to 95	60 to 90
½ inch	60 to 90		
3/8 inch			43 to 74
No. 4	35 to 60	40 to 65	28 to 60
No. 8		30 to 55	
No. 10			16 to 40
No. 30	10-35		
No. 40		16 to 40	3 to 22
No. 200	0-15	8 to 20*	0 to 15**
* For Type AB-3, the fraction passing the No. 200 sieve shall not exceed ¾ of the fraction passing the No. 40 sieve.			
** For KCMO PW 2200, the difference between Mass Percent Passing of successive sieve sizes shall not exceed 25%. That fraction of material passing the No. 40 sieve shall have a plasticity index not to exceed 8.			

1. MoDOT Type 5 material shall conform to Missouri Department of Transportation, Standard Specifications for Highway Construction, Section 1007, Type 5 Aggregate.
2. KDOT Type AB-3 material shall conform to Kansas Department of Transportation, Standard Specification and Construction Manual, Division 1100, Aggregates.

2.07 GEOTEXTILE

- A. Geotextile shall conform to the requirements of Section 02230 – Geotextiles.

2.08 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

- A. See Section 02250 – Trenching, Pipe Embedment and Backfill.

PART 3 - EXECUTION

3.01 DEMOLITION

- A. Demolition shall be conducted in accordance with Section 02190 – Demolition.

3.02 CLEARING AND GRUBBING

- A. Perform clearing and grubbing, in accordance with Section 02180 – Clearing and Grubbing, as indicated and as required to perform the Work.

3.03 STRIPPING

- A. Stripping shall consist of scraping areas clean of all brush, grass, weeds, roots and other materials.
- B. Remove topsoil from areas within limits of excavation, trenching, borrow and areas designated to receive fill.
- C. Strip to a minimum depth of 6 inches, but to a sufficient depth to remove excessive roots in heavy vegetation, unsuitable material or brush areas and as required to remove all soil containing organic material or segregate topsoil.
- D. Stockpile topsoil in areas designated or approved by the City/Design Professional where it will not interfere with construction operations or existing facilities. Stabilize and protect stockpiles from runoff per the SWPPP plan.

3.04 GENERAL REQUIREMENTS FOR OPEN EXCAVATIONS

- A. Excavations shall be restored to the level of the adjacent surfaces as soon as practicable.
- B. Unsupervised or unprotected excavations are prohibited. The Contractor shall adhere to the City's no open excavation policy.
- C. Protective Measures in Paved Areas:
 - 1. Excavations within paved areas shall be protected and secured in accordance with existing federal, state and local codes and standards. This includes, but not limited to, the most current edition of the Manual of Uniform Traffic Control Devices.
- D. Protective Measures Unpaved Areas:
 - 1. Supervision – As a temporary measure, the Contractor may provide personnel to supervise an open excavation that is not otherwise protected. Supervision shall ensure that the public is protected and shall serve the same function as a protective cover or fencing. A protective cover or fencing shall be installed for all excavations that are not supervised.
 - 2. Protective Cover – A protective cover shall be installed over the excavation so that it can sustain the weight of any persons and/or objects placed upon it. The cover shall be of sufficient weight or fixed to the ground so it cannot be moved. Protective covers shall have no opening(s) or protuberance(s) of sufficient size to cause a fall or injury. Advance warning devices shall be installed as required by the City/Design Professional.
 - 3. Fencing – Any excavation that is not covered shall be fenced in so that it surrounds the entire excavation area and prevents entry. The fencing shall be a minimum of 42 inches in height. The fence shall be secured and upright at all times.
- E. Inspection and Maintenance – Protective measures (coverings and fences) shall be inspected by the Contractor at least daily to assure integrity. Protective measures in heavy traffic areas shall be inspected more often as necessary.

F. Excavation permits shall be secured prior to starting the work.

3.05 EXCAVATION

- A. Excavations shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms.
- B. In no case shall excavation faces be undercut for extended footings.
- C. Subgrade surfaces shall be clean and free of loose material of any kind when concrete is placed thereon.
- D. Classification of Excavated Materials – No classification of excavated materials will be made. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition or condition thereof.

3.06 BLASTING

- A. Unless otherwise noted in Section 01015 – Specific Project Requirements, blasting or other use of explosives for excavation will not be permitted
- B. If allowed, blasting shall conform to all applicable ordinances, rules, regulations, permit requirements including Kansas City, Missouri Ordinance 180591 and the Missouri Blasting and Safety Act.
- C. Contractor shall provide a plan for pre-blast surveys, monitoring during blasting and post blast surveys to City prior to use of explosives.
- D. All existing safety regulations, permits, laws and ordinances regarding the storage, transportation and use of explosives shall be observed.
- E. Blasting will be permitted only when proper precautions are taken for the protection of all persons, the work, private property and public utilities from damage or injury. Any damage done by blasting will be repaired by the Contractor at no additional cost to the City.

3.07 DEWATERING

- A. Dewatering equipment shall be provided to remove and dispose of all surface water and groundwater entering excavations, trenches or other parts of the Work.
- B. To prevent damage from hydrostatic pressure, flotation or other cause, all excavations shall be protected and kept dry during subgrade preparation and continually thereafter until the structure is built or the pipe is installed and the area is backfilled.
- C. All excavations for concrete structures or trenches which extend down to or below groundwater shall be dewatered by lowering and keeping the groundwater level beneath such excavations 12 inches or more below the bottom of the excavation.
- D. Surface water shall be diverted or otherwise prevented from entering excavations or trenches to the greatest extent possible without causing damage to adjacent property.
- E. If the material within the excavation becomes unsuitable or unstable as a result of the Contractor's inability to implement adequate surface diversion or dewatering measures, then the Contractor shall remove unsuitable materials and replace with approved compacted fill material as directed by City and at no additional cost to the City.
- F. Surface water and groundwater that contains silt and soil shall not be disposed of without pre-treatment.
- G. The Contractor is responsible for the condition of any pipe, conduit or drainage way which is utilized for drainage purposes. Any such pipe, conduit or drainage way utilized shall be left clean and free of sediment.

3.08 SHEETING AND SHORING

- A. The Contractor shall provide all shoring, bracing, cribbing, trench boxes, underpinning and sheeting as necessary to support excavations.
- B. The Contractor shall provide a Sheeting and Shoring Plan that includes provisions that will accomplish the following:
 - 1. Prevent undermining of pavements, foundations and slabs.
 - 2. Prevent slippage or movement in banks or slopes adjacent to the excavation.
 - 3. Allow for the abandonment of shoring and sheeting materials in place in critical areas as the Work is completed. In these areas, backfill the excavation to within 3 feet of the finished grade and remove the remaining exposed portion of the shoring before completing the backfill.
 - 4. Except where banks are cut back on a stable slope, excavations for structures shall be supported as necessary to prevent caving or sliding.
 - 5. Excavations shall provide adequate working space and clearances for the Work to be performed.
 - 6. Undercutting of excavation faces is prohibited.

3.09 BACKFILL AND COMPACTION

- A. See Section 02250 – Trenching, Pipe Embedment and Backfill for additional requirements.
- B. Fills and embankments shall be constructed to the lines and grades indicated on the Drawings, using suitable material or as specified in Section 01015 – Specific Project Requirements.
- C. Weather Limitations – Construction of fills and embankments during freezing weather shall not be done except by permission of the City/Design Professional. No fill or embankment materials shall be installed on frozen surfaces, nor shall froze material, snow or ice be placed in the fill or embankment.
- D. To the extent possible, excess suitable material obtained from trench excavation can be used for the construction of fills and embankments. Additional material shall be provided as required.
- E. After preparation of the fill or embankment site, the subgrade shall be leveled and rolled so that surface materials of the subgrade will be compacted and well bonded with the first layer of the fill or embankment and for subsequent layers.
- F. All fill and embankment materials shall be placed in layers not to exceed 8 inches in un-compacted thickness.
- G. Material deposited in piles or rows by excavating and hauling equipment shall be spread and leveled before compacting.
- H. No shale particles, rock, gravel or stone with any dimension greater than 2 inches shall be placed in the upper 18 inches of any fill or embankment. Rocks or stones within the allowable size limit may be incorporated in the remainder of fills and embankments, provided they are distributed so that they do not interfere with proper compaction.
- I. The material in each layer shall be wetted or dried as required and thoroughly mixed to ensure uniform moisture content and adequate compaction. Each layer shall be thoroughly compacted as follows:
 - 1. Unpaved Areas:
 - (a) 90% of maximum dry density at moisture content range from 3% below optimum to 2% above optimum as determined by ASTM D698.
 - (b) If the material fails to meet the density specified, compaction methods shall be altered.

2. Paved Areas:
 - (a) All subgrades below paved area and within 1 foot of a paved areas shall be compacted to 95% of maximum dry density at moisture content range from 3% below optimum to 2% above optimum as determined by ASTM D698 for the subgrade 1 foot outside of paved areas.
 - (b) If the material fails to meet the density specified, compaction methods shall be altered.
3. Project specific requirements for backfill and compaction may be modified in Section 01015 – Specific Project Requirements.
- J. Trenches in Embankments – Wherever a trench is to pass through a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation not less than 36 inches above the top of pipe elevation before the trench is re-excavated.
- K. Unless otherwise specified in Section 01015 – Specific Project Requirements, trenches and pipes that pass through a water-containing embankment shall eliminate the granular embedment material and the trench bottom shall be graded to provide uniform and continuous support for the pipe. The pipe shall be embedded in embankment material containing no rocks, stones or other pervious material. The embedment material shall be compacted as specified for the embankment.

3.10 GRANULAR FILLS

- A. See Section 02250 – Trenching, Pipe Embedment and Backfill for additional requirements.
- B. Granular fill material shall be provided where indicated on the drawings.
- C. Granular fill material shall be placed on suitably prepared subgrades and compacted by vibration.
- D. Backfill and Compaction – The material in each layer shall be wetted or dried as required and thoroughly mixed to ensure uniform moisture content and adequate compaction. Each layer shall be thoroughly compacted with a vibratory compactor to 95% of maximum dry density at moisture content range from 3% below optimum to 2% above optimum as determined by ASTM D698.
- E. If the material fails to meet the density specified, compaction methods shall be altered.
- F. Where granular fills are to be covered with concrete, the top surface shall be graded to the required subgrade.

3.11 FIELD QUALITY CONTROL

- A. See Section 02250 – Trenching, Pipe Embedment and Backfill for additional requirements.
- B. Compaction Tests:
 1. Two initial gradation tests shall be made for each type of embedment, fill and backfill material used and one additional gradation test shall be made for each additional 500 tons of each material. At the sole expense of the Contractor, moisture-density (Proctor) tests, relative density tests on the materials and all in-place field density tests shall be performed by the Contractor. All tests performed shall be done in accordance with ASTM D698.
 2. The method of in-place compaction testing including density and moisture content shall be as follows:

- (a) Density - Cohesive materials: ASTM D2167, ASTM D1556 or ASTM D6938.
- (b) Density - Cohesion-less materials: ASTM D6938.
- (c) Moisture Content: ASTM D6938.
- 3. The minimum frequency of in-place compaction testing including density and moisture content will be as follows:
 - (a) At least one test for every 2,000 cubic yards of material placed in a mass fill.
 - (b) At least one test when the City suspects the quality of moisture control or effectiveness of compaction.
- 4. Any material/fill failing to meet required densities shall be removed, replaced and compacted as necessary to achieve specified results.
- 5. Removal of in-place material and replacement with approved new material will be required if scarifying and re-compaction do not produce the required densities.

3.12 EQUIPMENT

- A. The Contractor shall utilize appropriate equipment to obtain the compaction requirements specified. Acceptable equipment includes, but is not limited to, the following:
 - 1. Tamping Rollers.
 - 2. Pneumatic Rollers.
 - 3. Vibratory Rollers.
 - 4. Other methods that have been tested and have been shown to meet the specified compaction rates.
- B. Power tampers or rammers shall be used for the compaction of material in areas where it is impractical or unsafe to use heavy equipment or as recommended by the City.
- C. Vibratory plate compactors, manual or attached to excavation equipment, may be used for consolidation of embedment and compaction of granular fill in areas where it is impractical or unsafe to use heavy equipment or as recommended by the City.
- D. All compaction equipment is subject to the approval of the City/Design Professional.

3.13 FINAL GRADING AND PLACEMENT OF TOPSOIL

- A. After all trenching, backfilling, compaction and embankments to be constructed have been rough graded, all areas shall be final graded to the indicated elevations, slopes and contours.
- B. All cuts, fills, embankments and other areas which have been disturbed or damaged by construction operations shall be surfaced with at least 6 inches of topsoil to meet final grade.
- C. Use of graders or other power equipment will be permitted for final grading and dressing slopes, provided the result is uniform and equivalent to manual methods.
- D. All surfaces shall be graded to provide effective drainage. Unless otherwise indicated, a slope of at least 1 percent shall be provided.
- E. Final grade shall be smooth, even and free from clods, rocks, stones, weeds, brush and other debris.

3.14 DISPOSAL OF EXCESS EXCAVATED MATERIALS

- A. Except as otherwise permitted, all excess excavated materials shall be disposed of off-site.
- B. Demolition Debris, see Section 02190 – Demolition.

- C. Rock – Excavated rock in excess of the amount permitted to be installed in trench backfill (see Section 02250 – Trenching, Pipe Embedment and Backfill) shall be disposed of off-site.
 - D. Other Debris – Waste material and other debris encountered in during excavation shall be disposed of off-site.
 - E. The disposal of waste and surplus excavated materials, including hauling, handling and grading is incidental to Earthwork. No separate measurement or payment shall be made.
- 3.15 SEEDING AND SODDING
- A. All areas disturbed by the Contractor's operations shall be seeded or sodded according to the requirements of Section 02930 – Seeding or Section 02931- Sodding.
- 3.16 SETTLEMENT
- A. The Contractor is solely responsible for all settlement which may occur within the correction period (as stipulated in the General Conditions and Supplementary Conditions). Within 30 days after notice from the City, the Contractor shall make all settlement repairs and the associated restoration caused by correcting the settlement.

END OF SECTION

SECTION 02250 – TRENCHING, PIPE EMBEDMENT AND BACKFILL

PART 1 - GENERAL

1.01 SUMMARY

- A. This section specifies requirements for trench excavation, pipe embedment, backfill and compaction for the installation of water, sanitary sewer and storm water piping.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise modified in the Contract Documents.

1.03 RELATED SECTIONS

- A. Section 01000 – General Project Requirements.
- B. Section 01015 – Specific Project Requirements.
- C. Section 02180 – Clearing and Grubbing.
- D. Section 02190 – Demolition.
- E. Section 02200 – Earthwork.
- F. Section 02230 – Geotextiles.
- G. Section 02575 – Surface Restoration.
- H. Section 02930 – Seeding.
- I. Section 02931 – Sodding.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):

ASTM C33	Standard Specification for Concrete Aggregates.
ASTM C150	Standard Specification for Portland Cement.
ASTM C494	Standard Specification for Chemical Admixtures for Concrete.
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
ASTM C940	Method of Determination of Purity by Measurement of Freezing Points.
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft ³).
ASTM D4253	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
ASTM D4254	Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

ASTM D4832	Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.05 DEFINITIONS

- A. Paved Areas – Areas for which the final surfacing will be traffic-bearing surface treatments such as street pavement, shoulders, driveways, parking lots, curbs, gutters, gravel roads or other surface treatments for traffic (pavers, etc...). Sidewalks and trails are excluded from the definition.
- B. Unpaved Areas – Areas for which the final surfacing will not be a Paved Area.
- C. Downtown Loop – The area of the city bounded on the north by Interstate 70, on the east by U.S. 71, on the south by Interstate 670 and on the west by Interstate 35.

1.06 INFORMATION PROVIDED BY THE CITY

- A. As provided in the Contract Documents.

1.07 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Shop Drawings:
 - 1. Sheeting and Shoring Design – Contractor shall submit, in accordance with 29 CFR Part 1926 - OSHA Subpart P - Excavations and Trenches, a shoring design sealed by a registered professional engineer in the State of Missouri for all excavations greater than twenty (20) feet in depth prior to excavation. Submittal will be for informational purposes only.
- C. Testing Reports:
 - 1. Laboratory testing results for proposed Borrow Materials.
 - 2. Laboratory testing results and quarry control reports for Granular Material.
 - 3. Laboratory testing results for and quarry control reports Granular Bedding.
 - 4. Laboratory testing results for compression testing of CLSM.
 - 5. Moisture-density (Proctor) test results.
 - 6. In-Place Density test results.
- D. Other Submittals:
 - 1. Commercial Laboratory – submit name, contact information and certification of the commercial testing laboratory required by paragraph QUALITY ASSURANCE.
 - 2. Mix Design for CLSM.
 - 3. Concrete Plant – submit the name and location of the concrete plant which will provide the CLSM.

1.08 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. Sampling and Testing:
 - 1. Tests to determine conformance with all requirements of this Specification and for the quality and properties of all Contractor provided materials, including borrow materials proposed for use. The aforementioned testing shall be performed by an independent, state-certified, commercial laboratory retained and compensated by the Contractor and approved by the City.

2. All work associated with QUALITY ASSURANCE shall be included in the Bid Price and will be incidental to the Work.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Stockpile materials in other areas or offsite when adjacent structures, easement limitations or other restrictions prohibit storage adjacent to the Work.
- B. Offsite areas shall be arranged for by the Contractor in accordance with Section 01000 – General Project Requirements.
- C. Granular fill and granular bedding material shall be stored so that it is protected from freezing and significant changes in moisture content.

PART 2 - PRODUCTS

2.01 MATERIALS ENCOUNTERED

- A. Suitable Materials – As defined by, Section 02200 – Earthwork, paragraph MATERIALS ENCOUNTERED.
- B. Unsuitable Materials – As defined by, Section 02200 – Earthwork, paragraph MATERIALS ENCOUNTERED.
- C. Topsoil – As defined by, Section 02200 – Earthwork, paragraph MATERIALS ENCOUNTERED.
- D. Rock – Unless otherwise specified in Section 01015 – Specific Project Requirements, all Materials encountered, regardless of type, character composition and condition shall be considered "unclassified" for the purpose of payment. Contractor shall determine the quantity of various materials to be excavated prior to submitting their Bid. Rock encountered shall be excavated at no extra cost to City.

2.02 WASTE MATERIALS

- A. As defined by, Section 02200 – Earthwork, paragraph WASTE MATERIALS.

2.03 BORROW MATERIALS

- A. As defined by, Section 02200 – Earthwork, paragraph BORROW MATERIALS.

2.04 GRANULAR BEDDING

- A. Granular bedding for pipe bedding or embedment shall be clean crushed rock with not less than 95 percent passing a ½-inch sieve and not more than 5 percent passing a #No. 4 sieve. The gravel mixture shall contain no clay lumps or organic matter. The fraction passing the No. 4 sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 5 when tested in accordance with ASTM D4318.
- B. Granular bedding material shall contain no cinders, clay lumps or other material which may cause pipe corrosion.

2.05 JOB EXCAVATED MATERIAL

- A. Material excavated from the trench.
- B. Meets the requirements of suitable material, except that it may include shale particles gravel or stone with any dimension up to 2 inches.

2.06 GRANULAR FILL MATERIAL

- A. Granular Fill Material shall be as defined by, Section 02200 – Earthwork, paragraph GRANULAR FILL MATERIAL.

2.07 CONTROLLED LOW STRENGTH MATERIAL (CLSM)**A. Materials:**

1. Portland cement Type I or Type II conforming to ASTM C150.
2. Fly ash conforming to ASTM C618 for Class C.
3. Fine aggregate conforming to ASTM C33.
4. Water, clean and potable conforming to ASTM C1602.
5. Shrinkage compensation shall be proportioned in accordance with the manufacturer's recommendations and as tested by ASTM C940.
6. Admixtures for air entrainment or for other purposes shall conform to ASTM C494 or other appropriate standards referenced by the manufacturer. Admixtures shall only be used when specified in the Contract Documents.

B. Mixture Design:

1. Mix design for CSLM shall meet the requirements of Kansas City Public Works Department Specification Section 2600, except that the maximum compressive strength shall be from 50 to 125 psi and shall be removable without using a breaker and without damaging the utility.
2. The unit weight of the CLSM shall be a maximum of 120 pounds per cubic foot.

C. Quality Control:

1. CLSM material shall be provided from a City-approved concrete plant. Contractor shall submit name and location of plant to be used.
2. One set of cylinders for compressive strength testing shall be obtained once per day or for every 100 cubic yards of flowable backfill placed.
3. Cost for Quality Control shall be included in the Bid Price. No separate measurement or payment shall be made.

2.08 TOPSOIL

- A. Topsoil shall be as defined by Section 02200 – Earthwork.

PART 3 - EXECUTION**3.01 DEMOLITION**

- A. Demolition shall be conducted in accordance with Section 02190 – Demolition.
- B. Waste materials resulting from the cutting of pavement shall be considered demolition debris and disposed in accordance with Section 02190 – Demolition.

3.02 PAVEMENT REMOVAL AND RESTORATION

- A. See additional requirements in Section 01000 – General Requirements, paragraph CUTTING AND PATCHING.
- B. Public Right of Way:
 1. Kansas City, Missouri Public Works Department Standard Detail SR-1, Street Cut Restoration is hereby incorporated by reference.
 2. See Section 01015 – Specific Project Requirements for additional detail.
- C. Other Pavement Cut and Restoration:
 1. Removal and replacement on private property shall be done in accordance with paragraph STREET CUT RESTORATION.
 2. Pavement removal shall be no larger than necessary to provide adequate working space for the proper installation of pipe and appurtenances.
 3. Pavement removal for connections to existing lines or structures shall not exceed the extent necessary for their installation.

4. Where the trench parallels the length of concrete walks and the trench location is all or partially under the walk, the entire walk shall be removed and replaced. Where the trench crosses drives, walks, curbs or other hard surfaces, the hard surfaces shall be removed and subsequently replaced between existing joints or between saw cuts as specified for pavement.

D. Driveways:

1. Demolition and restoration of driveways will be as indicated in Section 01015 – Specific Project Requirements or as shown on the Drawings.

3.03 CLEARING AND GRUBBING

- A. Perform clearing and grubbing as indicated or as necessary to perform excavation or trenching.
- B. Clearing and grubbing shall conform to Section 02180 – Clearing and Grubbing.

3.04 STRIPPING

- A. Stripping shall conform to the requirements of Section 02200 – Earthwork, paragraph STRIPPING.

3.05 GENERAL REQUIREMENTS FOR OPEN EXCAVATIONS

- A. See Section 02200 – Earthwork for additional requirements on open excavations.

3.06 BLASTING

- A. Blasting is prohibited unless approved by the City. If approved, Blasting shall conform to the requirements of Section 02200 – Earthwork, paragraph BLASTING.

3.07 DEWATERING

- A. Dewatering of trench excavations shall conform to the requirements of Section 02200 – Earthwork, paragraph DEWATERING.

3.08 SHEETING AND SHORING

- A. Sheeting and shoring for trench excavations shall conform to the requirements of Section 02200 – Earthwork and as specified herein.
- B. Excavations shall provide adequate working space and clearances for the Work to be performed.
- C. In no case shall excavation faces be undercut for extended footings. Trench sheeting shall be removed only if the pipe strength is sufficient to carry trench loads based on the trench width to the back of sheeting. Trench sheeting shall not be pulled until backfilling is completed.
- D. With the written approval from the City, sheeting may be left permanently in the trench. Where trench sheeting is left in place, such sheeting shall not be braced against the pipe, but shall be supported in a manner which will preclude concentrated loads or horizontal thrusts on the pipe. Cross braces installed above the pipe to support sheeting may be removed after pipe embedment has been completed.

3.09 TRENCH EXCAVATION

- A. Classification of Excavated Materials – No classification of excavated materials will be made. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition or condition.

- B. No more trench shall be opened than is necessary to expedite the work. Except where tunneling is indicated on the Drawings, specified or permitted by the City, all trench excavation shall be open cut.
- C. Alignment, Grade and Minimum Cover:
1. The alignment, grade and elevation of each pipeline shall be as indicated on the Drawings.
 2. Trenches for waterlines shall be excavated to a depth sufficient to provide a minimum of 42 inches of pipe cover. Sixteen inch and larger diameter water lines shall be installed with a minimum of 60 inches of pipe cover.
 3. Greater pipe cover depths may be necessary on vertical curves or to provide necessary clearance for air release vaults, existing pipes, conduits, drains, drainage structures or other obstructions.
- D. Limiting Trench Widths:
1. Trenches shall be excavated to a width which will provide adequate working space and sidewall clearances for proper pipe installation, jointing and embedment. Minimum trench widths shall be as follows:

Table 1. Ductile Iron Pipe (DIP) and Polyvinyl Chloride (PVC) Pipe and High-Density Polyethylene Pipe (HDPE)

Pipe Size (inches)	Min. Trench Width in Earth (inches)	Max. Trench Width in Earth (inches)	Min. Trench Width in Rock (inches)
4	18	24	18
6	24	30	24
8	26	32	26
12	28	34	28
16	34	40	34
20	38	44	38
24	42	48	42
≥ 27	O.D. plus 24	O.D. plus 30	O.D. plus 24

O.D. = Outside Diameter

Table 2. Prestressed Concrete Cylinder Pipe (PCCP) and Reinforced Concrete Pipe (RCP)

Pipe Size (inches)	Min. Trench Width in Earth (inches)	Max. Trench Width in Earth (inches)	Min. Trench Width in Rock (inches)
16	36	44	36
20	40	50	40
24	44	56	48
≥ 27	2 * O.D.	(2 * O.D.) + 12	(2 * O.D.) - 12

O.D. = Outside Diameter

- E. Mechanical Excavation:
 - 1. The use of mechanical equipment will not be permitted in locations where its operation would cause damage to trees, buildings, culverts, adjoining property, utilities or other structures above or below ground. In all such locations, hand excavating methods shall be used.
 - 2. Mechanical equipment used for trench excavation shall be of a type, design and construction and operated so that the rough trench excavation bottom elevation can be controlled and that trench alignment is such that pipe, when accurately laid to the specified alignment will be centered in the trench with adequate sidewall clearance. Undercutting the trench sidewall to obtain sidewall clearance is not permitted.
- F. Excavation Below Pipe Subgrade – The trench bottom shall be over excavated below the proposed pipe, as indicated in 02250-1 and 02250-2 of this Section, to provide for the installation of granular embedment.
- G. Foundations in Trenches:
 - 1. Whenever unsuitable or unstable soil conditions are encountered, trench subgrades shall be over-excavated until the trench subgrade is suitable as determined by the City/Design Professional.
 - 2. Adjustments may be made in the Contract Price in accordance with the provisions of the General Conditions.
- H. Bell Holes:
 - 1. Bell holes shall provide adequate clearance for tools and methods used in installing pipe.
 - 2. No part of any bell or coupling shall be in contact with the trench bottom, trench walls or granular embedment when the pipe is jointed. Place embedment around the joint connection after joining the pipe.

3.10 TRENCH SUBGRADE

- A. Subgrades for trench bottoms shall be firm, dense and thoroughly compacted and consolidated.
- B. Protect and maintain the trench subgrade when natural suitable materials are encountered.
- C. Remove rock fragments and materials disturbed during excavation and stripped from trench walls.
- D. Subgrades shall be free from mud and muck and shall be sufficiently stable to remain firm and intact.

3.11 FOUNDATION

- A. Description – A foundation is necessary when the native soils are unsuitable. For such a condition, the trench shall be over-excavated and a layer of supportive material shall be placed and compacted to provide a firm foundation for the subsequent pipe embedment material.
- B. The Foundation layer is shown on 02250-1 and 02250-2.
- C. Subgrades for trench bottoms which are otherwise solid, but which become mucky on top due to construction operations, shall be reinforced with trench stabilization material.
- D. Material – If the trench foundation is an unsuitable foundation for the pipe, the Contractor shall submit a plan, to the City/Design Professional for review and approval, to include the proposed material to be used for the foundation.

E. Layer Thickness – Unsuitable material shall be over-excavated until the trench subgrade is suitable as determined by the City/Design Professional.

F. Bedding:

1. Description – A layer of supportive compacted material to provide even support of the pipe at the grade indicated on the Drawings.
2. The Bedding layer is shown on 02250-1 and 02250-2.
3. Material – Granular Bedding.
4. Layer Thickness:
 - (a) A minimum of 3 inches below the pipe or pipe bell when the pipe is placed on a foundation or suitable material.
 - (b) A minimum of 6 inches below the pipe or pipe bell when the pipe is placed on rock.

3.12 HAUNCHING

- A. Description – Extends from the bottom of the pipe to the spring line of the pipe. Haunching provides the most resistance to pipe deflection.
- B. The Haunching layer is shown on 02250-1 and 02250-2.
- C. Material – Granular Bedding.
- D. Layer Thickness – One half the outside diameter of the pipe or pipe bell.

3.13 INITIAL BACKFILL

- A. Description – Extends from the spring line of the pipe to a point above the top of the pipe.
- B. Bedding Material:
 - (a) Class A Bedding – Granular Bedding.

3.14 FINAL BACKFILL

- A. Description – The zone from the top of the Initial Backfill to the bottom of final surfacing.
- B. The Haunching layer is shown on 02250-1 and 02250-2.
- C. Material:
 1. Paved Areas within the Downtown Loop – For areas where the final surfacing is a paved area, the final backfill shall be Controlled Low Strength Material (CLSM).
 2. Paved Areas – For areas where the final surfacing is a paved area, the final backfill shall be Granular Fill Material. CLSM may be substituted for Granular Fill Material as approved by the City or as indicated in the Contract Documents.
 3. Unpaved Areas:
 - (a) For areas where the final surfacing is an unpaved area, the final backfill material shall be a suitable material.
 - (b) Where the pipe cover is 8 feet or more, job excavated material may be used as backfill if the following requirements are met:
 - (i) The final surfacing is unpaved.
 - (ii) The minimum clearance from the top of the initial backfill is 36 inches or 42 inches from the top of the pipe.
 - (iii) The job excavated material shall not be placed within 18 inches of the finished grade.
- D. Layer Thickness – Varies with pipe depth.

3.15 EMBEDMENT

- A. Class A Embedment shall be used for all pipes.

3.16 BACKFILL PLACEMENT

- A. Granular Bedding and Granular Fill Material shall be placed in lifts not exceeding 12 inches in loose thickness.
- B. Suitable Material shall be placed in lifts not exceeding 12 inches in loose thickness.
- C. Bedding – Bedding Granular bedding material shall be spread and the surface graded to provide a uniform and continuous support beneath the pipe at all points between bell holes or pipe joints. It is permissible to slightly disturb the finished subgrade surface by the withdrawal of the pipe sling or other lifting tackle.
- D. Haunches:
 - 1. After each pipe has been graded, aligned and placed in final position on the bedding material and shoved home, sufficient pipe embedment material shall be deposited and compacted by shovel slicing or chalking under the pipe haunches on each side of the pipe and back of the bell or end thereof to hold the pipe in proper position and alignment during subsequent pipe jointing and embedment operations.
 - 2. Care shall be taken to protect protective pipe coatings or wraps. If coating or wrapping is damaged, then the Contractor shall repair or replace the coating to the satisfaction of the City at no additional cost to the City.
 - 3. Haunching and initial backfill material shall be deposited uniformly and simultaneously on each side of the pipe to prevent lateral displacement.
- E. Weather Limitations – Backfilling of trenches during freezing weather shall not be done except by permission of the City. No backfill materials shall be installed on frozen surfaces, nor shall frozen materials, snow or ice be placed in the trench.
- F. Pipe Encasements – A layer of backfill material not more than 8 inches deep may be placed over concrete arch encasement or concrete reaction blocking after the concrete has reached its initial set, to aid curing. No additional backfill shall be placed over arch encasement or blocking until the concrete has been in place for at least 3 days.
- G. Use of Geotextile Material:
 - 1. Where indicated on the Drawings, migration of soil into the embedment material shall be prevented with geotextile fabric.
 - 2. Geotextile material shall conform to Section 02230 – Geotextiles, paragraph GEOTEXTILES on Subsurface Drainage, unless otherwise indicated on the Drawings or in Section 01015 – Specific Project Requirements.
 - 3. Geotextile shall be placed on the trench surfaces so that it completely surrounds the embedment material. Joints shall be lapped 12 inches.

3.17 COMPACTION

- A. Granular Bedding – Vibratory compactors and shovel slicing under the haunches of the pipe.
- B. Granular Fill Material – The material in each layer shall be wetted or dried as required and thoroughly mixed to ensure uniform moisture content. Each layer shall be thoroughly compacted, utilizing a vibratory compactor, to achieve the minimum allowable density of 95% of the maximum dry density (at moisture content range from 3% below optimum to 2% above optimum as determined by ASTM D698). If the granular fill material fails to meet the minimum 95% density specified, the material shall be removed and compacted to achieve 95% or greater.
- C. CLSM – Not applicable.

- D. Suitable Material:
 - 1. Cohesive Materials – As required to obtain 95% maximum dry density in accordance with ASTM D698 with a moisture content range from 3% below optimum to 2% above optimum.
 - 2. Cohesion-less Materials – As required to obtain not less than 85% relative density as determined by ASTM D4253 and ASTM D4254.
- E. Job Excavated Material – Where job excavated material is used for trench backfill, the Contractor shall use compaction methods to ensure that settlement does not occur within the limits of trench excavation. The Contractor shall repair settlement as directed by the City at any time during the Work or at any time during the warranty period. Repairs shall be made at no additional cost to the City.

3.18 FINAL SURFACING

- A. Final surfacing shall be indicated on the Drawings.
- B. For unpaved areas, see Section 02200 – Earthwork, paragraph FINAL GRADING AND PLACEMENT OF TOPSOIL.

3.19 DITCH CHECK

- A. Continuity of embedment material shall be interrupted by low permeability groundwater barriers to impede passage of groundwater through the embedment.
- B. Materials:
 - 1. Unpaved Areas – Suitable material classified as GC, SC, CL or ML-CL as defined in Section 02200 – Earthwork, paragraph MATERIAL ENCOUNTERED. Barriers shall be compacted to 95% maximum dry density in accordance with ASTM D698 with a moisture content range from 3% below optimum to 2% above optimum.
 - 2. Paved Areas – CLSM.
- C. Barriers shall be constructed the full depth of the trench and shall include the foundation, bedding, haunching, initial backfill and final backfill zones of the trench.
- D. Barriers shall be the full width of the trench excavation and 3 to 5 feet in length measured along the pipe.
- E. Barriers shall be placed in the trench at intervals as shown on the Drawings or as directed by City/Design Professional. Unless otherwise specified by the City/Design Professional or specified in Section 01015 – Specific Project Requirements, the spacing of the groundwater barriers shall not exceed 250 feet.
- F. The installed location of all groundwater barriers shall be noted on the Field Mark-Up Drawing and Construction Record Drawing.
- G. Construction of the groundwater barriers shall be incidental to trenching and backfilling. No separate measurement or payment will be made.

3.20 SPECIAL REQUIREMENTS

- A. For trench excavation within paved areas that required full depth and width pavement replacement, refer to additional instruction in Section 01015 – Specific Project Requirements.
- B. Suitable materials shall be approved by the City/Design Professional prior to backfill.
- C. Granular Fill Material may be used for final backfill in unpaved areas to within 18 inches of the final graded surface at the option of the Contractor.

3.21 DRAINAGE MAINTENANCE

- A. To the greatest extent practical, open trench excavations shall be protected from surface water. The Contractor shall conduct the Work in a manner that diverts surface water away from the open excavation.
- B. Trenches across roadways, driveways, walks or other trafficways adjacent to drainage ditches or watercourses shall not be backfilled prior to completion of backfilling the trench on the upstream side of the trafficway to prevent impounding water after the pipe has been laid.
- C. Bridges and other temporary structures required to maintain traffic across such unfilled trenches shall be constructed and maintained by the Contractor.
- D. Backfilling shall be done so that water will not accumulate in unfilled or partially filled trenches.
- E. All material deposited in roadway ditches or other water courses crossed by the line of trench shall be removed immediately after backfilling is completed; and the original cross section, grade and contour of the ditches or watercourses shall be restored.
- F. Surface drainage shall not be obstructed longer than necessary.
- G. If the trench subgrade becomes unsuitable or unstable after the trench is excavated and as a result of the Contractor's inability to meet the requirements for DRAINAGE MAINTENANCE, then the Contractor shall over-excavate the unsuitable material and construct a foundation to the satisfaction of the City/Design Professional and at no additional cost to the City.

3.22 FIELD QUALITY CONTROL

- A. Compaction Tests:
 - 1. All tests shall conform to ASTM D6938. All tests required shall be made by an approved independent testing laboratory.
 - 2. Two initial gradation tests shall be made for each type of embedment, fill and backfill material.
 - 3. Storm and Sanitary Sewer Installations:
 - (a) Unless otherwise specified in Section 1015 – Specific Project Requirements, the minimum frequency of in-place compaction testing including density and moisture content will be as follows:
 - (i) Compaction testing is required for all trench zones where suitable material or granular fill material is placed.
 - (ii) Compaction testing is not required for granular bedding material or zones of random fill.
 - (iii) One compaction test shall be done every 100 feet of trench length under pavement and for every three vertical feet of backfill lifts placed. A minimum of two sets of tests are required for each trench backfilled regardless of length.
 - (iv) One compaction test will be done for every 300 feet of trench length in unpaved areas and for every three vertical feet of backfill lifts placed. A minimum of two sets of tests are required for each trench backfilled regardless of length.
 - (v) As required when the City/Design Professional suspects the quality of moisture control or effectiveness of compaction.
 - 4. Water Mains and Service Lines:
 - (a) Unless otherwise specified in Section 01015 – Specific Project Requirements, the Contractor shall conduct a minimum of ten (10) in-place

compaction tests at various locations throughout the project area as designated by the City/Design Professional.

5. Backfill that fails to meet required densities shall be removed and compacted as necessary to achieve specified results at no additional cost to the City.
- B. Controlled Low-Strength Material (CLSM) Tests:
 1. Determine unconfined compressive strength using cylinders of CLSM sampled, handled, cured and tested in accordance with ASTM D4832. All tests required shall be made by an acceptable independent testing laboratory at the expense of the Contractor.
 2. The minimum frequency of compressive strength testing will be one set of cylinders obtained once per day or for every 100 cubic yards of flowable backfill placed.
- C. Field Quality Control shall be considered incidental to the Work associated with trenching, backfill and compaction. The Contractor shall include all costs in the Bid Price and no separate measurement or payment shall be made.

3.23 DISPOSAL OF EXCESS EXCAVATED MATERIALS

- A. Except as otherwise permitted in Section 01015 – Specific Project Requirements, all excess excavated materials shall be hauled off and disposed of off-Site by the Contractor.
- B. The disposal of waste and excess excavated materials, including hauling, handling, grading and surfacing shall be incidental to the work associated with trenching, backfill and compaction. No separate measurement or payment shall be made.

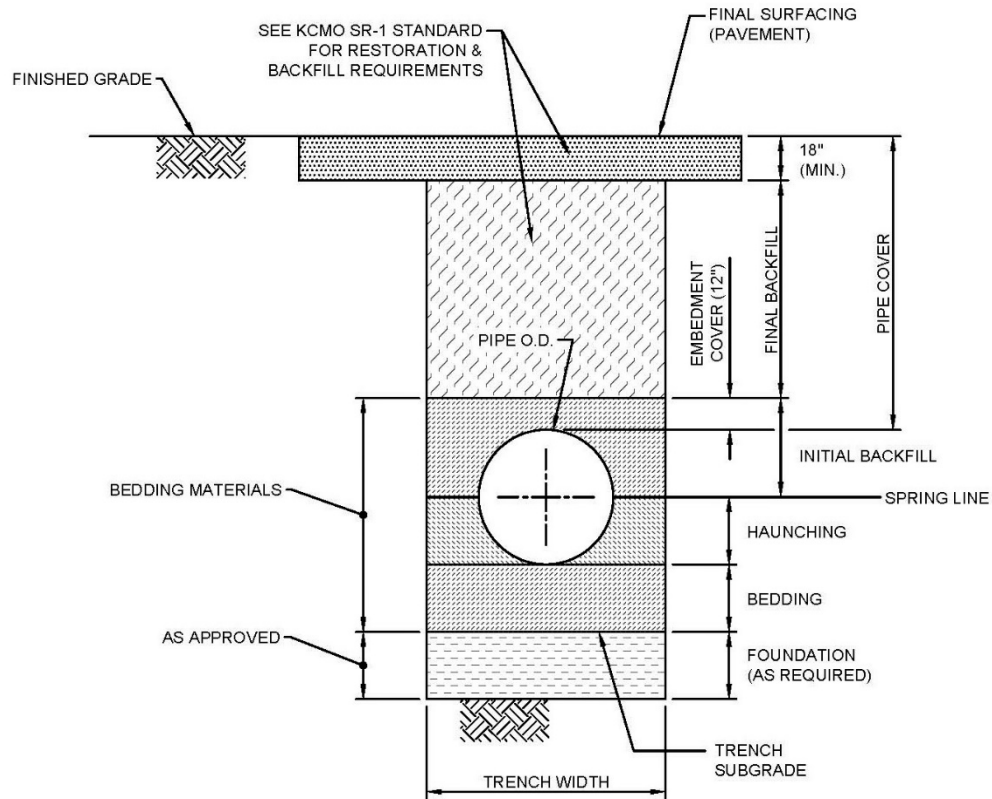
3.24 SEEDING AND SODDING

- A. All areas disturbed by the Contractor's operations shall be seeded or sodded according the requirements of Section 02930 – Seeding or Section 02931 – Sodding.

3.25 SETTLEMENT

- A. The Contractor is solely responsible for all settlement of backfills, fills and embankments which may occur within the correction period as stipulated in the General Conditions and Supplementary Conditions. The Contractor shall make or cause to be made, all repairs, replacements and restoration associated with settlement within 30 days after receipt of notice from the City.

Drawings 02250-1 and 02250-2 on the following 2 pages.



TRENCH DETAIL, CLASS A BEDDING, PAVED AREAS

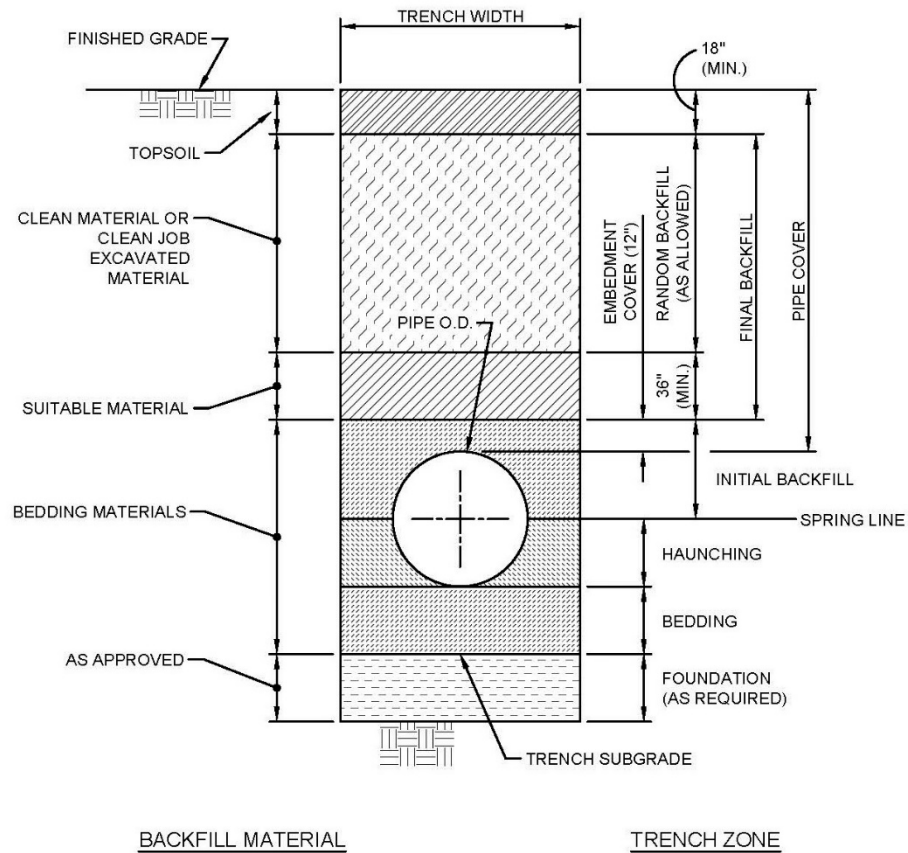
WATER SERVICES
CITY OF KANSAS CITY, MISSOURI

DRAWING NO. 02250-1

DEVELOPED BY: _____
TECHNICAL ADVISORY COMMITTEE

APPROVED BY: _____
DATE: 09/16/2021

1 OF 1



TRENCH DETAIL, CLASS A BEDDING, UNPAVED AREAS

WATER SERVICES
CITY OF KANSAS CITY, MISSOURI

DRAWING NO. 02250-2

DEVELOPED BY: _____
TECHNICAL ADVISORY COMMITTEE

APPROVED BY: _____
DATE: 09/13/2021

1 OF 1

END OF SECTION

SECTION 02575 – SURFACE RESTORATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section covers Work associated with surface restoration within the City's right-of-way, provided easements and other areas disturbed during construction.
- B. The Contractor shall replace all surface material and shall restore paving, curbing, sidewalks, gutters, shrubbery, fences, sod and all other surfaces disturbed or damaged by construction activities to a condition of equal or better than before the start of the Work.
- C. The Contractor shall restore the Site to conditions not less than that which existed prior to starting construction unless otherwise required by: the contract documents, permits and/or licenses.
- D. Coordinate surface restoration work with the affected property owners and the City/Design Professional. Special requests for restoration should be documented in writing and provided to the City/Design Professional.
- E. Private property on which the City has prior rights (i.e. easements, general utility easement, etc.) and/or has obtained easements, rights-of-way, licenses and/or agreements from the property owner shall be restored in conformance with these Contract Documents. Restore public property in accordance with the requirements of the department or public body having jurisdiction. Such entities include, but are not limited to, the following:
 - 1. The City of Kansas City, MO Public Works Department.
 - 2. The City of Kansas City, MO Parks and Recreation Department.
 - 3. Missouri Department of Transportation.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section, these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated in the contract documents.

1.03 RELATED SECTIONS

- A. Section 00700 – General Conditions.
- B. Section 00800 – Supplementary Conditions.
- C. Section 01000 – General Project Requirements.
- D. Section 01015 – Specific Project Requirements.
- E. Section 01320 – Construction Progress Documentation
- F. Section 01322 – Photographic and Video Documentation.
- G. Section 01566 – Cleanup Operations.
- H. Section 02200 – Earthwork.
- I. Section 02250 – Trenching, Pipe Embedment and Backfill.
- J. Section 02930 – Seeding.
- K. Section 02931 – Sodding.
- L. Section 02949 – Tree Protection, Removal and Replacement.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The most recent version of the publications are referred to within the text by the basic designation only.

- B. The City of Kansas City, Missouri Department of Public Works Construction and Material Specifications (<http://kcmo.gov/publicworks/design-construction-standards/>):
- | | |
|---------------|--------------------------------------------------------------------------------------------------------------------------------|
| KCMO PW 2200* | Section 2200, Paving. |
| KCMO PW 2202 | Subsection 2202, Untreated Compacted Aggregate. |
| KCMO PW 2204 | Subsection 2204, Prime and Tack Coat. |
| KCMO PW 2209 | Subsection 2209, Curbing. |
| KCMO PW 2211 | Subsection 2211, Smoothness. |
| KCMO PW 2301 | Subsection Section 2301, Incidental Construction, Standard. Sidewalks, Sidewalk Ramps, Driveways and Bicycle/Pedestrian Paths. |
| KCMO PW 2302 | Subsection 2302 Asphalt Sidewalks, Driveways and Bicycle/Pedestrian Paths. |
| KCMO PW 2306 | Subsection 2306 Pavement Markings. |
- C. The City of Kansas City, Missouri Department of Public Works Standard Drawings (<http://kcmo.gov/publicworks/standard-drawings/>):
- | | |
|--------------|------------------------------------------------------------|
| KCMO PW C* | Standard Drawing Number C, Curbs. |
| KCMO PW D-1 | Standard Drawing Number D-1, Driveway Entrances. |
| KCMO PW D-2 | Standard Drawing Number D-2, Reconstructed Driveways. |
| KCMO PW D-US | Standard Drawing Number D-US, Driveway Unimproved Streets. |
| KCMO PW SR-1 | Standard Drawing Number SR-1, Street Cut Restoration. |
- D. The City of Kansas City, Missouri Parks and Recreation Department (<https://kcparks.org/services/parks-planning-and-design-services/>):
- | | |
|-------------|------------------------------------------------------|
| KCMO PR CR* | Standard Detail Number CR, Rollback Curb and Gutter. |
| KCMO PR DC | Standard Detail Number DC, Commercial Driveway. |
| KCMO PR DR | Standard Detail Number DR, Residential Driveway. |
| KCMO PR SC | Standard Detail Number SC, Commercial Sidewalk. |
| KCMO PR SR | Standard Detail Number SR, Residential Sidewalk. |
| KCMO PR ARA | Standard Detail Number ARA, ADA Curb Ramp-Type A. |
| KCMO PR ARB | Standard Detail Number ARB, ADA Curb Ramp-Type B. |
| KCMO PR C | Standard Detail Number C, Curb. |
| KCMO PR CG | Standard Detail Number CG, Curb and Gutter. |
| KCMO PR CJ | Standard Detail Number CJ, Concrete Joint. |

*Abbreviation used within this specification section to distinguish between the standards of the Public Works Department (PW) and the Parks and Recreation Department (PR).

- E. American Society for Testing and Materials (ASTM):
- | | |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| ASTM D 422 | Standard Test Method for Particle-Size Analysis of Soils, grain-size, hydrometer analysis, hygroscopic moisture, particle-size, sieve analysis. |
| ASTM C 309 | Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete. |
| ASTM A 615 | Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement. |
| ASTM D 977 | Standard Specification for Emulsified Asphalt. |
| ASTM D 2397 | Standard Specification for Cationic Emulsified Asphalt. |

- | | |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------|
| ASTM D 2027 | Standard Specification for Cutback Asphalt (Medium-Curing Type). |
| ASTM D 2028 | Standard Specification for Cutback Asphalt (Rapid Curing Type). |
| ASTM E11 | Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves. |
| ASTM D448 | Standard Classification for Sizes of Aggregate for Road and Bridge Construction. |
| ASTM C131 | Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine. |
- F. Missouri Department of Transportation:
MoDOT Missouri Standard Specifications for Highway Construction (<https://www.modot.org/missouri-standard-specifications-highway-construction>).

1.05 DEFINITIONS

- A. Established Lawn: An Unpaved Area of soil-covered land planted with grasses which are maintained at a height of 5 inches or less. Established lawns include, but are not limited to, grassed areas associated with residential lots, businesses, parks, cemeteries, etc.
- B. Improved Street: A paved, public street, or portion thereof, that incorporates a curb and a gutter.
- C. Paved Areas: Areas for which the final surfacing will be street pavement, shoulders, driveways, parking lots, curbs, gutters, sidewalks, gravel roads, or other surface construction or structures.
- D. Site: Lands or areas indicated in the Contract Documents as being furnished by the City upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by the City which are designated for the use of the Contractor, or as defined in Section 00700 – General Conditions.
- E. Unpaved Areas: Areas for which the final surfacing will not be a Paved Area.
- F. Unimproved Street: A public street, or portion thereof, that does not incorporate a curb and gutter.

1.06 INFORMATION PROVIDED BY THE CITY

- A. As provided in the Contract Documents.

1.07 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Shop Drawings:
 - 1. Submit as required by the contract documents.
- C. Product Data:
 - 1. Submit as required by the contract documents.
- D. Samples:
 - 1. Submit as required by the contract documents.
- E. Other Submittals:
 - 1. The Contractor's Restoration Plan and Schedule adhering to all requirements of the contract documents.
 - 2. All applicable Department of Public Works standard specifications used to complete the Work.

3. All applicable Department of Public Works standard details used to complete the Work.
4. All applicable Parks and Recreation Department standard details used to complete the Work.

1.08 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. All areas disturbed by the Contractor's operations shall be restored in accordance with the contract documents, applicable permits and as directed by the City/Design Professional.
- C. All Work shall be performed by a Contractor, with a proven record of performance for the required restoration work. The Contractor shall submit the following:
 1. The materials to be used to restore the surface.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery of materials shall be in manufacturer's original unopened and undamaged packages. They shall be clearly marked to identify brand name, contents and order number on each package. Packages showing indication of damage that may affect condition of contents are not acceptable.
- B. Storage of material shall provide protective cover from damage and stored at temperatures in accordance with manufacturer's recommendation. Materials shall be staked or stored in accordance with manufacturer's recommendations.

1.10 RESTORATION SCHEDULE

- A. Project milestones and restoration schedule criteria shall be as specified in the following sections:
 1. Section 00800 – Supplemental Conditions.
 2. Section 01015 – Specific Project Requirements.
- B. The specified milestone and/or restoration schedule criteria shall be incorporated in the project schedule as required by Section 01320 – Construction Progress Documentation.

1.11 PROPERTY-SPECIFIC RESTORATION

- A. Easements provided by the City for the construction of the Work may include property-specific restoration requirements. These requirements are noted on the Contract Drawings or included in Section 01015 – Specific Project Requirements.

PART 2 - PRODUCTS

2.01 INCIDENTAL CONCRETE CONSTRUCTION

- A. Incidental concrete construction includes curbs, gutters, sidewalks, sidewalk ramps, ADA ramps, driveways, bicycle/pedestrian paths and other Work indicated in the Contract Documents.
- B. Parks and Recreation Department Standards: Incidental concrete surface restoration for Work having jurisdiction of the City of Kansas City, Missouri Parks and Recreation Department shall comply with the standards listed in paragraph CODES AND STANDARDS. All materials and construction standards are noted on the standard details.
- C. Public Works Department Standards: All materials and construction for incidental concrete surface restoration for Work having jurisdiction of the City of Kansas City, Missouri Public shall comply with the standards listed in paragraph CODES AND STANDARDS:
 1. Sidewalks: KCMO PW 2301.
 2. Sidewalk ramps: KCMO PW 2301.

3. Driveways: KCMO PW 2301.
4. Bicycle/pedestrian paths: KCMO PW 2301.
5. Curbs: KCMO PW 2209.
6. Curb and gutters: KCMO PW 2209.

2.02 GRANULAR SUBBASE MATERIAL

- A. Granular subbase material for incidental concrete construction shall conform to the requirements of Section 02200-Earthwork.

2.03 INCIDENTAL ASPHALT CONSTRUCTION

- A. Incidental asphalt work includes, but is not limited to, the construction of asphaltic concrete sidewalks, driveways, bicycle/pedestrian ramps and other Work indicated in the Contract Documents.
- B. Materials and construction for incidental asphalt surface restoration shall comply with the standards listed in paragraph CODES AND STANDARDS, KCMO PW 2302.

2.04 PAVEMENT

- A. Restoration of pavements shall include, but is not limited to, streets, parking lots, alleys, and other areas subject to traffic and other Work indicated in the Contract Documents.
- B. All materials and construction shall comply with the standards listed in paragraph CODES AND STANDARDS, KCMO PW 2200 and KCMO PW SR-1.
- C. Pavement shall be restored with the type of material existing prior to the Work unless otherwise noted in the Contract Documents.

2.05 PAVEMENT MARKINGS

- A. Materials and construction for incidental asphalt surface restoration shall comply with the standards listed in paragraph CODES AND STANDARDS, KCMO PW 2306.
- B. Paragraph Method of Measurement shall not apply.
- C. Paragraph Basis of Payment shall not apply.

2.06 AGGREGATE FOR SURFACING

- A. Aggregate for surfacing shall meet the requirements of Section 02200-Earthwork, paragraph GRANULAR FILL MATERIAL.

2.07 SEEDING SODDING

- A. Seeding shall conform to Section 02930 – Seeding.

2.08 SODDING

- A. Sodding shall conform to Section 02931 – Sodding.

PART 3 - EXECUTION

3.01 GENERAL

- A. The Contractor shall restore all permanent type pavements, sidewalks, driveways, curbs, gutters, and surface structures, lawns, landscaped areas, and other land covers that are removed or disturbed as a result of construction operations (unless otherwise requested in writing by the property owner).

3.02 FINAL GRADING

- A. Final grading shall conform to Section 02200 – Earthwork, paragraph FINAL GRADING AND PLACEMENT OF TOPSOIL.
- B. Finish grade the area to lines and grades which existed prior to the area being disturbed, with special attention directed to proper surface drainage, and the refilling of settled excavations with earth or fill compacted to the appropriate densities required.
- C. Eroded areas and areas having inadequate drainage, as indicated by ponding of water, shall be filled.
- D. Ruts, deep tracks, dead furrows, and ridges shall be eliminated.
- E. The area shall be smoothed by raking and/or dragging.
- F. Before placing topsoil, remove and dispose of excess gravel to the satisfaction of the City. Leave no stones larger than 1 inch on the surface.
- G. Flower and vegetable gardens in existence prior to this project shall have the separately stored topsoil restored unless otherwise requested in writing by the property owner.
- H. Cultivated areas shall be left in tillable condition; compacted areas shall be plowed or cultivated to loosen and aerate the soil.

3.03 AGGREGATE SURFACING

- A. Unless otherwise indicated on the Drawings, gravel surfaces shall be restored with a minimum 6 inches of compacted aggregate,

3.04 ESTABLISHMENT OF TURF

- A. Sodding
 - 1. Sodding shall be conducted in accordance with Section 02931 – Sodding.
 - 2. Unless otherwise specified in Section 01015 – Specific Project Requirements or on the Drawings, all unpaved areas that are established lawns prior to construction that are disturbed by construction shall be sodded (temporary seeding as approved by the City/Design Professional).
 - 3. If the Contract Documents do not identify the type of sod to be placed, then the sod type shall be the same as the type removed or damaged as part of the Work, or as directed by the City's representative (unless otherwise requested in writing by the property owner).
 - 4. Section 02931 – Sodding provides specification for the following sod types
 - (a) Fescue Turf:
 - (i) Type 1 Sod – Turf Type Tall Fescue.
 - (ii) Type 2 Sod – Kentucky Blue Grass and Turf Type Tall Fescue.
 - (b) Bermuda Turf: Type 3 Sod – Bermuda Grass.
 - (c) Zoysia Turf: Type 4 – Zoysia Grass.
- B. Seeding:
 - 1. Seeding shall be conducted in accordance with Section 02930 – Seeding.
- C. Maintenance:
 - 1. The Contractor shall be responsible for maintaining all turfed areas disturbed by construction activities.
 - 2. Maintenance Period: The Contractor shall maintain turfed areas until all of the following conditions have been met:
 - (a) The turf, including repairs, has been established as defined herein.
 - (b) The turf meets the requirements of paragraph ACCEPTABLE CONDITIONS to the satisfaction of the City.
 - (c) The minimum establishment period for all new turf, including repairs has passed.
 - (d) The Contractor shall be responsible for maintenance of turfed areas until establishment.

- (e) If specified in Section 01015 – Specific Project Requirements, the Contractor has provided notification in accordance with paragraph NOTIFICATION OF PROPERTY OWNERS.
 - (f) As approved by the City in accordance with paragraph EARLY RELINQUISHMENT OF MAINTENANCE RESPONSIBILITIES.
- 3. All turfed areas shall be kept in a healthy growing condition by watering, weeding, mowing, trimming, edging, repairs, etc.
- 4. Watering and Water Usage:
 - (a) Promptly after seeding or sodding, wet the area thoroughly. Watering shall continue so as to keep all areas moist as needed to promote healthy growth.
 - (b) Water used in this work shall be furnished by the Contractor and shall be suitable for irrigation and free from ingredients harmful to plant life.
 - (c) All watering equipment required for the work shall be furnished by the Contractor.
 - (d) Water may be taken from adjacent fire hydrants or public water lines only through metered and backflow protected hydrant connections permitted and issued by the City.
- 5. Mowing:
 - (a) All turfed areas within the limits of the Site shall be mowed with approved mowing equipment to a height of 3 inches whenever the average height of vegetation becomes 5 inches.
 - (b) Grass clippings shall be bagged with the mowing processes and clippings shall be disposed of off-site.
- D. Establishment Period:
 - 1. The establishment period for turfed areas shall be no less than 30 calendar days from the time of planting or last time of repair.
 - 2. The Contractor may not request the Final Inspection (as specified in Section 00700 – General Conditions, Article 14) until all turfed areas have completed the minimum establishment period.
- E. Acceptable Conditions:
 - 1. Turfed areas will be acceptable when grasses are growing, are in good condition, and no area more than 20 percent of the total areas is bare; of which no single area shall be more than 1-foot square in area. Any bare area larger than this will not be acceptable and shall be re-seeded or re-sodded (as applicable) at no additional cost to the City.
 - 2. For sodded areas, the grass shall be sufficiently rooted so that that sod pads cannot be lifted from the sod bed.
- F. Early Relinquishment of Maintenance Responsibilities:
 - 1. The Contractor may request in writing the early acceptance of turfed areas and a return of maintenance responsibilities to the property owner prior to the end of the maintenance period.
 - 2. Limitations on Acceptance of Turf:
 - (a) Acceptance of this request is at the sole discretion of the City.
 - (b) Acceptance of the turf for the purposes of transferring maintenance responsibilities does not constitute acceptance of the Work as a whole, Substantial Completion, Partial Utilization, or a Final Inspection as define in Section 00700 – General Conditions and modified in Section 00800 – Supplementary Conditions.
 - 3. Before the request is made, the following conditions must be met:
 - (a) The turf, including repairs, has been established.
 - (b) The minimum establishment period has passed for the turf, including repairs.
 - (c) Work has substantially been completed within the area, and no other construction activities are anticipated that will disturb or damage the turf.

- (d) The Contractor has demobilized all labor and equipment from the area.
- (e) All construction materials have been removed from the area.
- 4. The Contractor shall submit a written request to the City indicating the area of the Site for which turf maintenance responsibilities are to be transferred to the property owners.
- 5. The Contractor shall schedule and inspection with the City and /or their representative to determine if the turfed areas are acceptable as specified above.
- 6. If the all turf within the defined area is acceptable, then the City will provide written notification to the Contractor documenting acceptance.
- 7. After acceptance of the request for relinquishment of maintenance, the Contractor shall perform the following:
 - (a) Within 5 working days of acceptance, document the condition of the turfed areas in accordance with Section 01322 – Photographic and Video Documentation. Photographic documentation of conditions shall be conducted at no additional cost to the City.
 - (b) Notify all affected property owners in accordance with paragraph NOTIFICATION OF PROPERTY OWNERS.
 - (c) Provide written notification to the City that all affected property owners have been notified of the relinquishment of maintenance responsibilities.
- 8. After all the requirements listed above have been meet, then the City will consider maintenance responsibility of the identified turfed areas to be transferred to the respective property owners.
- G. Notification of Property Owners: In accordance with Section 01581 – Public Communications, the Contractor shall notify all affected property owners that the Work on their property has been completed, that turf has been established and that maintenance of the turfed area is now the property owner’s responsibility.

3.05 TREES, BUSHES AND PLANTS: PROTECTION AND REPLACEMENT

- A. Protection:
 - 1. The protection of trees, bushes and plants shall be done in accordance with Section 02949 – Tree Protection, Removal and Replacement.
- B. Transplanting shall be done in accordance with Section 02949:
 - 1. Existing trees, bushes, and hedges which cannot be tied back or trimmed to prevent damage and require removal because of the proposed construction shall be transplanted with a tree spade or replaced.
 - 2. Tree removal shall include the removal of stump and roots as specified in Section 02949.
 - 3. Transplanting shall be at the location directed by the City/Design Professional or as applicable by the Parks and recreation Department.
 - 4. After digging the plants, properly store them until they can be transplanted.
- C. Pruning or Replacement:
 - 1. Pruning or replacement of trees shall be done in accordance with Section 02949 – Tree Protection, Removal and Replacement.
 - 2. Replacement plants shall not be delivered until they can be planted.
- D. Plant during the proper seasons. Do not plant in frozen soil or during unfavorable weather conditions. Dig tree pits of such size as to provide ample space for the entire root system, as the tree comes from the nursery, without crowding or bending the roots. The pits shall be 12 inches wider than the ball diameter, have vertical sides, and be six inches deeper than the thickness of the ball. Thoroughly loosen the soil in the bottom of the pit by spading to a depth of six inches. Dig holes immediately before planting. Dispose of soil earth dug from the tree pits off the project site.

3.06 STREET CUT RESTORATION

- A. All pavement restoration work in streets shall conform to KCMO PW SR-1 with the following exceptions:
 - 1. Pipe bedding material and installation shall conform to Section 02250 – Trenching, Pipe Embedment and Backfill.
 - 2. Backfill material and installation shall conform to Section 02250 – Trenching, Pipe Embedment and Backfill.
 - 3. With respect to DETAIL 1 – ASPHALT PAVEMENT SURFACE (SR-1, page 1 of 3), the Contractor may pour the Portland cement concrete cap to finish grade. If poured to finish grade, the Contractor shall mill the top of the Portland cement concrete cap a uniform 2 inches ensuring a 2” vertical profile at edge prior to installing the 2” Patch (Type-5-01).
- B. Smoothness:
 - 1. The finish of the pavement surface shall be substantially free from waves or irregularities and shall be true to the established crown and grade.
 - 2. The final surface of pavement will comply with KCMO PW 2211.
 - 3. Testing for smoothness shall be conducted as directed by the City/Design Professional.
 - 4. Measurements for smoothness shall be pass or fail at the sole discretion of the City or their representative. No pay adjustments will be considered.
- C. Provide a straight joint between the existing and new surface per KCMO PW SR-1. All joints shall be at right angles. Diagonal cutting of pavement is prohibited.
- D. Unless the top 2” will be milled, cure and protect all exposed concrete installed under this contract in accordance with the referenced standard.
- E. Unless additives are used to accelerate curing, concrete shall achieve 70% of maximum strength before allowing traffic or construction equipment on the concrete (as proven by cylinder breaks).

3.07 CONCRETE SIDEWALKS, TRAILS, DRIVEWAY APPROACHES, AND RAMPS

- A. Remove concrete to the nearest joint. Removal of partial squares shall not be allowed.
- B. Saw-cut existing sidewalks at construction joints. Patching existing sidewalk squares damaged during construction activities shall not be allowed.
- C. Construct in accordance with all applicable KCMO Public Works and Parks and Recreation Standards.
- D. Minimum concrete thickness for residential sidewalks, trails, driveway approaches, ADA ramps, etc. shall be in accordance with the applicable KCMO Public Works or Parks and Recreation Standard.
- E. All concrete shall be constructed on a minimum of 4 inches of compacted granular sub-base material.
- F. Where sidewalks are constructed across aggregate driveways, increase the thickness to a minimum of six inches across the width of the driveway.
- G. At locations where sidewalks intersect with streets and sidewalk restoration is required, the Contractor shall construct sidewalk ramps in accordance with KCMO PW 2301.

3.08 CONCRETE CURB AND GUTTER

- A. Curb and Gutter dimensions and cross sections shall conform to existing installations. Construct new curbs and gutter in accordance with KCMO PW C.
- B. Expansion joints with dowels shall be placed where the new curb abuts existing curb and as required by KCMO PW C.

3.09 DRIVEWAY ENTRANCE/APPROACH RESTORATION

- A. Driveways shall be restored to a width matching preconstruction conditions, as indicated on the Drawings, or as indicated Section 01015 – Specific Project Requirements.
- B. Subgrades for driveway entrance restoration shall be in accordance with Section 02200 – Earthwork, paragraph BACKFILL AND COMPACTION.
- C. The Contractor shall provide full driveway flare/approach replacement if any of the following conditions are met:
 - 1. The Work requires removal of a portion of the driveway which includes the driveway flare/approach.
 - 2. The Contractor damages the driveway flare/approach.
 - 3. As indicated on the Drawings.
 - 4. As specified in Section 01015 – Specific Project Requirements.
- D. The Contractor may remove the drive approach and driveway pavement within the right-of-way and/or easements necessary to facilitate the Work.
- E. The limits of restorations beyond disturbed areas shall be as follows:
 - 1. To the Nearest Joint: The Contractor shall restore paved driveway surfaces from the street pavement to the nearest existing driveway joint.
 - (a) The Contractor shall saw cut the full depth of pavement to be removed.
 - (b) In no case shall the joint created by saw cutting be less than 3 feet from an existing joint. Adjust the location of the saw cut accordingly.
- F. Driveway Entrance Replacement Standards: Driveways entrances that abut improved streets shall be reconstructed in accordance with the following standards:
 - 1. Public Works Department Standards:
 - (a) KCMO PW D-1.
 - (b) KCMO PW D-2.
 - (c) Construction shall be in accordance with KCMO PW 2301.
 - 2. Parks and Recreation Department Standards:
 - (a) KCMO PR DC.
 - (b) KCMO PR DR.
 - (c) Construction shall be in accordance with KCMO PW 2301.
 - 3. Asphalt Driveway Entrances Abutting Unimproved Streets: Asphalt driveway entrances that abut unimproved streets shall be reconstructed in accordance with the following standards:
 - (a) KCMO PW D-US.
 - (b) Construction shall be in accordance with KCMO PW 2302.
 - 4. Concrete Driveways abutting Unimproved Street: Concrete driveway entrances that abut unimproved streets shall be reconstructed in accordance with the following standards:
 - (a) KCMO PW D-US, except that the material for construction shall be concrete.
 - (b) Construction shall be in accordance with KCMO PW 2301.
 - (c) The concrete thickness shall be a minimum of 6 inches.
 - (d) Expansion and contraction joints shall conform to the details shown on KCMO PW D-1.
 - (e) New joints shall match existing joint patterns (finished the same as existing), but shall be spaced at a maximum distance of 10 feet in both directions (\leq 100 square feet).

3.10 DRIVEWAY PATCHING

- A. Driveway patching will be allowed if any of the following conditions are met:
 - 1. The Work does not require the removal of the driveway flare.
 - 2. The Contractor does not damage the driveway flare/approach.

3. As indicated on the Drawings.
4. As specified in Section 01015 – Specific Project Requirements.
5. As requested in writing from the City.
- B. The Contractor may remove and replace a portion of the driveway necessary to facilitate the Work and the existing driveway flare may remain. Pavement shall be removed and replaced in accordance with the following:
 1. To the Nearest Joint:
 - (a) The Contractor shall remove and replace damaged driveway surfaces from the joint of the driveway flare/approach to the nearest joint of the driveway.
 - i. If the nearest joint is beyond the right-of-way or easement, the Contractor may saw cut the driveway if permitted by the City/Design Professional. In no case shall the joint created by saw cutting be less than 3 feet from an existing joint.
 2. The Contractor shall saw cut the full depth of pavement to be removed.
 - C. Subgrades for driveway patching shall be in accordance with Section 02200 – Earthwork, paragraph BACKFILL AND COMPACTION.
 - D. The Contractor shall replace all paved surfaces damaged or removed for the Work.
 - E. Concrete Driveways:
 1. Construction shall be in accordance with KCMO PW 2301.
 2. The thickness of the concrete shall be the same as the pavement removed or 6 inches; whichever is greater.
 - F. Asphalt Driveways:
 1. Construction shall be in accordance with KCMO PW 2302.
 2. The thickness of the concrete shall be the same as the pavement removed or 6 inches; whichever is greater.

3.11 ASPHALTIC CONCRETE PAVEMENT

- A. Construction of asphaltic concrete pavement shall conform to KCMO PW 2200.
- B. The limits of asphaltic concrete replacement shall be noted on the Drawings.
- C. Applicable details for asphaltic concrete pavement reconstruction shall be as indicated on the Drawings or Section 01015 – Specific Project Requirements.

3.12 PORTLAND CEMENT CONCRETE PAVEMENT

- A. Construction of Portland Cement Concrete pavement shall be in accordance with KCMO PW 2200. The limits of asphalt concrete replacement shall be noted on the Drawings.
- B. The limits of Portland Cement Concrete pavement replacement shall be as indicated on the Drawings.
- C. Applicable details for Portland Cement Concrete pavement reconstruction shall be as indicated on the Drawings or Section 01015 – Specific Project Requirements.

3.13 SUBSTANTIAL COMPLETION/ACHIEVEMENT OF FULL OPERATION

- A. When the Contractor considers the Work ready for its intended use, the Contractor shall notify the City in accordance with Section 00700 – General Conditions, Article 14 – Payments to the Contractor and Completion.

3.14 CLEANUP

- A. Cleanup operations shall be conducted in accordance with Section 01566 – Cleanup Operations.

3.15 SAFETY SIGNS, BARRICADES, LIGHTS AND PROJECT SIGNS

- A. Maintain adequate safety signs, barricades and lights until final restoration is completed.
- B. The Contractor shall install and maintain all project signs for the duration of the Work.

3.16 MAIL BOXES

- A. Mail boxes shall be maintained through the duration of the project in accordance with Section 01000 – General Project Requirements, paragraph MAIL BOXES.

END OF SECTION

SECTION 02605 – DRAINAGE STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

- A. This section covers the furnishing of all labor, materials and equipment required to install drainage structures, frames and covers, access hatches and all appurtenances as shown on the Drawings and as specified herein. All materials and construction shall be in compliance with the latest revision of the standards referenced in this section and Section 2600 of the “KCMO Standard Drawings and Specifications”, except as amended herein.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements, or as otherwise indicated in the Contract Documents.

1.03 RELATED SECTIONS

- A. Section 01000 – General Project Requirements.
- B. Section 01015 – Specific Project Requirements.
- C. Section 02200 – Earthwork.
- D. Section 02702 – Testing Requirements for Sanitary Sewer: Mains and Manholes.
- E. Section 02940 – GSI Inlets.
- F. Section 02955 – GSI Outlets.
- G. Section 03000 – Miscellaneous Concrete.
- H. Section 03370 – Sanitary Sewer Manhole Construction.
- I. Section 05011 – Stormwater Castings.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only
- B. American Concrete Institute (ACI):

ACI 350	Code Requirements for Environmental Engineering Concrete Structures.
ACI 350-06	Code Requirements for Environmental Engineering Concrete Structures and Commentary.
ACI 350.5-12	Specifications for Environmental Concrete Structure.
- C. American Society for Testing and Materials (ASTM):

ASTM A48	Standard Specification for Gray Iron Castings.
ASTM C150	Standard Specification for Portland Cement.
ASTM C443	Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
ASTM C478	Standard Specification for Precast Reinforced Concrete Manhole Sections.

ASTM C990

Standard Specification for Joints for Concrete
Pipe, Manholes and Precast Box Sections Using
Preformed Flexible Joint Sealant.

1.05 INFORMATION PROVIDED BY THE CITY

- A. As provided in the Contract Documents.

1.06 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Shop Drawings:
 - 1. Base sections, riser sections, eccentric conical top sections, flat slab tops, grade rings, including a certificate indicating compliance with ASTM C478.
 - 2. Pipe connections to precast concrete elements.
 - 3. Manhole frame and cover with certification of compliance with the specified ASTM standard and Class designation.
 - 4. Method of repair for minor damage to precast concrete sections.
- C. Product Data:
 - 1. Precast concrete sections:
 - (a) Sectional plan(s) and elevations showing dimensions and reinforcing steel placement.
 - (b) Concrete design mix.
 - (c) Structural Calculations, including assumptions.
 - (d) Structural design calculations and fabrication drawings shall be prepared and stamped by a professional engineer registered in the State of Missouri.
 - 2. Non-Precast Concrete Drainage Structures including but not limited to FRP, Plastic, or approved equal
- D. Test Reports:
 - 1. Precast concrete boxes:
 - (a) Concrete test cylinder reports from an approved testing laboratory certifying conformance with this Item.
 - 2. Results of leakage tests.

1.07 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. All material shall be new and unused.
- C. Materials' quality, manufacturing process and finished sections are subject to inspection and approval by the City/Design Professional. Inspection may be made at place of manufacture, at the work site following delivery, or both.
- D. Materials will be examined for compliance with this Section and approved manufacturer's drawings.
- E. Materials shall be rejected for failure to meet any requirements specified herein. Rejection may occur at place of manufacture, at work site, or following installation. Mark for identification rejected materials and remove from work site immediately. Rejected materials shall be replaced at no additional cost to Owner.
- F. Repair minor damage to precast concrete sections by a submitted and approved method, if repair is authorized by the City/Design Professional.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Handle materials and other accessories in such manner as to ensure delivery to the installation location in a sound undamaged condition.

- B. Non-shrink grout: Deliver Materials to the project in manufacturer's original, unopened packaging, with labels clearly identifying product name, manufacturer, and expiration date. Store grout in a cool, dry place and out of the sun.
- C. Precast concrete sections shall not be delivered to the job until the concrete control test cylinders have attained strength of at least 80 percent of the specified minimum.
- D. Precast concrete sections shall be handled carefully and shall not be bumped or dropped. Hooks shall not be permitted to come in contact with joint sections.
- E. Precast concrete sections shall be inspected when delivered. All cracked or otherwise visibly defective units will be rejected. City reserves the right to inspect the production of the units at the manufacturing plant.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Reference to a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
- B. Like items of materials/equipment shall be the end products of one manufacturer in order to provide standardization for appearance, operation, maintenance, spare parts and manufacturer's service.
- C. Provide lifting lugs or holes in each precast section for proper handling.
- D. Cement shall conform to ASTM C150, Type II cement or equal.
- E. Concrete Materials (acceptable mixes, MCIB, KCMMB).
- F. Precast concrete sections shall be properly cured prior to shipping. Precast concrete sections shall not be shipped before concrete has attained a compressive strength of 3200 psi or 80% of design strength minimum.
- G. Mark date of manufacture, name and trademark of manufacturer on the inside of each precast section.

2.02 DESIGN CRITERIA

- A. Precast concrete:
 - 1. Minimum compressive strength shall be 4000 psi at 28 days.
 - 2. Maximum water-to-cement ratio shall be 0.45 by weight.
 - 3. Minimum cement content shall be 564 lbs. of cement per cubic yard of concrete.
 - 4. For Precast Manhole Sections, design precast concrete base and flat slab top for their own weight, weight of soil at 130 pcf, and a live load equal to AASHTO H-25 truck loading applied at finished grade.
- B. Design of Manufactured products (Precast Concrete or approved equal):
 - 1. Analyze walls and slabs using accepted engineering principals. Design walls for internal fluid pressures and external soil pressures independently.
 - 2. When "fy" exceeds 60,000 psi, "z" (per ACI 350-01, Chapter 10) shall not exceed 95 kips/in, and "fs" shall be computed and shall not exceed 50 percent of "fy".
 - 3. Design products to support their own weight, weight of soil at 130 pcf, and a live load equal to AASHTO HS-25 truck loading applied to top slab.
 - 4. Design walls of the precast boxes for the governing case from the following load conditions:
 - (a) An external lateral pressure based on an equivalent fluid with a unit weight of 90 pounds per cubic foot (pcf). Originate the pressure diagram at the finished ground surface or top of pavement surface, as applicable. When designing by the Strength Design Method, environmental durability factors,

as defined in ACI 350-01, need not be included for this load condition. When designing by the Alternate Design Method (Service Loads), allowable stresses may be increased by one-third for this load condition.

- (b) An external lateral pressure based on an equivalent fluid with a unit weight of 60 pcf. Include a live load surcharge pressure equal to 2 feet of earth above the finished ground surface or top of pavement surface, as applicable.
- (c) An internal lateral pressure based on a fluid with a unit weight of 63 pcf. Assume internal fluid to the bottom surface of the top slab, unless otherwise noted or shown. Design of walls shall account for effects of tension due to internal fluid pressure.
- 5. Locate access openings, wall sleeves and pipe penetrations as shown on Drawings or as recommended by manufacturer and approved by Design Professional.
- 6. Locate horizontal wall joints 8-in minimum from edge of wall openings unless otherwise approved by the City/Design Professional.
- 7. Consider discontinuities in structure produced by openings and joints. Provide additional reinforcing around openings. Frame openings to carry full design loads to support walls.

2.03 PRECAST CONCRETE MANHOLE SECTIONS

- A. Precast manholes shall be in accordance with City Standards (<https://www.kcmo.gov/city-hall/departments/public-works/standard-drawings>), except as modified herein.
- B. Precast concrete base sections, riser sections, transition top sections, flat slab tops and grade rings shall conform to ASTM C478 and shall meet the following requirements or the KCMO City Standards whichever is more stringent:
 - 1. Bottom slab thickness shall be no less than the riser wall thickness.
 - 2. Construct precast concrete bases as shown on the Drawings.
 - 3. Base, riser and transition top sections shall have tongue and groove joints.
 - 4. Top section shall be a flat slab where cover over top of pipe is 4-ft or less.
 - 5. Provide integrally cast knock-out panels in precast concrete manhole sections at locations, and with sizes shown on Drawings. Knock-out panels shall have no steel reinforcing.

2.04 PRECAST CONCRETE BOX STRUCTURES

- A. Precast concrete box structures shall conform to the requirements of ACI 350 and the following additional requirements:
 - 1. Minimum reinforcing bar size shall be No. 5, and shall be Grade 60 or higher.
 - 2. Maximum spacing of reinforcing bars shall be 12 inches, center to center.
- B. Structural design calculations and fabrication drawings shall be prepared and stamped by a professional engineer registered in the State of Missouri.

2.05 PIPE CONNECTIONS

- A. Connect pipe to precast structure using one of the following methods:
 - 1. Grout in place - Precast section shall have a formed, tapered circular opening larger than the pipe outside diameter. Grout shall be non-shrink and waterproof equal to Hallemite, Waterplug or Embecco. Plastic pipe shall have a water stop gasket secured to pipe with a stainless steel clamp.
 - 2. Flexible sleeve – An integrally cast sleeve in precast section or install sleeve in a formed or cored opening. Fasten pipe in sleeve with stainless steel clamp(s). Coat stainless steel clamp(s) with bituminous material to protect from corrosion.

Flexible sleeve shall be Lock Joint Flexible Manhole Sleeve; Kor-N-Seal connector; PSX Press-Seal Gasket or equal.

3. Compression gasket - Integrally cast compression gasket in precast manhole section. Insert pipe into compression gasket. Compression gasket shall be A-Lok or equal.

2.06 MANHOLE FRAME AND COVER

- A. Manhole frames and covers shall be per Section 05011 – Stormwater Castings.

2.07 JOINTING PRECAST SECTIONS

- A. Seal tongue and groove joints of precast sections with either rubber O-ring gasket or preformed flexible joint sealant. O-ring rubber gaskets shall conform to ASTM C443. Preformed flexible joint sealant shall conform to ASTM C990 and shall be Kent Seal No. 2 by Hamilton-Kent; Ram-Nek by K.T. Snyder Company or equal.
- B. Completed joint shall withstand 15 psi internal water pressure without leakage or displacement of gasket or sealant.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All Drainage Structures shall be provided, installed and constructed at the location shown on the Drawings.
- B. Manhole and Precast Box Installation:
 1. Manholes and precast boxes shall be constructed to the dimensions shown on the Drawings and as specified herein. Construct cast-in-place bases in accordance with the requirements of the contract documents and KCMO Standard details.
 2. Place base on a bed of 8-in structural fill as shown on the Drawings. Set base grade so that a maximum grade adjustment of 8-in is required to bring the structure to final grade.
 - (a) Use precast concrete grade rings to adjust manhole frame and cover to final grade.
 3. Set precast concrete sections plumb with a 1/4-in maximum out of plumb tolerance allowed. Seal joints of precast sections with either a rubber O-ring set in a recess or preformed flexible joint sealant in sufficient quantity to fill 75 percent of the joint cavity. Fill the outside and inside joint with non-shrink mortar and finish flush with the adjoining surfaces. Caulk the inside of any leaking joints with lead wool or non-shrink grout to the satisfaction of the City/Design Professional.
 4. Allow joints to set for 14 hours before backfilling, unless a shorter period is specifically approved by the City/Design Professional.
 5. Plug holes in the concrete sections required for handling with a non-shrink grout or non-shrink grout in combination with concrete plugs. Finish flush on the inside.
 6. Cut holes in precast sections to accommodate pipes prior to setting precast sections in place to prevent jarring that may loosen the mortar joints.
 7. Backfill carefully and evenly around manholes and precast boxes.
- C. Pipe Connections:
 1. Construct pipe connections, including pipe stubs, as specified above in section 2.05. Close or seal pipe stubs for future connections with a gasketed watertight plug.

D. Setting Manhole Frame and Cover:

1. Set manhole covers and frames in a full mortar bed. Utilize precast concrete grade rings, a maximum of 8-in thick, to assure frame and cover are set to the finished grade. Set manhole frame and cover to final grade prior to placement of permanent paving.

3.02 LEAKAGE TESTS

- A. Test each liquid-containing structure for leakage. City/Design Professional shall observe each test. Perform exfiltration test as described below.
- B. Assemble structure in place; fill and point all lifting holes and exterior joints within 6-ft of the ground surface with an approved non-shrinking mortar. Test prior to placing the shelf and invert and before filling and pointing the horizontal joints below 6-ft of depth. Lower ground water table below bottom of the structure for the duration of the test. Plug all pipes and other openings into the structure and brace to prevent blow out.
- C. Fill structure with water to the top of the structure. If the excavation has not been backfilled and no water is observed moving down the surface of the structure, the structure is satisfactorily water-tight. If the test, as described above is unsatisfactory as determined by the City/Design Professional, or if the structure excavation has been backfilled, continue the test. A period of time may be permitted to allow for absorption. Following this period, refill structure to the top of the structure, if necessary and allow at least 8 hours to pass. At the end of the test period, refill the structure to the top of the structure again, measuring the volume of water added. Extrapolate the refill amount to a 24-hour leakage rate. The leakage for each structure shall not exceed one gallon per vertical foot for a 24-hour period. If the structure fails this requirement, but the leakage does not exceed three gallons per vertical foot per day, repairs by approved methods may be made as directed by the City/Design Professional. If leakage due to a defective section of joint exceeds three gallons per vertical foot per day, the structure shall be rejected. Uncover the rejected structure as necessary and to disassemble, reconstruct or replace it as directed by the City/Design Professional. Retest the structure and, if satisfactory, fill and point the interior joints.
- D. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorptions, etc. It will be assumed that all loss of water during the test is a result of leaks through the joints or through the concrete.
- E. An infiltration test may be substituted for an exfiltration test if the ground water table is above the highest joint in the structure. If there is no leakage into the structure as determined by the City/Design Professional, the structure will be considered water-tight. If the City/Design Professional is not satisfied, testing shall be performed as previously described.
- F. Regardless of whether leakage testing is required, visible leaks which occur after backfilling shall be sealed by approved means.

3.03 CLEANING

- A. Thoroughly clean all new manholes, precast boxes and drainage structures of all silt, debris and foreign matter of any kind, prior to final inspections.

END OF SECTION

SECTION 02624 – POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE

PART 1 - GENERAL

1.01 SUMMARY

- A. This section covers all work, materials and testing for the installation of PVC gravity sewer pipe by the open-cut method as shown on the Drawings and in conformity with these specifications. All pipelines shall be constructed to proper line and grade as shown on the Drawings and shall result in an unobstructed, smooth and uniform conduit.
- B. This section does not cover PVC pipe associated with pipe bursting. See Section 02580 – Pipe Bursting for Gravity Sewers.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Drawings.

1.03 RELATED SECTIONS

- A. Section 01015 – Specific Project Requirements.
- B. Section 01300 – Submittals.
- C. Section 02250 – Trenching, Pipe Embedment and Backfill.
- D. Section 02580 – Pipe Bursting for Gravity Sewers.
- E. Section 02702 – Sewer Pipe and Manhole Testing.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - 1. D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - 2. D2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
 - 3. D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - 4. D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
 - 5. F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - 6. F679 – Standard Specification for Type PSM Poly Vinyl Chloride (PVC).

1.05 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Shop Drawings and Laying Schedule as required by City/Design Professional.
- C. Product Data:
 - 1. Submit manufacturer's product data for all pipe, fittings and accessories to be used.
 - 2. Manufacturer's report of the test results.

3. A manufacturer's certification shall be submitted indicating that the pipe and fittings were manufactured, sampled, tested and inspected in accordance with this specification and meet the minimum requirements. Each certification furnished shall be signed by an authorized agent of the manufacturer.

1.06 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. Manufacturer:
 1. Certification of the minimum experience requirements. A minimum of five (5) years' experience in the design, manufacture and commercial supplying of the size and type of piping and fittings specified for the project.
 2. Inspection and testing shall be performed by the Manufacturer's quality control personnel in conformance with all applicable standards. Testing may be witnessed by City, Design Professional or approved independent testing laboratory. The Contractor shall provide certified test reports indicating that materials conform to these specifications.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Inspect all materials delivered to the site for damage. Damaged pipe shall be replaced at no additional cost to the City.
- B. Store materials (piping, jointing materials, rubber gaskets, etc...) with the minimum amount of handling possible. Store materials on site in enclosures or under protective coverings out of direct sunlight. Do not store materials directly on the ground.
- C. Keep the interior of pipes and fittings free of dirt and debris.
- D. Handle pipe, fittings and other accessories in such manner as to ensure delivery to the trench in a sound, undamaged condition. Hand carry, use slings or other approved devices designed to protect the pipe (do not drag pipe) when moving the materials.

PART 2 - PRODUCTS

2.01 REQUIREMENTS

1. Furnish pipe materials, joint types, sizes and strength classes as indicated and specified by the contract documents. The pipe shall be made of PVC plastic having a cell classification of 12454 or 12364 as defined in ASTM D1784.
2. Higher strengths Materials: may be furnished at the Contractor's option at no additional cost to the City.

2.02 PIPE, FITTINGS, JOINTS, COATINGS

- A. Pipes and fittings eight (8) inches through fifteen (15) inches in diameter shall conform to ASTM D3034 except as otherwise specified herein.
 1. The minimum pipe wall thickness shall be as shown in Table 1 unless a thicker wall is noted in the contract documents.
 2. Color for pipe and fittings shall be green.
 3. Furnish maximum pipe length normally produced by the manufacturer. Fittings, closures and specials shall be as specified in the contract documents.
 4. All pipe shall have an integral bell and spigot joint.

5. Joints shall conform to ASTM D3212. Joints shall be push-on type only with the bell-end grooved to receive a gasket.

Table 1. Minimum Pipe Wall Thickness for Pipes 8 inches through 15 inches in Diameter

Depth of Pipe Cover (feet)	Pipe SDR
Less than or equal to 15 feet	26
15 to 30 feet	21
Greater than 30 feet	PVC pipe is not allowed

6. PVC pipe shall contain the markings required by ASTM D3034.
7. The spigot end of the pipe shall be marked with a reference line to facilitate assembly and installation inspection.
8. Elastomeric seals (gaskets) shall conform to ASTM F477. Natural rubber gaskets shall not be used.
9. Fittings (tee or wye connections) suitable for four (4) inch and six (6) inch sanitary service lines shall be bell-end with a minimum wall thickness conforming to SDR 26 unless a thicker wall is noted in the contract documents.
10. A special design is required for sanitary service connections 8 inches and larger. Special designs shall conform to the contract documents.
11. Saddle connections are not be allowed for sanitary sewer service lines.
- B. Pipes and fittings eighteen (18) inches through (60) inches in diameter shall conform to ASTM F679 except as otherwise specified in the contract documents.
 1. Furnish maximum pipe length normally produced by the manufacturer. Fittings, closures and specials shall be as specified in the contract documents.
 2. Pipe shall have an integral bell and spigot joint to form a water tight seal.
 3. Pipe shall have a minimum wall thickness conforming to ASTM F679 (PS115) unless a thicker wall is noted in the contract documents.
 4. Joints shall conform to ASTM D3212. Joints shall be push-on type only with the bell-end grooved to receive a gasket.
 5. Elastomeric seals (gaskets) shall conform to ASTM F477. Natural rubber gaskets shall not be used.
 6. The minimum wall thickness of the fittings shall be the same as the minimum wall thickness of the equivalent size of the pipe for the project, specified in ASTM F679 or as otherwise specified in the contract documents, whichever is greater.
 7. The minimum pipe stiffness shall be as specified in ASTM F679 (PS115) when tested at 5% deflection in accordance with Test method D2412.

PART 3 - EXECUTION

3.01 HANDLING

- A. Pipe and accessories shall be handled in a manner that will ensure their finished installation keeps the materials in a sound, undamaged condition. Equipment, tools and methods used in loading, unloading, hauling and laying the pipe and fittings shall be such that the material is not damaged.
- B. Pipe shall be handled in such a manner that no weight, including the weight of the pipe itself, will bear on or be supported by the spigot end or bell end at any time. Pipe and fittings which have been damaged to any degree will not be accepted and shall be removed from the project site.

3.02 TRENCHING AND BACKFILL.

- A. Trenching, backfill, compaction and other efforts related to earthwork shall conform to Section 02250 – Trenching, Pipe Embedment and Backfill.

3.03 PIPE INSTALLATION

- A. Install pipe and fittings in accordance with the requirements of ASTM D2321 for laying and joining pipe and fittings.
- B. Inspect each pipe and fitting before and after installation; replace those found damaged or defective and remove from the trench and site.
- C. Provide proper equipment and tools for lowering sections of pipe into the trench.
- D. Lay pipe with the bell ends in the upgrade direction (bells ahead). Adjust spigots in the bells to give a uniform space all around. Blocking or wedging between bells and spigots is not allowed. Replace the pipe or fitting with one of the proper dimensions to allow uniform space for the proper installation of the joint.
- E. At the end of each work day, temporarily seal the open ends of the pipe with a manufacturer's watertight plug or cap.
- F. Provide batter boards not more than 25 feet apart in trenches for checking and ensuring that pipe invert elevations are as indicated in the contract documents. A laser beam may be used in lieu of batter boards for the same purpose.
- G. Pipe shall be protected from lateral displacement by means of granular bedding material as provided in Section 02250 – Trenching, Pipe Embedment and Backfill.
- H. Under no circumstances shall pipe be laid in water and no pipe shall be laid in unsuitable weather conditions or unsuitable trench conditions.
- I. When the pipe is jointed in the trench, the main shall form a true and smooth line. Pipe shall not be trimmed except for closures. Pipe not providing a good fit shall be removed and replaced.

3.04 ALIGNMENT AND GRADE

- A. All pipe shall be laid straight and true between changes in alignment and at a uniform grade between the changes in grade.
- B. All lines shall be laid so that each section between manholes will fully lamp.
- C. Pipe shall be aligned and constructed to the line and grade as shown on the Drawings.

3.05 JOINTING

- A. All instructions and recommendations of the pipe manufacturer, relative to gasket installation and other jointing operations, shall be observed and followed by the Contractor. All joint surfaces shall be heavily lubricated with a vegetable soap solution immediately before the joint is completed.

3.06 CUTTING PIPE

- A. Cutting of the pipe shall be done in a neat manner without damage to the pipe.
- B. All cutting of pipe shall be done with a mechanical pipe cutter of an approved type by the manufacturer; except in locations where the use of mechanical cutters would be impracticable. Existing pipe may be cut with diamond point chisels, saws or other tools which will cut the pipe without damaging the pipe by impact or shock.
- C. Pipe cuts shall be smooth, straight and at right angles to the pipe axis.

3.07 CLEANING

- A. The interior of all pipe shall be cleaned of all foreign matter before being installed and shall be kept clean until the work has been accepted. All lumps, blisters and excess coating shall be removed from the exterior surface of the spigot and the interior surface of the bell. Such surfaces shall be brushed, wiped clean, dry and free from dirt, oil and grease before placing the spigot in the bell. All joint contact surfaces shall be kept clean until the jointing is complete.
- B. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being installed. No debris, tools, clothing or other materials shall be placed or left in the pipe.
- C. Whenever pipe laying is stopped at the end of the work day, the open end(s) of the line shall be sealed with a watertight plug or cap. Whenever a tie-in to the existing collection system is being made, plugs shall be installed to prevent groundwater and debris from entering the collection system and removed just prior to installing the closure.

3.08 FIELD QUALITY CONTROL

- A. All pipelines shall be tested in accordance with Section 02702 - Sewer Pipe and Manhole Testing.

END OF SECTION

SECTION 02630 – STORMWATER PIPE AND STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

- A. This section covers all labor, work, materials and equipment required for the installation of stormwater pipe, structures and all associated appurtenances.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. 01000 – General Project Requirements.
- B. 01015 – Specific Project Requirements.
- C. 01016 – Water Mains Near Sewers.
- D. 01300 – Submittals.
- E. 01320 – Construction Progress Documentation.
- F. 02200 – Earthwork.
- G. 02250 – Trenching, Pipe Embedment and Backfill.
- H. 02575 – Surface Restoration.
- I. 02605 – Drainage Structures.
- J. 02624 – PVC Gravity Sewer Pipe.
- K. 02686 – Cleaning and Assessment of Gravity Lines.
- L. 02702 – Testing Requirements for Sanitary Sewer: Mains and Manholes

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO) standards as cited or referenced herein.
- C. American Society for Testing and Materials (ASTM):

ASTM C76-19a	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM F3219	Standard Specification for 6 to 30 in. Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe
ASTM F2764	Standard Specification for 6 to 60 in. Polypropylene (PP) Corrugated Double and Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
ASTM D2412-21	Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
ASTM D3212-20	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM F477-14	Standard Specification of Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F2306	Standard Specification for 12 to 60 in. Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications

ASTM D3350-14	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
ASTM D3034-16	Standard Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM F679-16	Standard Specification for Polyvinyl Chloride (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.

1.05 INFORMATION PROVIDED BY THE CITY

- A. As provided in the Contract Documents.

1.06 SUBMITTALS

- A. Submit in accordance with Section 01300 – Submittals.
- B. Submittals include, but not limited to, the following:
 - 1. Pipe Certifications.
 - 2. Joint Sealant and/or Gaskets.
 - 3. Product Data.

1.07 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. Manufacturer:
 - 1. Shall be experienced in the design, manufacture and commercial supplying of the specified material for a minimum period of five (5) years.
 - 2. Shall be experienced in the design, manufacture, and commercial supplying of the specified size of pipe for a minimum period of three (3) years.
 - 3. Inspection and Testing shall be performed by the Manufacturer's quality control personnel in conformance with applicable standards. Testing may be witnessed by City, Design Professional, or approved independent testing laboratory. The Contractor shall provide certified test reports indicating that materials conform to all standards and specifications.
 - 4. Shall certify to the above minimum experience requirements.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pipe, fittings, and accessories shall be handled in accordance with the pipe manufacturer's recommendations.
- B. Equipment, tools, and methods used in handling and installing pipe and fittings shall not damage the pipe and fittings.
- C. Pipe shall not be stored uncovered in direct sunlight.
- D. Pipe materials delivered or stored on site shall be free of all damage, chips, cracks, gouges or ultraviolet (UV) degradation. Damaged materials shall be removed from the site and replaced at no additional cost to the City.
- E. See also Section 01000 – General Project Requirements.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All materials and construction shall be in compliance with KCMO Water's Standard Specifications and Manufacturer's recommendations.
- B. Reinforced Concrete Pipe: All reinforced concrete pipe (RCP) as called out on the Contract Drawings, shall be of standard manufacture in accordance with the applicable sections of the Standard Specifications. Pipe materials shall meet or exceed ASTM C76, Class II, III, IV, or

- V (per the design), wall B, Reinforced Concrete Pipe (RCP). Reinforced concrete storm sewer pipe shall use synthetic rubber “O-ring” gasketed joints where specified on the plans.
- C. Polyvinyl Chloride Pipe: All Polyvinyl Chloride (PVC) pipe for storm sewer pipe shall be a minimum of SDR 21 and comply with Section 02624 with the exception of the color requirement.
 - D. Dual Wall and Triple Wall Polypropylene Storm Sewer Pipe: Dual wall pipe and fittings 12 inch through 24 inch diameter shall conform to ASTM F3219 and triple wall pipe 30 inch through 60 inch shall conform to ASTM F2764, except as otherwise specified herein. Dual wall polypropylene pipe shall have a smooth interior and annular exterior corrugation. Triple wall polypropylene pipe shall have a smooth interior and exterior with annular inner corrugations. Pipe shall have a minimum pipe stiffness of 46 psi when tested in accordance with ASTM D2412. Pipe shall be joined with an integral bell and spigot joint on all sizes. The joints shall be watertight in accordance with ASTM D3212. The spigot shall have two gaskets meeting the requirements of ASTM F477. The gaskets shall be installed by the pipe manufacturer and shall be covered with a removable, protective wrap to ensure the gaskets are free from debris. A joint lubricant shall be used on the gasket and pipe bell during assembly. Pipe shall have a reinforced bell with a polymer composite band installed by the manufacturer.
 - E. High Density Polyethylene Pipe (For use outside of roadways): High density polyethylene (HDPE) pipe and fittings shall conform to ASTM F2306 with annular corrugations and an integral bell and spigot. The manufacturer of the pipe must participate in the AASHTO/National Transportation Product Evaluation Program (NTPEP). The maximum cover depth shall be 30 feet.
Material for pipe and fitting production shall be HDPE conforming with the minimum requirements of cell classification 435400C for 12” to 60” diameters as defined in ASTM D3350, except carbon black content shall not exceed 4%. Joint tightness shall conform to ASTM D3212. Elastomeric seal (gasket) shall have a basic polymer of synthetic rubber conforming to ASTM F477. Natural rubber gaskets will not be used. Bells shall span over three corrugations.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Storm sewer pipe structures and appurtenances shall be provided, installed and constructed at the locations shown on the Drawings. Materials and construction shall be in compliance with this Section, Related Sections listed in paragraph 1.03 and Section 2600 of the “KCMO Standard Construction Specifications and KCMO Standard Drawings”, except as amended herein.
- B. Prior to constructing new sewers, the Contractor shall physically locate all utilities within ten (10) feet of the proposed sewers. If there is a utility conflict with the proposed sewers, the Contractor shall notify the City/Design Professional and survey the existing service top elevation and horizontal coordinates. Certified as-built redlines and the utility investigation surveying are the sole responsibility of the Contractor.
- C. The Contractor is responsible for determining all conflicted crossings for the proposed storm sewer and submit their service-relocation shop drawings and/or certified sketches for the City/Design Professional’s review and approval. (Contractor is also responsible for providing field electronic data such as the location coordinates and spot elevations for the City/Design Professional’s use.) It shall be the responsibility of the Contractor to obtain necessary field information for aiding in determining the required minimum length of the existing sanitary or

any other services necessary to clear for the construction of proposed sewers. See also Section 01016 – Water Mains Near Sewers for additional requirements.

- D. Existing sewer mains, sanitary sewer service laterals and water service lines that require relocation or adjustment, in the vertical or horizontal alignments shall be performed by the Contractor. Repairs to the damages caused by the Contractor are the sole responsibility of the Contractor.
- E. Connection(s) to an Existing System pipe and structures shall be installed per manufacturer's guidelines and recommendations. Where a storm sewer pipe is being connected to an existing drainage structure, the work shall be constructed by sawing and chipping a hole through its sidewall to allow a minimum of three-inches of new concrete around the pipe. The invert shall be chipped away and replaced to shape a new doghouse collar and invert. The interior concrete surfaces shall be grouted smooth with non-shrink grout. Depending on the method and extent of the sidewall demolition, reinforcing bars may need to be doweled into the existing structure at the direction of the City/Design Professional.
- F. Pipe Trimming: Pipes connecting to structures shall be cut parallel with the inside face of structures with plane walls. Pipes connecting to other pipes shall be cut parallel with the spring line of the pipe. Projection of the pipe beyond the inside face shall not exceed one inch. Voids shall be grouted with non-shrink grout.
- G. Connection of Existing Pipes to New Pipes: Connection to and/or extension of an existing pipe shall be accomplished by using a fabricated non-shear coupling. The connection shall be properly supported to prevent settlement. All work shall be performed to the satisfaction of the City/Design Professional.
- H. Pipe Abandonment: Any abandoned pipes left in place shall be filled with Fly Ash Slurry and both ends plugged with concrete or as otherwise specified in the Contract Drawings.
- I. Tunneling under or near a tree: Storm sewer pipes within the drip line of a tree marked "Save" shall be installed by tunneling under the roots. Drip line is defined as the diameter of the tree in inches x 10 = drip line diameter in feet. One joint of RCP may be pushed with the excavator bucket. Boring and jacking shall be accomplished in accordance with KCMO 2600; steel casing may not be required for RCP, per the design. There will be no separate payment for tunneling operations of 30' or less.

3.02 ACCEPTANCE TESTING

The Contractor shall perform acceptance testing for all manholes, structures, pipe and all appurtenances in accordance with Section 02702 – Testing Requirements for Sanitary Sewer: Mains and Manholes. The Contractor shall furnish all labor, equipment, materials and provide the testing reports for the required acceptance tests. Pipelines that do not conform to the requirements shall be repaired and/or replaced and shall be retested until the pipeline meets the project requirements. Testing shall be performed in the presence of the City/Design Professional. Testing shall be recorded by the Contractor and a copy shall be submitted to the City/Design Professional. The mandrel or laser profiling testing shall be performed after backfill and compaction operations have been completed and in accordance with Section 02702.

3.03 POST CONSTRUCTION CCTV

- A. Contractor shall provide post-construction CCTV video footage for all completed pipe, in accordance with Section 02686 – Cleaning and Assessment of Gravity Lines.

END OF SECTION

SECTION 02641 – WATER VALVES

PART 1 - GENERAL

1.01 SUMMARY

- A. This section provides valve specifications and installation requirements for all valves and the associated appurtenances required for the project.
- B. This section includes: Gate Valves, Butterfly Valves, Air Release Valves, Tapping Valves, Valve Boxes, Bases, Lids and Covers, Torque Limiting Devices, Valve Seals, Coatings and Check Valves.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. Section 01000 – General Project Requirements.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01300 – Submittals.
- D. Section 02250 – Trenching, Pipe Embedment and Backfill.
- E. Section 03608 – Concrete Vaults.
- F. Section 05012 – Water Castings.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - ASTM A48 Standard Specifications for Gray-Iron Castings.
 - ASTM A126 Standard Specifications for Gray-Iron Castings for Valves, Flanges, and Pipe Fittings.
 - ASTM A276 Standard Specification for Stainless Steel Bars and Shapes.
 - ASTM A536 Standard Specification for Ductile Iron Castings.
 - ASTM A564 Standard Specification for Hot-Rolled and Cold-Finished Stainless Steel Bars and Shapes.
 - ASTM D47 Standard Test Method for Rubber Property-Effect of Liquids.
 - ASTM D1149 Standard Test Method for Rubber Deterioration-Surface Ozone Cracking in a Chamber.
- C. American Water Works Association (AWWA):
 - ANSI A21.11/ AWWA C111 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - AWWA C504 Rubber-Seated Butterfly Valves.
 - AWWA C508 Swing-Check Valves for Waterworks Service, 2in. – 24 in.
 - AWWA C509-94 Standard Specification for Resilient Seated Gate Valves for Water Supply Service.

AWWA C512-99	Performance Standards for Air Release, Air/Vacuum, and Combination Air Valves for Water Works Service.
AWWA C515-09	Standard Specification for Reduced Wall Resilient Seated Gate Valves for Water Supply Service.
AWWA C153	Standard Specification for Ductile Iron Watermain Fittings.

1.05 MATERIALS PROVIDED BY THE CITY

- A. Valves and appurtenances to be provided by the City shall be as indicated in Section 01015 – Specific Project Requirements.

1.06 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Shop Drawings:
 - 1. Detailed drawings, data and descriptive literature on all valves and appurtenances; including, but not limited to, the following:
 - (a) Manufacturer.
 - (b) Dimensions .
 - (c) Size.
 - (d) Specification for materials of construction.
 - (e) Weight.
 - (f) Protective coating.
 - (g) Actuator weight and turns to operate where applicable.
 - (h) Calculations for actuator torque where applicable.
 - (i) Proof of design tests in accordance with AWWA C504, Section 5 – Verification. Tests shall include the following:
 - (i) Hydrostatic test.
 - (ii) Actuator proof of design testing.
 - (iii) Test valve rehabilitation.
 - (iv) Certification for proof of design.
 - (j) Cross section drawings detailing all components.
 - (k) Exploded assembly drawings.
 - (l) Parts list.
 - 2. The Contractor shall submit descriptive literature describing the proposed valves and accessories. Contractor shall also furnish a copy of the manufacturer's warranty that applies to the valves and actuators. See part E. and Part 1.11 of this Section.
- C. Product Data:
 - 1. Gate Valves:
 - (a) Provide catalog data, including illustration and a parts list that identify the materials used for various parts. The information shall be in sufficient detail to serve as a guide in the assembly and disassembly of the valve and for ordering repair parts.
 - (b) Provide manufacturer's drawings showing the principal dimensions, construction detail, and materials used for valve parts.
- D. Other Submittals:
 - 1. Furnish the Butterfly Valve manufacturer's warranty that applies to the valves and actuators being proposed. The warranty period shall be for a minimum of three years after substantial completion of the contract under which the valve is installed or twenty years from the date of shipment, whichever comes first.

2. Furnish the Gate Valve manufacturer's warranty. See Paragraph 1.10 of this Section.
3. Furnish Affidavits of Compliance from the Butterfly Valve manufacturer and Gate Valve manufacturer.
4. Additional Affidavit of Compliance for Coatings: Submit affidavit(s) of compliance associated with the painting of the interior and exterior of the valves.

1.07 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. Manufacturer:
 1. Valves shall be manufactured by a company specializing in the regular production of the Products specified herein and proven reliable in similar service for at least five (5) years.
 2. All valves of the same type shall be the product of one (1) manufacturer.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Follow the provisions for the delivery, storage, protection and handling of products to the site and on-site provided in Section 01000 – General Project Requirements.
- B. Butterfly Valves:
 1. All other requirements of AWWA C504 Section 6.2 "Shipping" shall apply. Requirements include, but are not limited to, the following:
 - (a) Cavities: The manufacturer shall prepare valves for shipment by draining all valve cavities.
 - (b) Fastening requirements: Valves larger than 36 in. (900 mm) shall be bolted or otherwise fastened to skids. Each valve shall be fastened to and delivered on an individual pallet on 4" x 4", or heavier, wood skids, high enough to protect the valve and actuator
 - (c) Surfaces: Uncoated steel and iron-machined surfaces shall be coated with a corrosion inhibitor.
 - (d) Flange protection: Full-face flange protectors of metal, waterproof plywood, or weather-resistant pressboard, of at least the outside diameter of the flange, shall be fastened to each flange to protect both the flange and the valve interior.
 - (e) Small valves: Small valves may be fully packaged at the manufacturer's option.
 - (f) Valve components: Components shipped unattached shall be adequately protected and identified for correct field assembly.

1.09 INFORMATION TO BE SUBMITTED WITH BID

- A. Butterfly Valves:
 1. Descriptive Literature: The Bidder shall include literature describing the valves and actuators to be furnished.
 2. Warranty: The Bidder shall furnish three copies of the manufacturer's warranty that applies to the valves and actuators proposed for the Work. The warranty shall meet the requirements of paragraph WARRANTIES below.

3. The Contractor's selection of butterfly valve manufacturer will be approved as part of the Bid process. Changes to information submitted with the Bid will not be allowed unless otherwise approved.
4. Butterfly valves and actuators that do not meet the minimum requirements of this specification may constitute a non-responsive bid.
5. Failure to provide the requested information with the Bid may constitute a non-responsive bid.

1.10 WARRANTIES

A. Gate valves:

1. The manufacturer shall warranty that all gate valves provided for the Project will be free from defects in material and workmanship.
2. The warranty period shall be for a minimum of three years after substantial completion of the Contract under which the valve is installed, or twenty (20) years from the date of shipment, whichever comes first.
3. Submit in accordance with paragraph SUBMITTALS manufacturer's warranty for all butterfly valves provided. Warranty documentation shall include the date of shipment and unique serial number for each valve.

B. Butterfly valves:

1. The manufacturer shall warranty that all butterfly valves and actuators provided for the Project are free from defects in material and workmanship.
2. The warranty period shall be for a minimum of three years after substantial completion of the Contract under which the valve is installed, or twenty (20) years from the date of shipment, whichever comes first.
3. Submit in accordance with paragraph SUBMITTALS manufacturer's warranty for all butterfly valves provided. Warranty documentation shall include the date of shipment and serial number for each valve.

PART 2 - PRODUCTS

2.01 GENERAL

- ##### A. Marking and identification of valves shall conform to AWWA C504 or AWWA C509/C515.

2.02 GATE VALVES

A. Approved gate valve manufacturers:

1. Clow.
2. Mueller.
3. M&H.
4. AVK.
5. EJ

B. Gate valves shall be used on all water mains 12-inches and smaller.

- ##### C. Except as modified or provided herein, all gate valves shall be 200 psi, ductile iron body, resilient-seated, tight closure gate valves with non-rising stems conforming to the requirements of AWWA C509/C515. AWWA C515 Reduced-wall valves shall have a body and flange thickness/depth equal to or greater than AWWA C153.

- D. Valve Ends:
 - 1. Mechanical Joint or Push-on Joint: Conforming to ANSI A21.11/AWWA C111 except where flange ends are required. Flanges shall be uniform in thickness/depth, thinning of flange face between bolt locations is prohibited. All glands shall be ductile iron.
 - 2. Flanged: Conforming to the dimensions and drilling of ANSI B16.42 for ductile iron flanges and flange fittings, Class 150. The laying lengths of the flange valves shall conform to the dimensions of ANSI B16.42.
- E. Valve Gate:
 - 1. Wedge type gate with a minimum 3/8-inch thick resilient rubber, urethane rubber, Buna "N" or SBR rubber bonded to or mechanically attached to one side or both sides of the gate.
 - 2. No sliding or shear is permitted on the resilient seat, when compressed to a drop-tight shut-off.
- F. Fasteners: All exterior bolts and nuts shall be ASTM A276 Type 304 or Type 316 stainless steel.
- G. Operating Nut: The valve shall be equipped with a two-inch square operating nut produced from a material that is corrosion resistant (stainless steel, bronze, etc.) and has a minimum yield strength of 40 KSI. Operating nut shall have a flanged base upon which shall be cast the word OPEN and an arrow indicating the direction to open. The operating nut shall be securely pinned to the actuator shaft using a corrosion resistant (stainless steel, bronze, etc.) fastener.
- H. Valve Stems: The gate valve stems shall be produced from a material that is corrosion resistant to potable water and has a minimum yield strength of 40 KSI.
- I. Seals: Gate Valves shall be provided with stem seals of the "O" ring type. Two "O" rings shall be used with at least one "O" ring inserted above the thrust collar. The packing plate shall be attached to the valve bonnet by not less than two (2) bolts if bolts are required and one "O" ring below the thrust collar.
- J. Coatings: All exterior surfaces of each valve shall be cleaned and painted in the shop with two (2) coats of asphalt varnish conforming to Federal Specifications TT-V-51-E. The interior surface shall have a protective coating of fusion-bonded, non-toxic epoxy that is safe for potable water. Non-toxic epoxy may also be used for exterior coating.
- K. Tapping Valves: The valves shall be 200 psi, ductile iron body, resilient-seated, tight closure gate valves with non-rising stems in conformance with AWWA C509/C515, except that the outlet end shall be a standard mechanical joint end conforming to ANSI A21.11/ AWWA C111 and the inlet end shall have an inlet flange conforming to ANSI B16.42 for ductile iron flanges, Class 150. Gland shall be ductile iron.

2.03 BUTTERFLY VALVES

- A. Approved butterfly valve manufacturers:
 - 1. M&H.
 - 2. Dezurik.
 - 3. VSI.
- B. Butterfly valves shall be used on all mains 16-inches and larger.
- C. Affidavit of Compliance:
 - 1. For each butterfly valve or appurtenance provided as part of the Contract, the Contractor shall submit the manufacturer's affidavit of compliance.

2. The affidavit shall certify that each butterfly valve or appurtenance meets the minimum requirements of the specifications.
3. Affidavits shall be printed on the manufacturer's letterhead and signed by responsible officials of the manufacturer attesting that the product meets specification requirements.
4. The affidavit must be dated after the award of the contract.
- D. Butterfly valves shall comply with AWWA C504 and as specified herein:
 1. Butterfly valves shall be rubber-seated.
 2. Size: 16-inches through 72-inches in diameter.
 3. Operating pH Range: 6 to 12.
 4. Operating temperature range: 33° to 125°F.
 5. Maximum steady-state fluid working pressure: 250 psig.
 6. Maximum steady-state differential pressure: 250 psi.
 7. Maximum full open fluid velocity: 16 ft./sec (based on nominal valve size).
- E. Body Type:
 1. Vault Installation:
 - (a) Short Body, Flanged Valves.
 - (b) Material: Ductile Iron cast to full gray cast iron thickness.
 - (c) Class 150B for sizes 16-inches through 72-inches.
 - (d) Class 250B in sizes 16-inches through 48-inches.
 2. Direct Bury Installation:
 - (a) Short Body, Mechanical-Joint-End Valves.
 - (b) Material: Ductile Iron cast to full gray cast iron thickness.
 - (c) Class 150B and Class 250B for sizes 16-inches through 24-inches.
 - (d) Class 150B and 250B for sizes 30-inches through 48-inches.
- F. Actuators for Butterfly Valves:
 1. Limitorque Model HBC series.
 2. Auma Model GS series.
- G. Torque Limiting Devices:
 1. Model D86 Overtorque Protector Model D86 as manufactured by Aunspach Controls Company, Inc.
- H. Interior Coatings for Valves 54-inches and greater:
 1. Tnemec N141.
- I. Exterior Coatings for Valves 54-inches and greater:
 1. Tnemec N141.
- J. The valves and actuators shall be of the latest model with all standard accessories ordinarily furnished to the industry except as otherwise specified herein.
- K. All valves of one size shall be built by one manufacturer with actuators built by one manufacturer.
- L. Serial Number: Each valve shall have a unique serial number, which shall be part of the information on the tag specified in paragraph MARKING REQUIREMENTS.
- M. Marking Requirements:
 1. Markings shall be cast on the body with raised letters or provided on a plate.
 2. Plates shall be corrosion-resistant and shall conform to ASTM A276 Type 304 or Type 316 stainless steel.
 3. At a minimum, the markings shall show the following information:
 - (a) Valve size.
 - (b) Manufacturer.
 - (c) Class.

- (d) Year of manufacture.
- (e) Unique serial number.
- (f) The position of the valve seat in the valve body shall be marked on the outside of the valve body, within 12 inches of the actuator nut of upper valve trunnion, tagged or cast, in ¼-inch high print, "SEAT THIS SIDE."
- (g) Number of turns to fully open or close the valve.
- 4. If the design is such that there is a preferred seating direction, the seating direction shall be marked.
- 5. Lettering Dimensions:
 - (a) Cast letters: ½-inch minimum.
 - (b) Plate letters: ⅛-inch minimum. Letters shall be etched or engraved.
- N. The quantity, pressure rating, valve material type, and size of each valve shall be as indicated on the Drawings.
- O. Design: All valve parts shall be designed for a minimum safety factor of 3 based on yield strength, or a safety factor of 5 if based on tensile strength.
- P. Flow Coefficient:
 - 1. The flow coefficient in terms of velocity head (K), in the full open position, shall not be greater than indicated in Table 1:

Table 1 - Maximum Allowable Flow Coefficients (K)

Valve Size	Valve Pressure Rating		
	75 psi	150 psi	250 psi
16-inch through 24-inch	0.40	0.45	0.55
30-inch through 48-inch	0.40	0.40	0.50
54-inch through 72-inch	0.40	0.40	---

- 2. Pressure measurements shall be made at two pipe diameters upstream of the valve and eight pipe diameters downstream of the valve in accordance with recommended procedures of ASME Report on Fluid Meters, Latest Edition.
- Q. Minimum Port Diameter: The minimum port diameter through the valve shall not be less than indicated in Table 2:

Table 2 – Minimum Allowable Port Diameter

Nominal Valve Size (inches)	Allowable Difference in Diameter (inches)
16 through 42	1
48 through 54	1 ¼
60 through 72	1 ½

- R. Fasteners: All bolts and nuts inside and outside the valve, except Mechanical Joint bolts and nuts, shall be ASTM A276 Type 304 or Type 316 stainless steel or ASTM A564 Grade 630 stainless steel.
- S. Valve Body: The valve body shall be ductile iron poured to full gray iron thickness.
- T. End Plate: No bolt or end thrust adjusting screw shall extend through the End Plate.
- U. End Connections:
 - 1. The dimensions and drillings of end flanges shall conform to ANSI B16.42 for 75 psi valves, ANSI B16.42 Table 5 for 150 psi valve and 250 psi valves, both with 150 psi drillings.
 - 2. If specified or shown on the Drawings, 250 psi dimensions and drillings of end flanges shall conform to ANSI B16.42 Table 8, to include but not be limited to, flange outside diameter, flange thickness, bolt circle diameter, bolt diameter, and bolt quantity.
 - 3. The mechanical joint valves are to include the following accessories: gaskets, ductile iron gland rings, mechanical joint bolts, and nuts.
- V. Shafts:
 - 1. All valve shafts shall be in accordance with AWWA C504 Table 3 unless otherwise amended herein.
 - 2. All valve shafts, dowels, and taper pins shall be ASTM A276 Type 304 or Type 316 stainless steel or ASTM A564 Grade 630 condition H1100 stainless steel.
 - 3. The valve shaft shall have a means of clearly indicating the position of the disc on the actuator end of the shaft. This mark shall be machine grooved and shall be visible when the cover and lubrication are removed and shall be offset to the same side as the disc.
 - 4. The valve shaft shall be completely enclosed between the valve body and the actuator body.
- W. Valve Disc: The valve disc shall be ductile iron and shall seat perpendicular to the centerline axis of the valve body.
- X. Valve Seats:
 - 1. The resilient seat shall be EPDM synthetic rubber applied to the valve disc.
 - 2. The resilient seat shall be mechanically secured to either the valve disc or valve body with ASTM A276 Type 304 or Type 316 stainless steel fasteners or non-bonding epoxy.
 - 3. Resilient seats shall be field adjustable and replaceable without special tools or instruction.
 - 4. Mating surfaces for the valve seats shall be ASTM A276 Type 304 or Type 316 stainless steel.
 - 5. All seats shall be designed to provide tight shut-off with flow in both directions.
- Y. Shaft Seals:
 - 1. Seal shall be provided by the use of standard V-type packing or standard "O" ring seals; pull-down packing is not acceptable.
 - 2. The valve shall be designed so that the actuator may be removed and replaced while the valve is in service without losing water.
- Z. Actuator:
 - 1. The actuator shall be a link lever traveling nut type, worm gear type, or yoke and nut type and shall be capable of withstanding submersion in water to a pressure of 10 psi.
 - 2. All exposed bolts, nuts, and shafts shall be of ASTM A276 Type 304 or Type 316 stainless steel or ASTM A564 Grade 630 condition 1100 stainless steel.

3. All actuators shall have outside mechanical adjustments capable of adjusting valve travel without removing the valve from the pipeline or removing the actuator cover.
4. Direction of Operation:
 - (a) Buried service valves shall open right (clockwise).
 - (b) Vault service valves shall open left (counterclockwise).
5. Operating Nut: The actuator shall be equipped with a two-inch square operating nut produced from a material that is corrosion resistant (stainless steel, bronze, etc.) and has a minimum yield strength of 40 KSI. The operating nut shall have a flanged base upon which shall be cast the word OPEN and an arrow indicating the direction to open. The operating nut shall be securely pinned to the actuator shaft using a stainless steel fastener.
6. Handwheels: For vault service valves, the actuator shall be supplied with a handwheel. The handwheel shall be no smaller in diameter than 30 inches and no larger in diameter than 36 inches. Manual actuators shall be suitable for future adaptation to motor operation. Vault service actuators shall have an indicator on the exterior of the actuator indicating the valve disc position. This indicator shall be stainless steel.
7. All gearing and actuator stops shall be enclosed in a suitable housing with a removable cover to permit inspection, repair, and adjustment of the mechanism.
8. Adjustable stop limiting devices shall be provided inside the actuator housing to stop the input shaft at full open and full closed positions. The use of stop nuts or shaft collars which rely on clamping forces or set screws to prevent rotation of the nut or collar on the screw shaft will not be acceptable.
9. The actuator shall rotate the disc from full open to full closed and vice-versa using not less than, nor more than, the number of turns indicated in Table 3:

**Table 3 – Minimum and Maximum Turns for
Butterfly Valves**

Valve Size (inches)	Minimum Turns	Maximum Turns
16	30	60
20	40	80
24	40	80
30	40	200
36	80	200
42	80	220
48	90	300
54	90	700
60	200	700
72	200	700
90	200	700

- AA. Painting Interior of Valves:
 - 1. The interior of valves sizes 16-inch through 72-inch shall be coated with a white, NSF 61 certified, fusion-bonded or powder coated epoxy.
 - 2. Surface preparation and application shall be in accordance with SSPC PA-1.
 - 3. The dry film thickness of the coating shall be a minimum of 10 mils.
- BB. Painting Exterior of Valves:
 - 1. The exterior of valve sizes 16-inch through 48-inch shall be coated with an NSF 61 certified, fusion-bonded or powder coated epoxy.
 - 2. The exterior of valve sizes 54-inch through 70-inch shall be coated with an epoxy paint.
 - 3. Surface preparation and application shall be in accordance with SSPC PA-1. The dry film thickness of the coating shall be a minimum of 10 mils.
- CC. Factory Inspections:
 - 1. The City's representative shall witness the performance, leakage and hydrostatic tests as prescribed in AWWA C504, Section 5 – Verification. Factory tests shall be conducted at the Manufacturer's facility.
 - 2. The City's representative will inspect all valves provided as part of the Contract for conformance to the Contract Documents.
 - 3. No valve shall be shipped from the manufacturer's facility until it passes the factory inspection to the satisfaction of the City.
 - 4. All costs associated with the factory inspection shall be included in the Bid. The Contractor (or valve manufacturer) shall pay all expenses for transportation, lodging, and meals required by the City's representative to complete the inspection. Absolutely no expenses are to be paid by the City's representative at any time. All transportation and lodging shall be subject to approval by the City.
 - 5. The Contractor shall coordinate with the City's representative regarding the schedule for the factory inspection. The inspection date and time shall be approved by the City.
 - 6. The need for multiple factory inspections is at the discretion of the Contractor (or valve manufacturer.) The costs to conduct multiple inspections, or to reschedule a factory inspection, shall be included in the Bid and shall be conducted at no additional cost to the City.
- DD. Post-Delivery Inspections:
 - 1. After the valves are delivered, the City may again test the valves and actuators for compliance with the Contract Documents.
 - 2. Any valve that does not meet specifications or fails testing will be considered defective work, and shall be addressed in accordance with Section 00700 – General Conditions, Article 13 – Tests and Inspection; Correction, Removal or Acceptance of Defective Work.
 - 3. The Contractor shall also be responsible for all testing expenses incurred by the City for all valves that fail to perform as specified herein.
- EE. Torque Limiting Devices:
 - 1. Contractor shall provide a Torque Limiting Device for each direct-bury butterfly valve as specified herein.
 - 2. The torque limiting device shall make over-torque, in either direction, impossible. The unit shall be preset and designed to release when the torque level exceeds 210 foot pounds on the operating nut, in either direction, OPENING or CLOSING the valve. The torque unit shall reset automatically when the torque level drops below 200 foot pounds on the operating nut in either direction.

3. The torque level of the unit shall be adjustable so it may be field set to release at a desired torque limit.
4. The unit shall be less than 5-1/4 inches in diameter and made to mount on the valve inside of the 6-inch diameter stem riser tube of the valve box or in the valve box.
5. The unit shall be provided with a two-inch AWWA operating nut, securely attached to the device. The nut shall have an arrow on the base indicating the valve opens to the "RIGHT" (clockwise) and the word "OPEN". The unit shall be provided with a two-inch square tapered AWWA socket securely attached to the device. The socket shall fit a 2-inch AWWA nut.
6. The unit shall be designed to withstand submersion in water to a pressure of 10 psi; to endure long periods (years) of active or inactive use buried underground and submerged in water. The unit shall be sealed to prevent water and direct from entering the mechanism. The unit shall be packed with a suitable grease.
7. All housing parts, including nut and socket, shall be coated inside and outside with catalyzed (2-part) epoxy. A top coat of catalyzed (2-part) polyurethane enamel shall be applied over the epoxy for additional hardness and extra corrosion protection.
8. Contractor shall mount the torque limiting device's integral socket on each butterfly valve's 2-inch AWWA operating nut inside of the stem riser tube before backfilling around the valve. No fasteners or screws shall be used to secure the torque limiting device to the operating nut.

2.04 AIR RELEASE VALVES AND COMBINATION VALVES

- A. Approved manufacturer:
 1. ARI Flow Control Accessories.
- B. Air Release Valves:
 1. Air release assemblies shall be manufactured in accordance with AWWA C512 performance standards.
 2. All piping shall be brass pipe except the air outlet from the air release valve that shall be brass or copper tubing. Brass piping shall be ASTM B43, Extra Strong with ASME 816.1 Class 250 fittings.
- C. Air Release Valves for mains 12-inches in diameter or smaller shall be 3/4-inch in Diameter unless otherwise specified.
 1. Isolation valves shall be 3/4-inch stainless steel ball valves, 150 psi working pressure.
 2. Air release valves shall be installed in accordance with Drawing No. 02641-1.
 3. Provide vault cover with minimum one 1-inch diameter hole for air flow.
- D. Combination Air Release Valves for mains larger than 12-inches in diameter:
 1. The contractor shall submit to ARI Flow Control Accessories the bid documents so ARI may perform a sizing and placement analysis to verify the placement and sizing of the valves specified during the design of the waterline.
 2. Isolation valves shall be 2 inch stainless steel ball valves with screwed, non-rising stems, 175 psi working pressure or wafer style BFV with handwheel or lever operator.
 3. Air release valves shall be installed in accordance with Drawing Nos. 02641-2 and 02641-2B.
 4. Provide vault cover with a minimum of four 1-inch diameter holes for air flow.

- E. Air Release Valves for mains 12-inches in diameter or smaller shall be 3/4-inch in diameter unless otherwise specified:
 - 1. Model S-050 as manufactured by ARI Flow Control Accessories.
- F. Combination Air Release Valves shall be used for mains larger than 12-inches in diameter:
 - 1. Model D-040 Combination Air Release Valve 2-inch as manufactured by ARI Flow Control Accessories.
 - 2. Model D-060 Combination Air Release Valve 3-inch and larger as manufactured by ARI Flow Control Accessories.

2.05 VALVE BOXES AND BASES

- A. Approved manufacturers:
 - 1. Ametek.
 - 2. MacLean Highline.
 - 3. Pentek Access Boxes.
- B. All valve boxes and bases shall be one-piece only.
- C. One-piece valve boxes and bases shall be injection molded plastic conforming to ANSI/ASTM 2853, Class 1212.

2.06 VALVE BOX LIDS AND COVERS

- A. Approved manufacturers and models shall be in accordance with this section and section 05012 – Water Castings.
- B. Approved manufacturers:
 - 1. Clay & Bailey.
 - 2. Sigma Municipal Castings.
 - 3. Star Pipe Products.
 - 4. EJ.
 - 5. MacLean Highline.
 - 6. Pentek Access Boxes.
- C. The approved manufacturers shall submit their model in accordance with this Section and Section 01300 – Submittals for review and approval.

2.07 CHECK VALVES

- A. Approved manufacturers:
 - 1. Kennedy Valve.
 - 2. ValMatic.
- B. Check valves shall be ductile iron body with reinforced Buna-N rubber flapper.
- C. Check Valves shall be rated for 250 psi working pressure, 500 psi hydrostatic test for structural soundness.
- D. Check Valves shall have ANSI 16.42 – Class 150 flanged end connections.
- E. The check valve body shall have full flow equal to nominal pipe diameter at all points in the valve. The valve body shall be of ductile iron construction to ASTM-A-536-65-45-12. Castings shall be clean, sound and without defects. No plugging or welding of such defects will be allowed. The seating surface will be at a 45 degree angle to minimize water hammer.
- F. Rubber Clapper & Hinge shall be constructed of ductile iron to ASTM-A 536-65-45-12. Both Clapper and hinge shall have permanently bonded Buna-N rubber with a metal reinforcement connecting the hinge to the clapper.

- G. The top cover plate will be of ductile iron to ASTM-A536-65-45-12 and must be of full size to allow removal of the disc without removing the valve from line. All exterior nuts and bolts shall be 304 or 316 stainless steel.
- H. All iron parts inside and out will be fusion bonded epoxy coated. All coatings must be NFS-61 approved for use in drinking water systems.
- I. Vault service check valves shall have an external mechanical position indicator.

2.08 VAULTS

- A. Concrete vaults shall conform to Section 03608 – Concrete Vaults.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Each valve shall be inspected before installation to ensure that all foreign substances have been removed from within the valve body.
- B. Valves shall be opened and closed to see that all parts are in required working condition.

3.02 SETTING VALVES

- A. All valves and fittings shall be set and jointed in the manner specified herein. The valves shall be set vertical in the horizontal pipeline. All valves shall be anchored directly to adjacent tees or crosses.
- B. One-piece valve box and base or a two-piece valve box and valve base shall be installed on all valves. An approved valve box alignment device shall also be installed in all valve boxes. Install in accordance with Standard Detail No. 02641-4 – Actuator Nut Extension.
- C. Valve covers, bases, and lids shall be supported and maintained, centered and plumb over the actuator nut. Cover shall be flush with the roadway or ground surface or at such other as directed by the City.

3.03 AIR RELEASE VALVES

- A. Air release valves shall be installed in accordance with the following Standard Details:
 - 1. Mains 12-inches and smaller:
 - (a) Standard Detail No. 02641-1 – Typical Air Release, 12” Mains and Smaller.
 - 2. Mains 16-inches and larger:
 - (a) Standard Detail No. 02641-2 – Typical Air Release, 16” Mains and Larger.
 - (b) Standard Detail No. 02641-2a – Typical Air Release, 3” ARVs & CAVs, Type “A” Setting, 16” Mains and Larger.
 - (c) Standard Detail No. 02641-2b – Typical Air Release, 3” ARVs & CAVs, Type “B” Setting, 16” Mains and Larger.

3.04 BUTTERFLY VALVES

- A. Install in accordance with Standard Detail No. 02641-3 –Typical Butterfly Valve Installation.

3.05 QUALITY CONTROL

A. Leak Tests for Butterfly Valves:

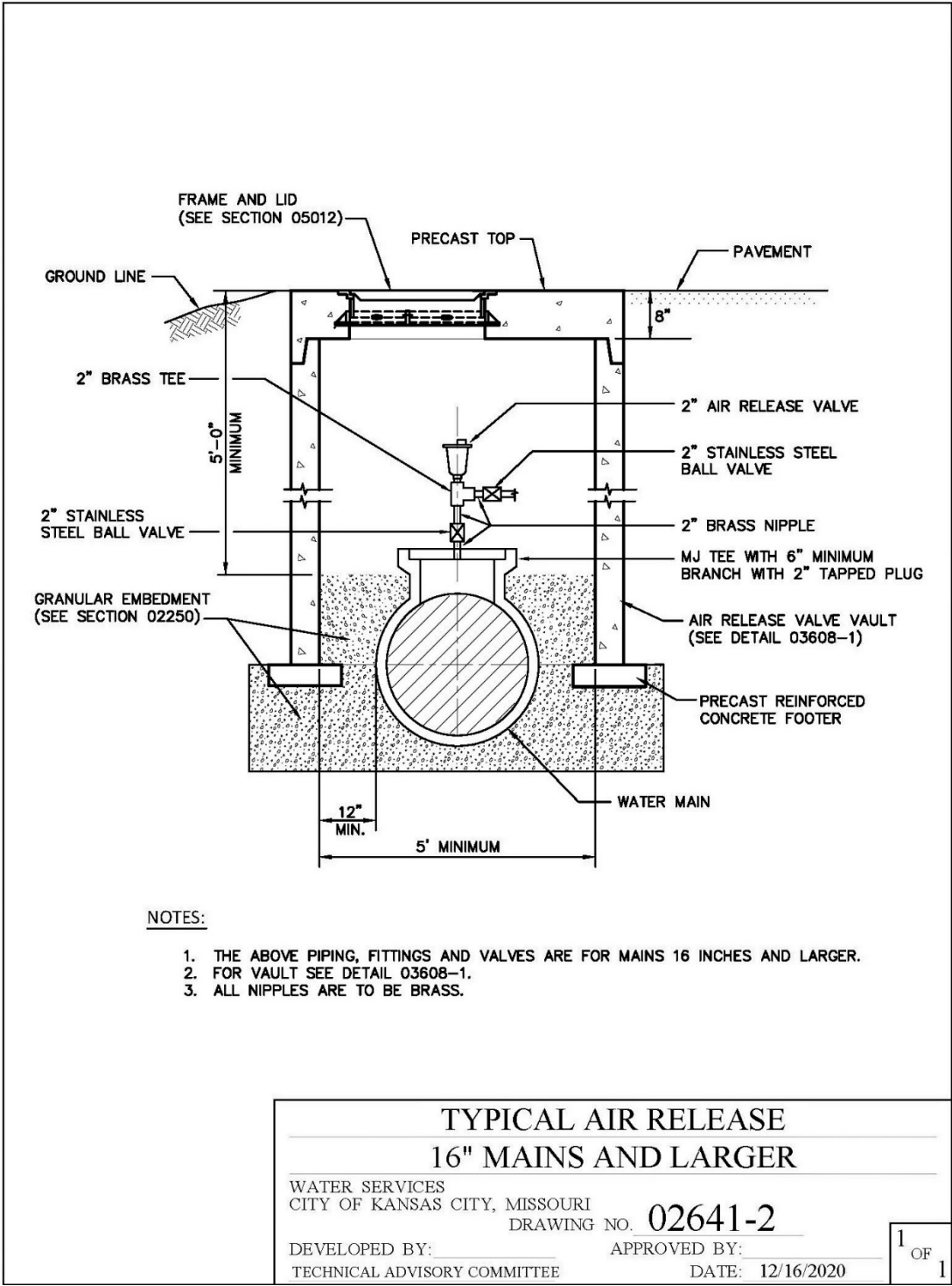
1. Each valve shall be shop tested in both directions for leaks in the closed position. The test shall be conducted with the body in a horizontal plane.
2. Air pressure shall be applied to the lower face of the disc for 5 minutes.
3. Both 150-psi and 250-psi rated valves shall be leak tested to 250-psi pressure.
4. The upper surface of the valve disc shall be visible and covered with a pool of water at "O" psi pressure. There shall be no leakage past the valve disc. Bubbles will appear in the water on the disc if it is leaking.
5. The valve body shall be tested with an internal hydrostatic pressure equivalent to two times the specified shutoff pressure. There shall be zero leakage during the test through the casting, the end joints or the shaft seals. Any part damaged by the Manufacturer's factory testing shall be replaced or a new valve provided.
6. The hydrostatic test period for 4-inch valve bodies through 20-inch bodies shall be at least 3 minutes. Valve body's 24-inch and larger shall be tested for at least 10 minutes.

B. Operational Test for all valves:

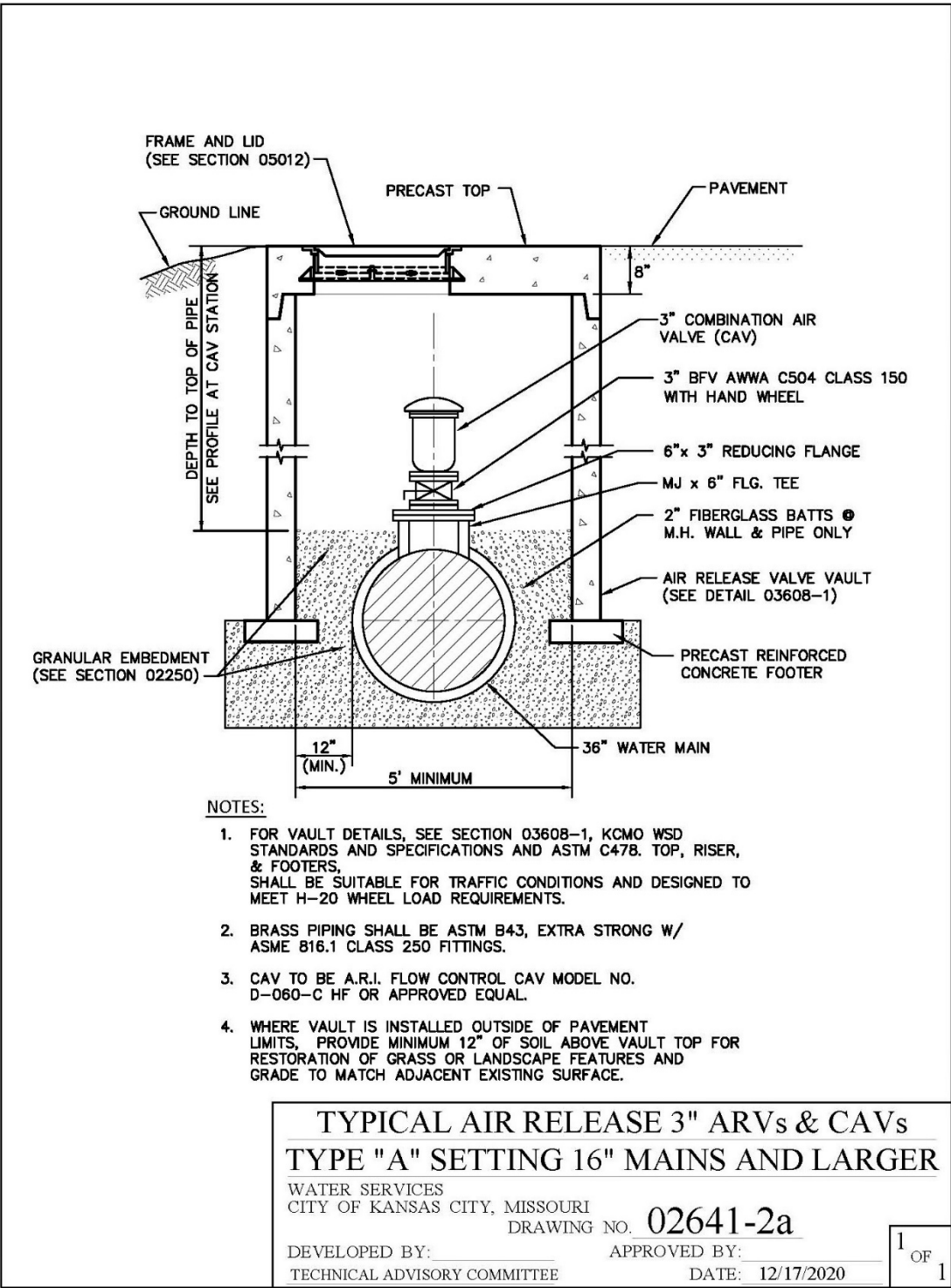
1. Prior to installation, each valve shall be operated three times from the fully closed to the fully open position and vice versa.
2. Each valve shall also be tested in the same manner following installation.

THE FOLLOWING SIX PAGES CONTAIN
TYPICAL INSTALLATION DETAILS

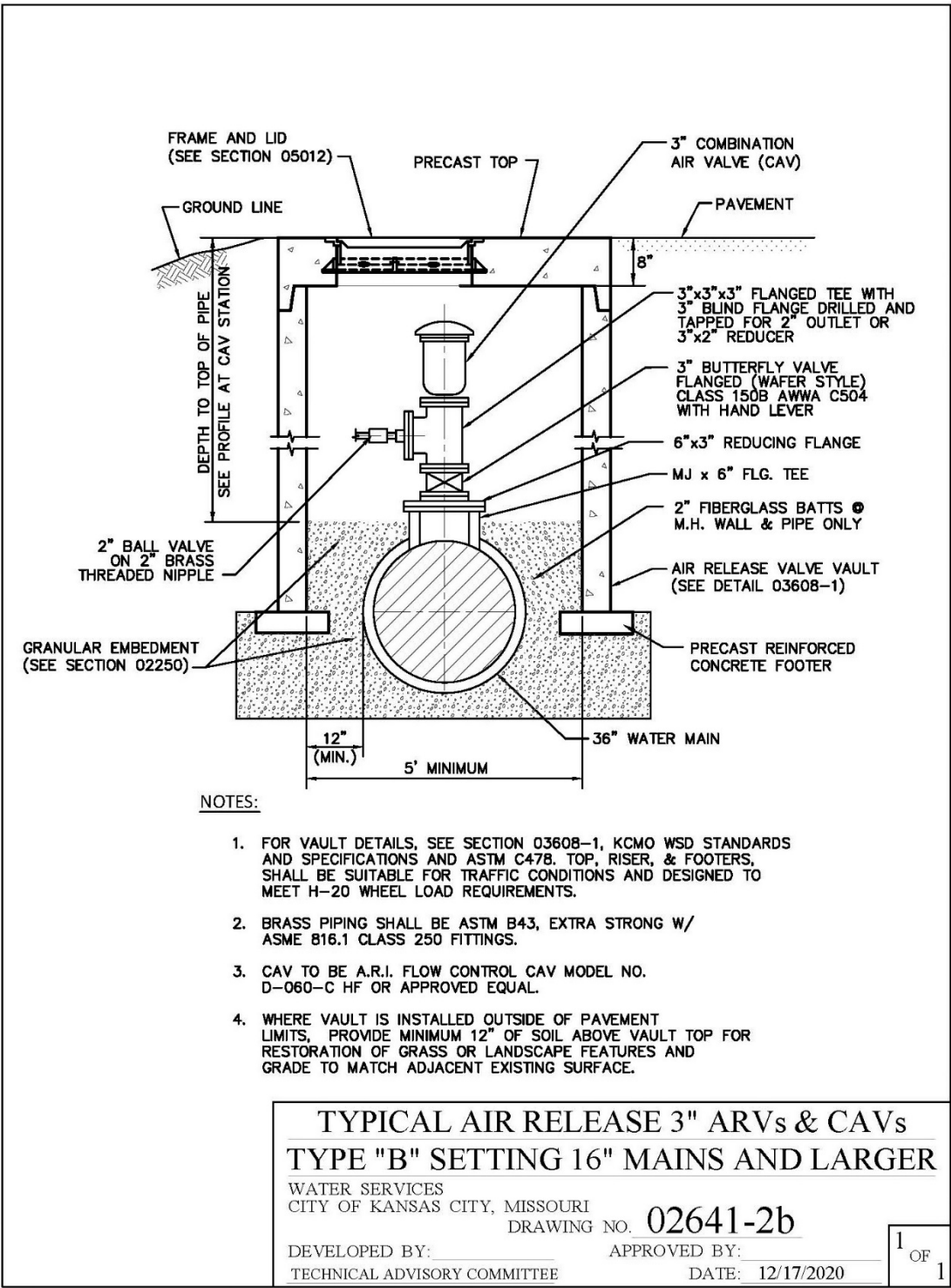
DETAIL 02641-2



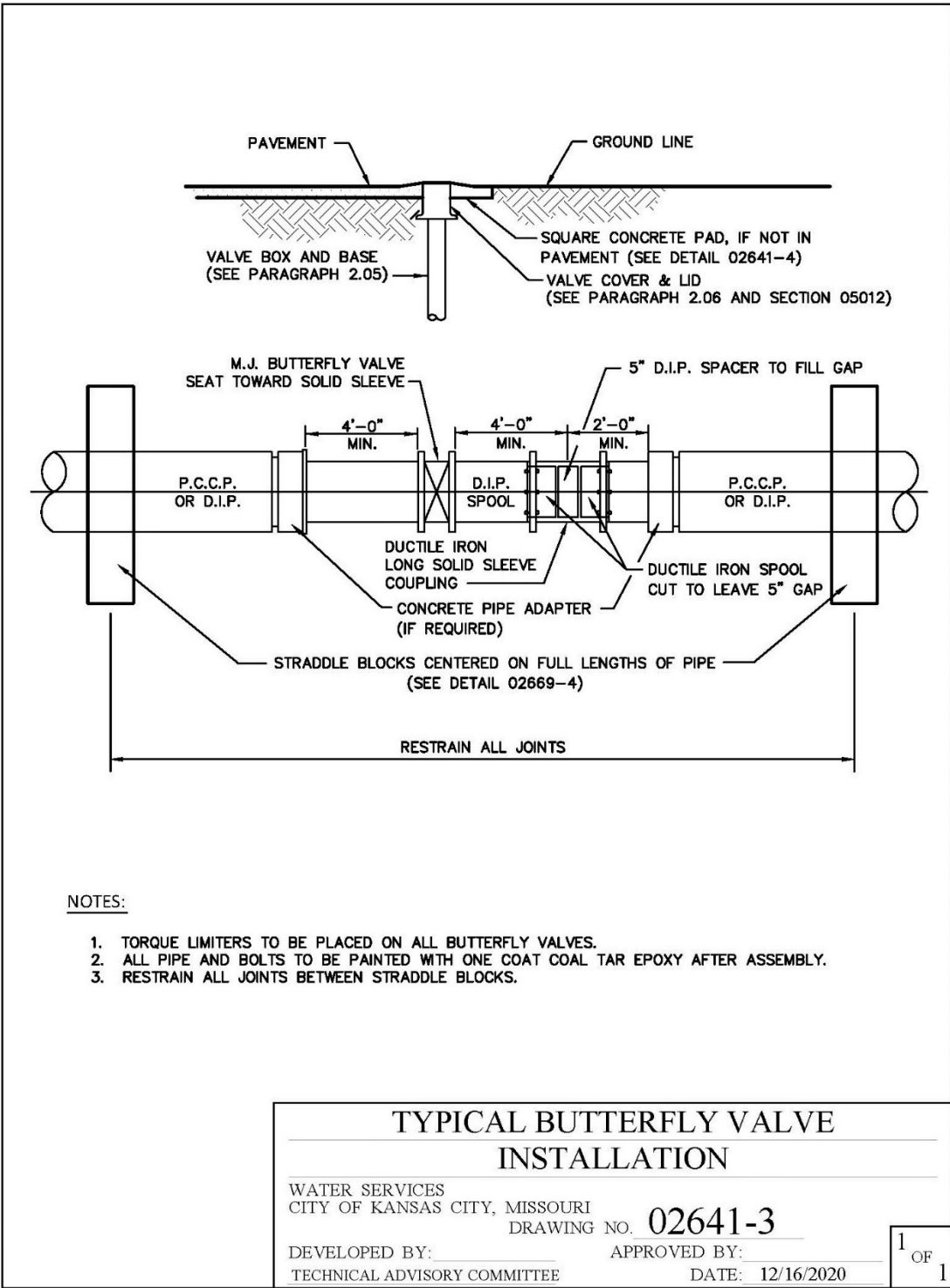
DETAIL 02641-2a



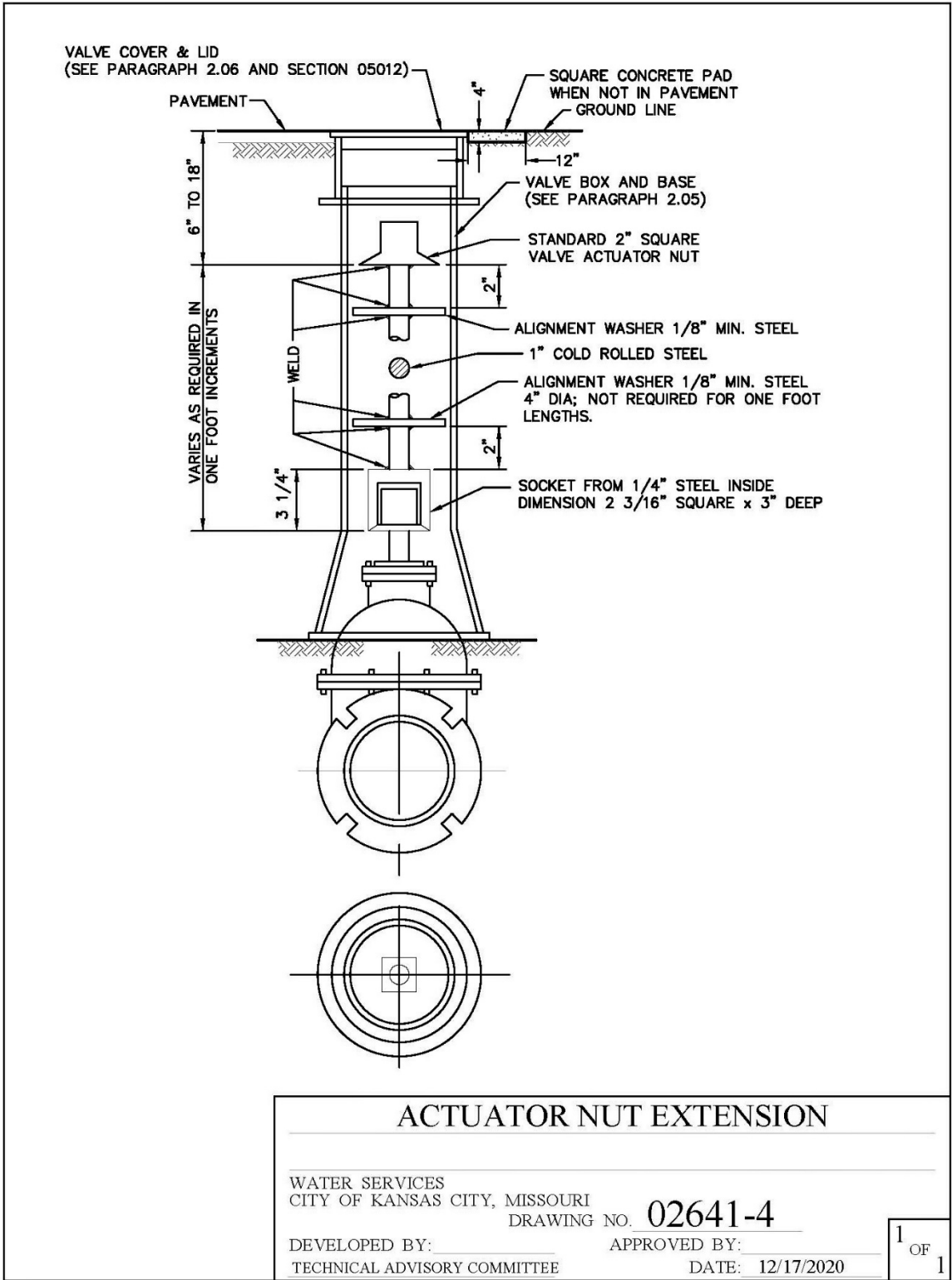
DETAIL 02641-2b



DETAIL 02641-3



Detail 02641-4



SECTION 02675 – FLUSHING, TESTING AND DISINFECTION OF WATER MAINS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section provides the required procedure for water main flushing, testing, disinfection, and de-chlorination of water mains prior to placing the main in service.
- B. This section includes Corporation Cocks, Hydrostatic Testing, and Disinfection of Water mains.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements, or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. Section 01000 – General Project Requirements.
- B. Section 01015 – Specific Project Requirements.
- C. Section 02645 – Hydrants and Flushing Assemblies.
- D. Section 02669 – Thrust Restraints.

1.04 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Water Works Association (AWWA):
AWWA C651 Standards for Disinfecting Water Mains.

1.05 PROVIDED BY CITY

- A. The City will perform bacteriological testing in accordance with paragraph BACTERIOLOGICAL TESTING.
- B. The City will provide Contractor with all sampling bottles for bacteriological testing.
- C. The City shall provide water for filling, flushing and testing water mains in accordance with Section 01000 – General Project Requirements.

1.06 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Other Submittals:
 - 1. Disinfection Report.
 - 2. Certification of Cleanliness.
 - 3. Product data for sodium hypochlorite or calcium hypochlorite.
 - 4. Product data for meters.
 - 5. Product data for backflow preventers.

1.07 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.
- B. Work shall be performed in accordance with AWWA C651.
- C. Disinfection Plan:

1. Prior to the Preconstruction Conference, the Contractor shall submit for review and approval a Disinfection Plan which includes, but is not limited to, the following information:
 - (a) Information as required in Section 01015 – Specific Project Requirements.
 - (b) Type and form of disinfection to be used (sodium hypochlorite or calcium hypochlorite).
 - (c) Location of injection points.
 - (d) Location of sample points / corporation cocks. The maximum spacing of sample points shall be 1,200 feet or as directed by the City.
 - (e) Order of sampling.
 - (f) Location of required valve operations.
 - (g) Location of flushing points.
 - (h) Locations for disposal water.
 - (i) Product data pertaining to neutralizing chemicals.
 - (j) Procedures for final connection to existing mains.
2. Locations of key features associated with the plan shall be provided on a marked-up set of Contract Drawings.
3. Any modifications to the Disinfection Plan shall be resubmitted to the City for review and approval.
- D. Disinfection Report: Immediately following the completion of the disinfection procedures, Contractor shall prepare a Disinfection Report which shall include the following information:
 1. Type and form of disinfectant used.
 2. Date and time of disinfectant injection start and time of completion.
 3. Test locations.
 4. Initial and 24-hour disinfectant residuals (quantity in treated water) in parts per million for each outlet tested.
 5. Date and time of post disinfectant flushing start and completion.
 6. Disinfectant residual after flushing in parts per million for each outlet tested.
- E. Certification of Cleanliness: The Contractor shall certify in writing that the cleanliness of the installed water distribution system meets or exceeds specified requirements.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. See Section 01000 – General Project Requirements, paragraph PRODUCT DELIVERY, STORAGE AND HANDLING.

PART 2 - PRODUCTS

2.01 CORPORATION COCKS

- A. The Contractor, when needed, shall furnish and install a ¾-inch corporation cock to be used in the testing and disinfection of each new main. The location of these corporation cocks shall be as directed by the City.
- B. After the line has been tested and prior to placing the main in service, the Contractor shall remove the corporation cock and replace it with a tapered brass plug.

2.02 SODIUM HYPOCHLORITE

- A. Sodium hypochlorite shall conform to AWWA B300

2.03 CALCIUM HYPOCHLORITE

- A. Calcium hypochlorite shall conform to AWWA B300

2.04 WATER

- A. See Section 01000 – General Project Requirements, paragraph WATER.

PART 3 - EXECUTION

3.01 OPERATIONS OF EXISTING VALVES

- A. See Section 01000 – General Project Requirements, paragraph OPERATION OF EXISTING VALVES.

3.02 TEMPORARY CONNECTIONS

- A. The Contractor shall furnish and install all temporary flushing assemblies, fittings, thrust blocking, and restraining devices required for temporary connections for the filling, flushing, pressure testing, chlorination, de-chlorination and final flushing of the new water mains.
- B. See also the following sections:
 - 1. See Section 02645 – Hydrants and Flushing Assemblies.
 - 2. See Section 02669 – Thrust Restraints.

3.03 PREVENTIVE AND CORRECTIVE MEASURES DURING CONSTRUCTION

- A. General:
 - 1. Preventive and corrective measures to protect water mains during construction shall be in accordance with AWWA C651 which states the following:
 - (a) Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing these organisms. Therefore, the procedures of this section must be observed to ensure that a water main and its appurtenances have been thoroughly cleaned for the final disinfection by chlorination.
 - (b) Any connection of a new water main to the active distribution system before the receipt of satisfactory bacteriological samples may constitute a cross-connection. Therefore, the new main shall remain isolated until bacteriological tests are satisfactorily completed.
- B. Keep Pipe Clean and Dry:
 - 1. The interiors of pipes, fittings, and valves shall be protected from contamination.
 - (a) Openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when watertight plugs are not practicable and when thorough cleaning will be performed by flushing or other means.
 - (b) Pipe delivered for construction shall be strung to minimize the entrance of foreign material.
 - (c) Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery is correlated to the rate of pipe laying, the lower the risk of contamination.
- C. Joints:
 - 1. Joints of pipe in the trench shall be completed before work is stopped.
 - 2. If water accumulates in the trench, the plugs shall remain in place until the trench is free of standing water and mud that may enter the pipe.
- D. Packing Materials:
 - 1. Yarning or packing material shall consist of molded or tubular rubber rings, rope of treated paper, or other approved materials.
 - 2. Materials such as jute or hemp shall not be used.
 - 3. Packing material shall be handled in a manner that avoids contamination.

E. Sealing Materials:

1. No contaminated material or any material capable of supporting growth of microorganisms shall be used for sealing joints.
2. Sealing material or gaskets shall be handled in a manner that avoids contamination.
3. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water meeting the requirements of NSF/ANSI 61 and shall not contribute odors.
4. It shall be delivered to the job in closed containers and shall be kept clean and applied with dedicated clean applicators.

F. Cleaning and Swabbing:

1. If dirt enters the pipe, it shall be removed and the interior pipe surface swabbed with a minimum 1 percent free chlorine disinfecting solution.
2. If, in the opinion of the City, the dirt remaining in the pipe will not be removed using the flushing operation, the interior of the pipe shall be cleaned using mechanical means, such as a hydraulically propelled foam pig (or other suitable device acceptable to the purchaser) in conjunction with the application of a minimum 1 percent free chlorine disinfecting solution.
3. For larger mains, pigging or other suitable method acceptable to the City is an option in place of high-velocity flushing. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces.

G. Wet-Trench Construction:

1. Wet-trench construction is strictly prohibited. The trench shall be kept dry at all times and the end of the pipe plugged overnight.

H. Chemical Contamination:

1. If chemical contamination occurs, such as a hydraulic oil leak or petroleum product spill, the pipe sections exposed to the contamination shall be replaced at no additional cost to the City and not reused for potable water applications.

I. Disinfection:

1. After construction is completed, the main shall be filled, flushed, tested, chlorinated, de-chlorinated, final flushed and bacteriologically tested using the methods described herein.

3.04 TESTING

A. General:

1. The entire main shall be hydrostatically tested (pressure and allowable leakage test) after thoroughly flushing the new main. Flushing and testing shall be as directed by and witnessed by the City.
2. The City will provide water for filling, preliminary flushing and testing of the new water mains as specified herein.
3. The Contractor shall furnish and install all temporary flushing assemblies, fittings, thrust blocks and restraining devices required for temporary connections for filling, flushing and testing all new water mains.
4. The Contractor shall furnish all pumps, piping, gauges, labor and other materials and services necessary to bring the main up to the specified test pressure.
5. The contractor shall conduct the pressure test and leakage test simultaneously.

B. Pressure and Allowable Leakage Test:

1. Pressure and allowable leakage test may be conducted after all trenches have been backfilled, temporary connections made and the main is filled and flushed with water.
2. Minimum test pressures:
 - (a) Mains 12-inches and smaller: a minimum pressure of not less than the normal operating pressure (for the lowest point on the line) plus 50% for surge, but in no case less than 160 psi at the lowest point in the line.

- (b) Mains larger than 12-inches: a minimum pressure of not less than the normal operating pressure (for the lowest point on the line) plus 50% for surge but in no case less than 225 psi.
- 3. Duration of test: pressure shall be maintained on the new water main for at least two (2) hours.
- 4. All pipe, fittings, valves, hydrants and joints shall be inspected by the Contractor and any evidence of moisture appearing on the surface of the ground during the test shall be investigated by the Contractor by excavation.
- 5. All defective pipe, fittings, valves or hydrants discovered during the pressure test shall be removed and replaced by the Contractor and the test shall be repeated until satisfactory to the City.
- 6. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe to maintain the specified leakage test pressure.
- 7. No water main, or section thereof will be accepted if it has a leakage rate in excess of that determined by the following formula:

$$L = [.0000075 SD(P)^{1/2}] / 2$$
 Where:
 L = Maximum allowable leakage in gallons for two hours.
 S = Length of pipe tested, in feet.
 D = Nominal internal diameter of the water main being tested in inches.
 P = Test pressure in psi.
- 8. Should the leakage exceed the allowable leakage, the test pressure shall be maintained for an additional period of time so that the leakage location may be detected.

3.05 FLUSHING AND DISINFECTION OF WATER MAINS

A. General:

- 1. After completion of the pressure and leakage testing, the Contractor shall flush and disinfect the entire main and all branches. The Contractor shall coordinate with the City so that the City's representative is on-site for all flushing and disinfection activities.
- 2. The Contractor shall provide all labor, materials and equipment required to perform flushing and disinfection.
- 3. The Contractor shall prepare the main for disinfection by exposing the pipe at all entry points where the chlorine will be introduced into the pipe and installing temporary flushing assemblies at all discharge ends.
- 4. The continuous feed method of chlorination is required. The slug method of chlorination may be used only when approved or directed by the City.
- 5. The City will provide water for flushing, chlorinating, de-chlorinating and final flushing of new water mains as specified herein.
- 6. Temporary connections to the City's water distribution system shall have double valves installed to prevent backflow to the existing system.
- 7. Water supplied from the source approved by the City shall be used at a flow rate into the new water main so as not to disrupt service to existing customers

B. Flushing:

- 1. Under the supervision of the City, the Contractor shall flush the new mains to remove all particulates. The flushing velocity in the main shall not be less than 3.0 feet per second unless the City determines that conditions do not permit the required flow. Table 1 shows the rates of flow required to produce the minimum required velocity in commonly used sizes of pipe.

Table 1 – Required Flow to Flush Pipelines at 3.0 feet per second.

Pipe Diameter (inches)	Flow (gpm)
4	120
6	260
8	470
10	730
12	1,060
16	1,880

2. For 36-inch diameter mains and larger, prior to filling the main, the entire main is to be broom swept. Sweepings shall be thoroughly and carefully removed from the pipe.
- C. Continuous Feed Method:
1. The water main shall be filled with potable water a constant, measured flow rate. In that absence of a flow meter, the rate may be approximated using a Pitot gauge in the discharge, measuring time to fill a container of known volume, or measuring the trajectory of discharge and using the formula shown in Figure 2 of AWWA C651.
 2. At a point not more than 10 feet downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 60 mg/L free chlorine at the sampling points.
 3. To ensure that this concentration is achieved, the chlorine concentration should be measured at regular intervals in accordance with the procedures described in Standard Methods for the Examination of Water and Wastewater or AWWA Manual M12 or using an appropriate chlorine test kit. See Table 4 in AWWA C651 for the amount of chlorine required for various pipe diameters.
 4. As an optional procedure, water used to fill the new water main during the application of chlorine shall be supplied through a temporary connection. This temporary connection shall be installed with an appropriate cross-connection control device for backflow protection of the active distribution system. Chlorine application shall not cease until the entire main is filled with heavily chlorinated water.
 5. The chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants shall be operated to ensure disinfection of all appurtenances.
 6. At the end of this 24-hour period, the treated water in all portions of the main shall have a residual of at least 45 mg/L free chlorine. Chlorine concentration shall be verified by sampling.
- D. Slug Method:
1. Use of the Slug Method requires pre-approval by the City. Submit justification and details of procedure in the Disinfection Plan (see paragraph QUALITY ASSURANCE).
 2. Water supplied from an approved source of supply shall be made to flow at a constant, measured rate into the new water main.
 3. At a point not more than 10 ft. downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 100 mg/L free chlorine. To ensure that this concentration is achieved, the chlorine concentration should be measured at regular intervals.
 4. The chlorine shall be applied continuously and for a sufficient period to develop a solid column, or “slug” of chlorinated water that will, as it moves through the main, expose all interior surfaces to a concentration of approximately 100 mg/L for at least 3 hours

5. If at any time chlorine residual drops below 50 mg/L, the flow shall be stopped. Then the chlorination equipment shall be relocated at the head of the slug, and, as flow is resumed, chlorine shall be applied to restore the free chlorine in the slug to not less than 100 mg/L.
 6. After the required retention period (at least 3 hours), the 3-hour residual chlorine sample shall be pulled, the heavily chlorinated water shall then be de-chlorinated to 0 mg/L chlorine. A reducing agent shall be applied to the water before discharging, to neutralize the chlorine residual in the water.
- E. De-chlorinating:
1. Clearing the Main of Heavily Chlorinated Water by De-chlorination:
 - (a) After the applicable retention period, the heavily chlorinated water shall be de-chlorinated.
 - (b) The heavily chlorinated water shall be de-chlorinated and flushed from the main and all branches achieving chlorine measurements at 0 mg/L chlorine.
 - (c) A neutralizing chemical shall be applied to the water to thoroughly neutralize the residual chlorine (see ANSI/AWWA C655 for neutralizing chemicals). Submit product data for neutralizing chemicals with the Disinfections Plan.
- F. After de-chlorinating, the new mains shall be final flushed to prepare for the bacteriological tests.

3.06 BACTERIOLOGICAL TESTING

1. The City will perform bacteriological testing, reporting and interpretation of testing results.
2. Contractor shall take water samples in accordance with the approved Disinfection Plan or as directed by the City.
3. City will provide bottles for sampling.
4. The Contractor shall take two (2) sets of Bac-T samples, one immediately after the final flush, the second taken 24 hours later.
5. Contractor shall coordinate disinfectant testing and bacteriological testing to demonstrate that the above requirements have been met.
6. A representative of the City shall be present to observe all sampling.
7. City will provide copies of all bacteriological testing reports to Contractor. Contractor shall submit reports in accordance with paragraph SUBMITTALS.

3.07 FINAL CONNECTION TO EXISTING MAINS

- A. New water mains must be disinfected and satisfactory bacteriological sample results received prior to permanent connections being made to the existing distribution system.
- B. Sanitary construction practices must be followed during installation of the final connection so that there is no contamination of the new or existing water main with foreign material or groundwater.
- C. The new pipe, fittings, and valves required for the connection shall be spray disinfected or swabbed with a minimum 1 percent solution of chlorine just before being installed, if the total length of the connection from the end of a new main to the existing main is equal to or less than 20 feet.
- D. If the total length of the connection from the end of a new main to the existing main is greater than 20 feet, the Contractor shall submit the procedures for disinfection as part of the Disinfection Plan. Procedures should comply with AWWA C651.
- E. Prior to placing new mains in service, the Contractor shall remove any corporation cocks used for testing or chlorination and replace them with tapered brass plugs.

END OF SECTION

SECTION 02686 – CLEANING AND ASSESSMENT OF GRAVITY LINES

PART 1 - GENERAL

1.01 SUMMARY

- A. The work covered by this section consists of furnishing all materials, labor, equipment and supplies required to perform cleaning and inspection of gravity lines and associated structures. All pipe and structures indicated on the drawings shall be cleaned as described herein. The cleaning shall remove all accumulated grease, sand, grit, solids, roots and debris from the pipe in accordance with the specifications and to the complete satisfaction of the City/Design Professional. The inspection/assessment may include one or more of the following technologies: acoustic inspection, closed-circuit television (CCTV), laser profiling, sonar technology, focused electrode leak location (FELL) technology, light detection and ranging (LIDAR) or multi-sensor inspection. The work shall also include all data storage, data transmission, data analysis and the full reporting of the results.
- B. Inspection is used to determine the physical condition of a gravity system by viewing and evaluating the inside of the piping. Condition assessments may be used for one or more of the following purposes:
 - 1. Verify cleaning operations.
 - 2. Identify defects that may result in eventual pipe failure or allowing infiltration to enter the pipe.
 - 3. Identify current failures of the pipe.
 - 4. Identify obstructions.
 - 5. Locate and classify connections to the pipe including sources of inflow.
 - 6. Percent ovality of the pipe.
 - 7. Corrosion and wall loss analysis.
 - 8. Pre-rehabilitation verification for alignment, bend analysis, and mandrel testing.
 - 9. Acceptance inspection.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section, these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements, or as otherwise indicated on the Contract Drawings. The technologies to be used for the project shall be as listed in Section 01015. If a technology is not specified in Section 01015, then by default, CCTV shall be used for the project.

1.03 RELATED SECTIONS

- A. Section 00700 – General Conditions.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01020 – Record Documents.
- D. Section 01300 – Submittals.
- E. Section 01566 – Cleanup Operations.
- F. Section 01700 – Traffic Control.
- G. Section 02580 – Pipe Bursting for Gravity Sewers.
- H. Section 03362 – Sanitary Sewer Manhole Rehabilitation.
- I. Section 06010 – Cured-in-Place Pipe (CIPP), CIPP Point Repairs and End Seals.

1.04 CODES AND STANDARDS

- A. The publications listed form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. National Association of Sewer Service Companies (NASSCO):
 - 1. CCTV inspection, coding, and grading procedures shall be based upon the latest version of NASSCO Pipeline Assessment and Certification Program (PACP) observation classifications.
 - 2. Manhole inspection, coding, and grading procedures shall be based upon the latest version of NASSCO Manhole Assessment and Certification Program (MACP) observation classifications.
 - 3. If lateral launches are specified in Section 01015, lateral inspection, coding and grading procedures shall be based upon the latest version of NASSCO Lateral Assessment and Certification Program (LACP) observation classifications.

1.05 DEFINITIONS

- A. Safety Representative: as defined by Section 00700 – General Conditions, Article 6 – Contractor’s Responsibilities.
- B. Cleaning is defined as the removal of all materials and debris from the gravity line, manholes and all other structures along the gravity line. The cleaning shall restore the gravity line to a minimum of 95 percent of the original carrying capacity. This does not include the removal of hard deposits such as minerals or iron scale.
- C. Preconstruction Television Inspection: the requirements for Preconstruction Television Inspections are defined in other Sections of the Contract Documents. Sections that include specific requirements include, but are not limited to, the following:
 - 1. Section 02580 – Pipe Bursting.
 - 2. Section 06010 – Cured-in-Place Pipe (CIPP), CIPP Point Repairs and End Seals.
- D. Post-Construction Television Inspection: All post construction CCTV inspection and/or post installation CIPP inspections will follow all requirements listed in this section, in addition to any other requirements listed in the Contract Documents. Sections that include specific requirements include, but are not limited to, the following:
 - 1. Section 02580 – Pipe Bursting.
 - 2. Section 06010 – Cured-in-Place Pipe (CIPP), CIPP Point Repairs and End Seals.

1.06 INFORMATION PROVIDED BY THE CITY

- A. As provided in the Contract Documents.
- B. Work order numbers, if assigned by the City.
- C. “Comp Key” numbers, if assigned by the City.
- D. Manhole numbers to be used when unrecorded or unnamed manholes are encountered.
- E. GIS shape file or geodatabase of the project area.
- F. As-built drawings as needed to complete the scope of work.

1.07 SUBMITTALS

- A. Submit as specified in Section 01300 – Submittals.
- B. Complete details and specifications covering cleaning procedures, modifications, and equipment to be used.
- C. Shop Drawings:
 - 1. Not applicable.

D. Product Data:

1. Complete details and specifications covering all television inspection equipment. Information shall include, but is not limited to, that required to verify conformance with the following:
 - (a) Part 2.03 TELEVISION INSPECTION EQUIPMENT FOR MAINLINE SEWERS.
 - (b) Part 2.04 TELEVISION INSPECTION EQUIPMENT FOR CONNECTIONS/LATERALS.
 - (c) That the equipment is suitable and can provide video recordings in the resolution and format specified in Part 2.05 VIDEO RECORDINGS.
 - (d) That the equipment is suitable and can provide still photographs in the resolution and format specified in Part 2.06 PHOTOGRAPHS.
2. Inspection procedures:
 - (a) Provide example NASSCO PACP Header Form to be used.
 - (b) Provide example NASSCO PACP Inspection Form to be used.
 - (c) Provide example NASSCO MACP Header Form to be used.
 - (d) Provide example NASSCO MACP Inspection Form to be used.
 - (e) Provide example NASSCO LACP Header Form to be used (if lateral launches are specified in Section 01015).
 - (f) Provide example NASSCO LACP Inspection Form to be used (if lateral launches are specified in Section 01015).

E. Samples:

1. Not applicable.

F. Other Submittals:

1. CCTV Operators NASSCO-PACP/MACP/LACP certifications and when utilized, the artificial intelligence software used to identify and assess defects.
2. Requests for Working Hours Adjustment (as required).
3. Preconstruction and Post-construction CCTV inspection videos and cable footage meter calibration reports shall be submitted weekly.
4. Preconstruction and Post-construction inspections shall be submitted monthly, as a condition to payment, and include at a minimum the following:
 - (a) Could Not Access (CNA) List: Submit a list of manholes that could not be accessed and why they couldn't be accessed.
 - (b) Clearing Request Map: Submit with the CNA List a map showing the requested areas for clearing (as applicable).
 - (c) Could Not Locate (CNL) List: Submit a list of manholes that could not be located.
 - (d) Could Not Open (CNO) List: Submit a list of manholes that could not be opened.
 - (e) Map Change Forms.
 - (f) Videos.
 - (g) PACP Pipe Run Reports: Reports shall be submitted as individual PDF files for each pipe segment.
 - (h) MACP Manhole Reports: Reports shall be submitted as individual PDF files for each manhole (if manhole inspections are specified in Section 01015).
 - (i) LACP Lateral Reports: Reports shall be submitted as individual PDF files for each lateral (if lateral launches are specified in Section 01015).
 - (j) NASSCO PACP Microsoft Access Database.
 - (k) NASSCO MACP Microsoft Access Database.

- (l) NASSCO LACP Microsoft Access Database (if lateral launches are specified in Section 01015).
- 5. Post-construction inspection and documentation shall be submitted as one final consolidated package at the end of the project, as a condition to final completion, and include at a minimum the following:
 - (a) Videos.
 - (b) Photographs.
 - (c) PACP Microsoft Access Database.
 - (d) MACP Microsoft Access Database (if manhole inspections are specified in Section 01015).
 - (e) LACP Microsoft Access Database (if lateral launches are specified in Section 01015).
 - (f) PACP Pipe Run Reports: Reports shall be submitted as individual PDF files for each pipe segment.
 - (g) MACP Manhole Reports: Reports shall be submitted as individual PDF files for each manhole (if manhole inspections are specified in Section 01015).
 - (h) LACP Lateral Reports: Reports shall be submitted as individual PDF files for each lateral (if lateral launches are specified in Section 01015).
 - (i) A log of all manholes located in the field but not included on City maps.
 - (j) A log of all manholes included on City maps but not located in the field.
 - (h) A log of pipes, manholes and laterals that were inspected before cleaning.

1.08 ACOUSTICAL INSPECTION

- A. When specified in Section 01015, an acoustical inspection shall be done as an initial assessment tool to identify blockages in gravity pipes. The acoustical inspection shall be performed in accordance with the Acoustical Systems manufacturer's recommendations in order to establish ratings of 0-10 for obstructions in the pipeline segments being assessed.
- B. If acoustical inspection is specified for the project, it shall only be used on sewers 6-inches through 12-inches in diameter.

1.09 2D LIDAR/LASER PROFILING INSPECTION

- A. When specified in Section 01015, the CCTV inspection system with laser ring projection or 2D LIDAR head shall be used for inspection/assessment of the gravity line. The color inspection video, from the camera, shall be recorded in mp4 format. 2D Laser/LIDAR shall be used for measuring internal diameters to determine corrosion, wall loss, and/or ovality.
- B. Each Inspection shall contain CCTV Pre-Inspection (including header), Profiler Inspection (including header), calibration (horizontal and vertical) and lens distortion validation.

1.10 SONAR INSPECTION

- A. When specified in Section 01015, sonar inspection shall be performed according to the Sonar System manufacturer's recommendation as it pertains to survey rate in inches per second to collect data below the flowline. The Sonar Inspection System shall operate in real time mode with continuous interior scanning over full 360 degrees. Digital data shall be recorded at full resolution.

1.11 3D LIDAR INSPECTION

- A. When specified in Section 01015, 3D LIDAR inspection shall be performed according to the LIDAR manufacturer's specifications for assessment of the gravity line. LIDAR scans shall be used to measure internal diameters to determine corrosion, wall loss, and/or ovality.
- B. When specified for pre-rehabilitation, only 3D LIDAR can be used for determining alignment, bend analysis, and virtual mandrel testing for construction purposes.

1.12 MULTI-SENSOR INSPECTION

- A. When specified in Section 01015, multiple inspection technologies/sensors shall be used in synchronization to assess the interior of the pipe. This can include, but is not limited to, CCTV, Sonar, 2D Laser or 3D LIDAR, hydrogen sulfide gas sensor and/or temperature sensor. Where applicable, the analysis of data from each technology will be used to verify one another, providing a visual representation of the internal pipe with laser-LIDAR above the flow line and sonar measurement below the flow line. In all scenarios, high-definition CCTV must be used. After processing, all data and reporting deliverables shall be delivered to the City/Design Professional.

1.13 FOCUSED ELECTRODE LEAK LOCATION (FELL) TESTING FOR POST CURED-IN-PLACE PIPE (CIPP) MAINS

- A. When specified in Section 01015, acceptance testing and certification of repairs, relining, and renewal, shall be performed using Focused Electrode Leak Locating (FELL) and shall be performed by an independent third-party contractor, in accordance with the ASTM F2550, Standard Practice for Locating Leaks in Sewer Pipes By Measuring the Variation of Electric Current Flow Through the Pipe Wall and the Seventh Edition, Volume 1, MAINTENANCE AND OPERATION OF WASTEWATER COLLECTION SYSTEM manual (December 2015) ISBN 978-1-59371-066-8, where Focused Electrode Leak Locating is referred to as Electro Scanning Inspection.
- B. The contractor shall furnish all necessary labor, equipment, materials, services and incidentals required to record inspection by means of Focused Electrode Leak Locating technology on City designated, rehabilitated gravity sewer line sections from manhole to manhole (or from clean out to mainline for laterals), including but not limited to, charts and graphs, and final overall report. The report shall include a graph and chart outlining the location of all defects and the magnitude of each. The report shall include an estimate of the size of the defect and the potential infiltration of each, with a total for all.
- C. Post-Rehabilitation FELL Testing shall be performed on the lineal footage specified in Section 01015 of all rehabilitated mainline pipes that receive CIPP lining, selected at random by the City, paid for at the established unit prices in the Contract. The City reserves the right to perform additional post-rehabilitation FELL testing at the established unit prices in the Contract.
- D. Qualifications: All FELL inspections shall be done with the use of an approved supplier of the Focused Electrode Leak Locating technology equipment that meets ASTM F2550-13, Standard Practice for Locating Leaks in Sewer Pipes by Measuring the Variation of Electric Current Flow through the Pipe Wall. Only those licensed and pre-approved by the equipment manufacturer shall be allowed to perform the Work. Submit certification of licensing and training in accordance with Section 01300 – Submittals.

1.14 AUTO DETECTION/AUTO CLASSIFICATION SOFTWARE

- A. When specified in Section 01015, the contractor shall use an artificial intelligence (AI) software to analyze the CCTV inspection footage of the gravity line. The software shall automatically detect and classify every defect per established NASSCO PACP standards.

1.15 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work. Contractor shall employ minimum quality control methods that meet or exceed those required by the latest versions of NASSCO.
- B. Contractor shall employ only experienced personnel who are familiar with, and regularly engaged in, the type of work required; shall provide adequate supervision by a qualified supervisor at all times when cleaning is in progress; and shall have access to the equipment of proper size and capacity to perform the work as specified herein.
- C. All inspections, post processing, and quality control shall be conducted by NASSCO certified PACP/MACP/LACP operators (Operators).
- D. Contractor shall submit a copy of each Operator's NASSCO certification(s) and ID card with Name, Certification Number, and Expiration Date clearly visible. The NASSCO certification(s) shall be current upon Notice to Proceed. If the operator's certification expires during the Work, documentation of recertification shall be provided to the City prior to the expiration.
- E. All videos, photographs, and audio recordings are subject to acceptance by the City. Equipment that does not produce a picture or audio quality acceptable to the City shall be replaced. For deliverables that are not accepted by the City, the inspection shall be re-conducted at no additional cost to the City.
- F. The data and information provided by the Contractor shall be delivered in strict accordance with the naming conventions for assets described herein. Information included as part of the final deliverables that cannot be associated with the Comp Keys provided, or does not meet the naming conventions specified, will not be accepted.
- G. Data cleanliness, handling, labeling, naming conventions, PACP coding standards, organization, and security are of the utmost importance to the City. Any CCTV videos, reports, or database not in compliance with this Section shall not be accepted.

1.16 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Product Delivery for weekly deliverables shall be electronically uploaded to a City-designated site. Weekly submittals shall not represent interim acceptance by the City, with any quality control or quality assurance concerns, corrections, or required modifications, to be included in any and all final deliverables.
- B. Product Delivery for final consolidated package shall be delivered on an external, portable hard drive that will become the property of the City. Each external hard drive or digital file in the data set shall be given a unique name/label. The Contractor shall include an electronic photograph index that identifies the photographs by file name located on each external hard drive or digital file folder. The hard drive shall include a README text file that includes the following information:
 1. Name of Project.
 2. City Project Number.
 3. City Contract Number.
 4. Date of Submittal.

5. Contractor Name.
6. Contractor Address.
7. Name of Contractor's Representative.
8. Phone Number of Contractor's Representative.
9. Email of Contractor's Representative.
- C. Storage of all source media will be the sole responsibility of the Contractor and must be stored and properly maintained for a period of thirty-six (36) months after Contractor's Substantial Completion date, available to the City or its designated representatives within ten (10) business days of the written request.
- D. All work product and deliverables shall be in digital format, or in a format requested by the City. Additionally, three paper copies of the final report shall also be provided.

1.17 SAFETY PLAN

- A. The Contractor's responsibilities for safety are defined by Section 00700 – General Conditions, Article 6 – Contractor's Responsibilities.
- B. Entrance into any manhole is considered a Permit Required Confined Space.
- C. In addition to the safety requirements of Section 00700, the Contractor shall develop and implement a project-specific, comprehensive safety plan to address safety concerns related to the Work.
- D. The Safety Plan shall be submitted to the City prior to commencement of pipeline inspections.
- E. At a minimum, the safety plan shall conform to the following guidelines:
 1. The work area shall be properly barricaded to direct pedestrian and vehicular traffic away from the work site following local and state traffic control requirements and the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD) and Section 01700 – Traffic Control.
 2. The plan shall describe personal protective equipment (i.e. hard hats, reflective safety vests and other required personal protective equipment) to be worn.
 3. The plan shall describe all personal protective equipment to be worn while handling hazardous material (sewage).
 4. The plan shall describe all confined space entry protocols.
 5. Work shall be scheduled to avoid rush hour traffic when possible.
- F. The Safety Plan shall include the name and contact information of the Contractor's Safety Representative with a description of their job duties and level of responsibility with respect to the Work described in this section.

1.18 SCHEDULING THE WORK

- A. Generally, the Work is to be conducted during times allowed by Section 00700, Article 6, Contractor's Responsibilities and Section 01000 – General Project Requirements, paragraph TEMPORARY ENVIRONMENTAL PROTECTION which establishes hours of operations.
- B. See additional instruction for scheduling the Work in Section 01015 – Specific Project Conditions.

PART 2 - PRODUCTS

2.01 ACOUSTICAL INSPECTION EQUIPMENT

- A. Contractor shall own, lease and/or rent one (1) set (minimum) of acoustical assessment equipment as manufactured by Infosense Incorporated (SL-Rat equipment). The set includes an acoustic transmitter and a signal receiver.

2.02 CLEANING EQUIPMENT

- A. The equipment selected for cleaning shall be capable of removing all dirt, grease, rock, brick, wood, sand, mud, roots and other deleterious materials and obstructions from the gravity line. Cleaning shall be performed using hydraulically-propelled, high-velocity and/or mechanically-powered cleaning equipment and vacuum removal equipment.
 1. Hydraulically powered equipment: The equipment used shall be of a movable dam type and be constructed in such a way that a portion of the dam may be collapsed at any time during the cleaning operation to protect against flooding of the sewer or bypassing to waterways. The movable dam shall be equal in diameter to the pipe being cleaned and shall provide a flexible scraper around the outer periphery to ensure removal of grease. If sewer cleaning balls or other equipment which cannot be collapsed are used, special precautions shall be taken that are acceptable to the Owner, to prevent flooding of sewers and property.
 2. High velocity equipment: All high-velocity cleaning equipment shall be constructed for ease and safety of operation. The equipment shall have a minimum of 700 feet of one inch minimum diameter hose with working pressure ratings to match the rating of the water pressure. The equipment shall have a selection of two or more high-velocity nozzles. The nozzles shall be capable of producing a scouring action from 10 degrees to 45 degrees in all sizes of gravity lines included in this Contract using a minimum volume of 60 gallons of water per minute, at a minimum working pressure of 2,000 pounds per square inch. Special care shall be taken when cleaning CIPP rehabilitated pipelines by using a wide spray nozzle with a maximum spray angle of 30 degrees, a nozzle pipe centralizer and a maximum pressure of 2,000 PSI.
 - (a) Equipment shall also include a high-velocity gun for washing and scouring the manholes and diversion structure walls, channels, shelves, floors, and manhole covers and frames from grade level. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically-driven hose reel. Filler piping on the tank shall have an air gap to prevent backflow and contamination of the water supply system.
 3. Mechanically powered equipment: Bucket machines shall be in pairs with sufficient power to perform the work in an efficient manner. Machines shall be belt operated or have an overload device. Machines with direct drive that could cause damage to the pipe will not be allowed. A power rodding machine shall be either a sectional or continuous rod type. To ensure safe operation, the machine shall be fully enclosed and have an automatic safety clutch or relief valve.

2.03 TELEVISION INSPECTION EQUIPMENT FOR GRAVITY LINES

- A. All television inspection equipment shall be specifically designed and manufactured for the inspection purposes intended under this Contract.

- B. Video cameras/recorders not specifically intended for use for internal television inspection of gravity lines will not be allowed.
- C. The Contractor shall conduct CCTV inspections using a self-propelled tractor unit. The tractor unit shall have the following minimum features and capabilities:
 - 1. The camera shall be designed specifically for gravity pipe inspections and the appropriate diameter.
 - 2. The camera shall be capable of operating in 90% humidity.
 - 3. For 8 inch through 46 inch pipes, the camera shall have a minimum of 640 lines of resolution.
 - 4. For 48 inch and larger pipes, the camera shall have a minimum of 1280 lines of resolution.
 - 5. The camera shall have either automatic or remote: focus and iris control.
 - 6. The camera shall have zoom, pan and tilt capabilities to facilitate defect viewing and evaluation. Digital zoom is acceptable when utilizing equipment with HDCCTV.
 - 7. The unit shall be equipped with lights capable of lighting the entire periphery of the pipe. The illumination shall allow an even distribution of the light around the perimeter of the pipe without the loss of contrast or flare out of picture shadowing.
 - 8. Cable Footage Meter:
 - (a) The unit shall be equipped with a cable footage meter so that the location of defects and service laterals relative to the starting manhole location can be reported.
 - (b) The cable footage meter shall be able to reach a minimum of 1,000 feet.
 - (c) The cable footage meter shall be accurate to 0.5 feet per 100 feet (0.5%).
 - (d) The cable footage meter shall be calibrated in accordance with paragraph CABLE FOOTAGE METER CALIBRATION.
 - 9. Camera must have capability to position camera head in the middle of the pipe (example: camera head will be 4-inches from pipe invert in an 8-inch pipe) by adjusting elevator or by varied wheel sizes. For pipe sizes 48-inch and larger, Contractor shall submit the proposed equipment for City approval.
 - 10. In no case shall cameras be equipped with carbide-tipped wheels that increase traction and potentially harm post-rehabilitation lining or pipe wall interiors. Any damage caused to post-rehabilitation repairs, relining, or rehabilitation will be the sole responsibility of the Contractor to correct or repair to the City's satisfaction.

2.04 TELEVISION INSPECTION EQUIPMENT FOR CONNECTIONS/LATERALS

- A. If laterals or connecting pipes are to be inspected, the Contractor may use one of the following:
 - 1. Inspections from the mainline: a self-propelled tractor unit that incorporates a lateral launch camera tool.
 - 2. Inspections from a cleanout: a push camera system provided especially for lateral inspections.
- B. The lateral equipment shall have the following minimum features and capabilities:
 - 1. The camera shall be designed specifically for lateral pipe inspections and the appropriate diameter.
 - 2. The camera shall be capable of operating in 100% humidity.
 - 3. The camera shall have a minimum of 640 lines of resolution.
 - 4. The unit shall be equipped with lights capable of lighting the entire periphery of the pipe. The illumination shall allow an even distribution of the light around the

perimeter of the pipe without the loss of contrast or flare out of picture shadowing.

- C. In the event of a full-length lateral rehabilitation, from the mainline connection to the house, a full-length lateral inspection shall be conducted.

2.05 VIDEO RECORDINGS

- A. Contractor shall perform sewer pipe inspections from access point to access point unless a pipe converges into another pipe alignment at a fitting; then the inspection shall be performed from access point to fitting as shown in figure 2.1.

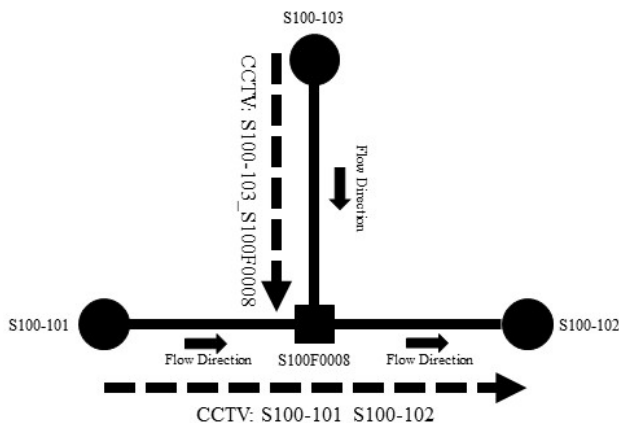


Figure 2.1: Performing Sewer Pipe Inspections

- B. Each video television inspection shall be submitted in digital format with associated video, images, report, and all inspection data included in a Microsoft Access Database.
- C. All video recordings shall be recorded and provided in digital MPEG-4 Part 14 (MP4) format.
- D. All video recordings shall be in color.
- E. File Naming Convention – Mainline Sewers:
 1. Each line segment video shall be named using the upstream manhole identifier, underscore, downstream manhole identifier, underscore, date stamp, underscore and inspection direction (no exceptions). Use “U” for upstream and “D” for downstream inspection direction.
 2. For example, the video for the line segment from manhole S023-314 to manhole S023-317 inspected upstream to downstream would be labeled as follows: S023-314_S023-317_YYYYMMDD_D. Any deviation from the File Naming Convention for Mainlines will not be accepted.
- E. File Naming Convention – Service Laterals:
 1. Each service lateral video shall be named using the upstream manhole identifier, underscore, downstream manhole identifier, underscore, date stamp, underscore, inspection direction, underscore, Tap Feature Code, underscore, and lateral location in feet from start of inspection. Use “U” for upstream and “D” for downstream inspection direction.
 2. For example, the video for a rehabilitated sewer service 50 feet downstream from manhole S023-314 on line segment S023-314_S023-317 would be labeled as

follows: S023-314_S023-317_YYYYMMDD_D_TRA_50. Any deviation from the File Naming Convention for Laterals will not be accepted.

- F. Videos shall not be filtered, clipped, edited, modified, enhanced, or otherwise changed, except for overlay corrections. In no event shall videos have missing frames or sections of video.

2.06 PHOTOGRAPHS

- A. All photographs shall be recorded and provided in a digital format.
- B. Photographs shall be provided in JPEG file format.
- C. All photographs shall be in color.
- D. File Naming Convention:
 - 1. Digital photograph files shall be named using the associated video file name, associated defect code, and linear footage (in 3-digits) assigned to the defect for each line segment survey (**no exceptions**).
 - 2. For example, if a picture is taken May 25, 2021, at a Hole Soil Visible defect, 75 linear feet upstream against the direction of flow (reverse set up), on a line segment located south of the Missouri River on atlas map 24 between manholes 500 (upstream manhole) and 498 (downstream manhole), then the digital photograph file name would be as follows:
S024-500_S024-498_20210525_U_HSV_75

2.07 SOFTWARE

- A. The CCTV data shall be delivered utilizing the latest version of NASSCO PACP certified software.
- B. The latest version of the Data Viewer shall be provided at the start of the inspection.
- C. If specified, the artificial intelligence (AI) software for detecting and classifying defects shall be:
 - 1. SewerAI.
 - 2. Molfar.AI.
 - 3. City approved equal.

2.08 LASER / 2D LIDAR PROFILING INSPECTION EQUIPMENT

- A. All laser profile inspection equipment shall be specifically designed and manufactured for the inspection purposes intended under this Contract.
- B. Laser Profilers and 2D LIDAR sensors shall be Laser Safety Class II and certified eye-safe as per US – IEC 60825-1 standard.
- C. All laser/LIDAR equipment shall be calibrated regularly to ensure accuracy of +/- 5mm in pipes 20-inches or larger.
- D. Contractor shall own, lease and/or rent at a minimum one (1) each of the MSI SuperMD Profiler and MSI MD Profiler as manufactured by RedZone Robotics and one (1) CUES SolidFX Profiling system for the duration of the field work associated with the Work.

2.09 SONAR INSPECTION EQUIPMENT

- A. The sonar equipment must be specifically designed for use in sanitary sewer systems using high frequency sound waves to locate and map irregularities within the pipe environment creating continuous sonar images recorded in “real time” mode.
- B. Sonar equipment must be capable of continuous data collection throughout each applicable pipe segment reach and contain sufficient information to produce a visual

profile, profile comparison, and dimensions data of significant debris and/or defects. This includes depth, volume and cross-sectional area along the length of pipe.

- C. When specified, sonar inspections, either on their own or through multi-sensor inspection, shall be utilized prior to any cleaning in pipes 21" and greater to provide evidence that cleaning is required. Post verification inspections shall be a combination of CCTV and/or Sonar, as flow permits.

2.10 3D LIDAR INSPECTION EQUIPMENT

- A. Contractor shall own, lease and/or rent at a minimum one (1) each of the MSI Responder tracked crawler as manufactured by RedZone Robotics for the duration of the field work associated with the Work.
- B. 3D LIDAR inspection equipment should be capable of inspections in pipes 36 inches and larger.
- C. When pre-rehabilitation inspection that requires alignment, bend analysis, or virtual mandrel testing is specified, a 3D LIDAR must be used for proper accuracy and modelling.
- D. LIDAR sensor shall be Class I eye-safe as per US – IEC 60825-1 standard.
- E. High-definition CCTV shall be captured when any LIDAR inspection is performed.

2.11 MULTI-SENSOR INSPECTION EQUIPMENT

- A. Multi-sensor inspection equipment must be capable of synchronized sensor measurement, collected during a single deployment of the equipment. Where applicable, the analysis of data from each technology will be used to verify one another. All sensors shall be zeroed at the beginning of the pipe segments.
- B. Equipment must be operated via a tracked crawler or floating platform specifically designed for inspection in gravity lines.
- C. Equipment shall be capable of long-distance deployments and have tether length of 3000 linear feet, and sufficient power (battery or otherwise) to operate at those lengths. It is permissible to inspect through multiple access points, provided that sensor data is zeroed at the beginning of each new pipe segment.
- D. When specified, multi-sensor inspection equipment shall be utilized prior to any cleaning in pipes 21" and greater to provide evidence that cleaning is required. Post verification inspections shall be a combination of CCTV and/or Sonar, as flow permits.

2.12 FELL INSPECTION EQUIPMENT

- A. The Focused Electrode Leak Locating technology system used for the pipeline assessment shall be specifically designed and constructed for such inspection. This equipment and proposed solution shall be in full compliance with and have capabilities as outlined in ASTM F2550-13 Standard Practice for Locating Leaks in Sewer Pipes by Measuring the Variation of Electric Current Flow through the Pipe Wall.
- B. Instrumentation must represent a complete and fully functioning device to scan the pipe and record all pipe defects capable of causing leaks. The proposed solution must include any recommended accessories and spare parts necessary to complete this work.

PART 3 - EXECUTION

3.01 OBSERVATION OF WORK

- A. City reserves the right to be present and continuously observe the work and information being displayed at the recording site.

3.02 TRAFFIC CONTROL

- A. Traffic control and signage for the inspection operation shall be the responsibility of the Contractor and shall be acceptable to the City.
- B. Traffic Control shall be conducted in accordance with Section 01700 – Traffic Control.

3.03 LOCATING MANHOLES/STRUCTURES

- A. For the work required by the contract documents, the Contractor shall locate, make open and accessible all existing manholes, structures and access points.
- B. The Contractor will be responsible for conducting a reasonable search to locate missing manholes. The minimum effort to locate missing manholes should include:
 - 1. Conducting a field search.
 - 2. A comparison of verified field conditions against available City information.
 - 3. Utilization of specialty equipment such as metal detectors.
- C. If after conducting a reasonable search, a manhole cannot be found in the area specified by the sewer maps, then the Contractor should seek City assistance.

3.04 UNRECORDED/UNNAMED MANHOLES

- A. Manholes located in the field, which are not shown on the Drawings shall be documented for submittal.
- B. If an unrecorded/unnamed manhole is encountered, television inspection may proceed, but the Contractor shall notify City and request a City assigned manhole number and comp key. Manhole numbers and Comp Keys be obtained from the City and the final deliverable data shall be modified to reflect the assigned manhole number and comp key on any segment connected to an unrecorded/unnamed manhole.
- C. Contractor shall submit weekly to the City: a Map Change Form with Unrecorded/Unnamed Manholes showing the revised system connectivity, photographs of the location, and a brief description of the location of each Unrecorded/Unnamed Manhole.

3.05 ACOUSTICAL ASSESSMENT

- A. Assessment shall be done one pipe segment at a time between two adjoining structures or manholes. The flow within pipeline is irrelevant to the assessment.
- B. The unit set shall be calibrated daily prior to starting the assessment.
- C. The following information is required by the City: manhole ID's upstream and downstream for the pipeline segment being assessed, assessment date, pipeline length, notes, etc. Prior to initiating the acoustical assessment, all information shall be entered into the unit for each segment.
- D. During the assessment, the software will designate a numerical value to the quality of the sound sent and received (rating of 0-10) giving a nominal assessment of Good, Fair, Poor or Blocked.
- E. Each night the data shall be transferred from the field assessment equipment to the SL-Dog software installed on a PC.

- F. The assessment data shall be provided to the City/Design Professional in CSV (Excel), SHP (Arc GIS) or PDF. The data deliverables shall be solely at the discretion of City/Design Professional.
- G. The City/Design Professional will be responsible for the review and analysis of the data provided.

3.06 CLEANING

- A. It is the responsibility of the Contractor to properly apply for, secure and provide for all water needed to perform the cleaning work described herein.
Precautions shall be taken to protect the sanitary sewer structures from damage that may result from improper use of the cleaning equipment. Contractor is responsible for traffic control, as needed; in addition to Contractor's truck warning lights and traffic cones, as needed or required. Traffic control is subject to review and approval by the Owner. If successful cleaning cannot be performed without risk of damage to the pipe, or if the equipment fails to traverse the entire line segment, cleaning efforts shall be temporarily suspended, and the Owner shall be notified. The line segment shall then be evaluated in order to determine if the segment can be adequately cleaned. Any unusual conditions found during the cleaning operations shall be reported to the Owner as soon as possible.
- B. Any modifications to manholes to facilitate cleaning shall be the Contractor's responsibility and shall be subject to approval by Owner.
Contractor shall salvage and reuse all manhole covers and rings that are removed during sewer line and manhole rehabilitation, unless otherwise directed by Engineer.
- C. When pumping and bypassing is required, Contractor shall supply the pumps, piping, and other equipment necessary to divert the flow of wastewater around the sewer section being cleaned and back into the interceptor sewer. All existing wastewater flows, plus waters added to the flow due to cleaning, shall be contained within the existing sewer system. The bypass system shall have the necessary capacity to handle all the flow.
The Contractor shall be responsible for furnishing the labor and supervision necessary to set up and operate the pumping and bypass system. For pumping and bypassing operations, a plan must be submitted in accordance with the procedures set forth in the submittals section. In performing the work under this Contract, Contractor shall be thoroughly familiar with federal, state, and local statutes, ordinances, and directives with respect to excessive noise and pollution of air and water due to construction operations. If pumping and bypassing is required, engines shall be equipped in a manner to keep noise to a minimum.
- D. During sewer cleaning operations, satisfactory precautions shall be taken in the use of cleaning equipment. When hydraulically propelled cleaning tools, which depend on water pressure to provide their cleaning force, or tools which retard flow in the sewer line are used, precautions shall be taken to ensure that the water pressure created does not damage or cause flooding to public or private property being served by the sewer being cleaned or does not cause bypassing of flow to nearby waterways.
The flow of wastewater in the sewers shall be utilized to provide necessary pressures of hydraulic cleaning devices whenever possible. When additional water is required from other sources to avoid delay in normal work procedures, the water shall be conserved and not used unnecessarily. No fire hydrant shall be obstructed in case of fire in the area served by the hydrant. The Contractor shall be responsible for all damage to public and private property as a result of all cleaning operations. The cost

of restoring any damaged area to conditions prior to cleaning shall be borne by the Contractor at no additional cost to the Owner.

- E. All roots shall be removed. Special attention shall be given during the cleaning operation to assure complete removal of roots from the joints. Procedures may include the use of mechanical equipment such as rodding machines, bucket machines and winches using root cutters and porcupines, and equipment such as high-velocity jet cleaners. Chemical root treatment may be used at the option of the Contractor. When chemicals are used to aid in the removal of roots, the chemical shall be EPA registered and labeled for use in sewer lines and acceptable to all applicable State and City agencies. All material and mixing/application procedures for chemical root treatment shall be consistent with the latest standards, requirements, and recommendations of the manufacturer of the chemical root treatment material used.
- F. All sludge, dirt, sand, grit, rocks, bricks, wood, mud, grease, roots and any other solid or semi- solid material resulting from the cleaning operation shall be removed using vacuum removal equipment or other methods to assure debris does not cause downstream obstruction. Vacuum equipment shall be suitable for removal of all debris at each manhole location for each line being cleaned. Vacuum system performance will be at least 4,000 CFM and 16" Hg vacuum pressure to ensure all debris can be efficiently removed from the sewer. A device designed to minimize debris from escaping down the sewer line, the design and use of which is subject to approval by Owner, shall be used in all sewer line cleaning operations. When hydraulic cleaning equipment is used, a suitable sand trap, weir, basket, or dam shall be constructed in the downstream manhole in such a manner that the solids will be trapped while using a rake or sewer shovel to help collect solids. Material or debris removed from the sewer shall be immediately placed in watertight containers. Containers may include valved drains to remove excess water from containers. Drainage, including rainfall, shall be contained and returned to the sewer by means acceptable to the Owner.
- G. Multiple passes (one to three passes) with the water jet shall be made, as required, to flush the debris to the manhole in order to remove the debris. Sewers will be cleaned by introducing the water jet into the sewer line facing against the sewer flow and retrieving the water jet under pressure with the sewer flow. The nozzle shall not be stopped in the sewer line when under working pressure, but shall continue to move through the line at all times.
- H. All debris removed from the sewer shall be legally disposed of by and at the expense of the Contractor. The disposal facility shall be a permitted landfill. The debris shall be dewatered and suitable for immediate disposal prior to weighing at the landfill. Contractor shall provide the Engineer with scale tickets to verify quantities of debris disposed of in an approved landfill. Transportation of debris or other material by the Contractor shall be done in vehicles or equipment which contain the debris or other material in such a manner to minimize objectionable odor and avoid the possibility of dripping, spilling, scattering, leaking, or blowing. Should mishaps occur for any reason, the Contractor shall be responsible for cleaning up any debris or other material to the satisfaction of the Owner or other authorities having jurisdiction. All vehicles transporting debris or other material shall not exceed the maximum allowable load limits of any road being used.
- I. Contractor shall televise the sewers, in accordance with the television inspection section, upon the completion of cleaning. Acceptance of sewer line cleaning shall be based upon the review of the inspection videos by the City or Design Professional.

If cleaning inspections show the cleaning to be unsatisfactory, the Contractor shall be required to re-clean and re-inspect the sewer line, at no additional cost to the Owner, until cleaning is shown to be satisfactory.

3.07 SEWER FLOW DIVERSION AND CONTROL

- A. During CCTV inspection, the pipe should be free of obstructions that impede visibility. The depth of flow at the upstream manhole of the sewer line section being inspected shall not exceed 15 percent of the pipe diameter. As necessary, Contractor shall divert flow to allow for the CCTV inspection to capture as much of the invert of the pipe as possible. In pipes 21 inches or larger, where sonar or multi-sensor inspection is specified, flow diversion is not required.
- B. A sewer line plug may be installed upstream of the section being inspected. Sewer plugs are always installed in the upstream (incoming) pipe of a manhole. It is desirable that the plug be equipped with an air hose to permit deflation from above ground. A strong rope should be attached to enable the plug to be quickly pulled out of the manhole. Care must be taken to prevent a plug from being pushed into the outgoing pipe when the backed-up sewage is released.
- C. When pumping and diverting flow is required, pumps, conduits, and other equipment shall be used to divert the flow of sewage around the manhole section in which work is to be performed. The diversion system should have sufficient capacity to handle the existing flow plus additional flow that may occur. Bypass pumping plan to be submitted to the City for approval.
- D. When the flow in a sewer line is reduced, plugged, or diverted, precautions must be taken to ensure that the operations do not cause flooding or damage to public or private property. Contractor should closely monitor sewer surcharging upstream of the manhole section being inspected and be alert for situations such as residential flooding that would be likely to occur. Contractor is responsible for all backups, spills, or damage that may occur from plugging or diversion efforts.

3.08 CABLE FOOTAGE METER CALIBRATION

- A. Calibration of the cable footage meter shall be done by checking the cable counter against a pre-measured length of 50 to 300 feet. At least one out of every five calibrations shall be in excess of 200 feet.
- B. At a minimum, calibration of the cable footage meter shall be conducted each day before the first use of the equipment, or as directed by the City.
- C. If a cable footage meters fails a calibration test, then all inspections completed since the last successful calibration shall be re-inspected at no additional cost to the City.
- D. The results of all calibration testing shall be submitted in accordance with paragraph SUBMITTALS.
- E. In no case shall footage readings start at anything more than 0.00.

3.09 PIPE PREPARATION

- A. As needed or as indicated in the Contract Documents, the Contractor shall clean the sewer lines in accordance with Section 02676 – Sewer Line Cleaning prior to CCTV work.
- B. All fog condensation shall be evacuated from the pipeline and the pipeline kept clear of any fog condensation during the inspection process.
- C. When sonar or multi-sensor inspection is specified for pipes 21 inches and larger, inspection shall be performed prior to any cleaning, to provide evidence that cleaning

is required. Post verification inspections shall be a combination of CCTV and/or Sonar, as flow permits.

3.10 INSPECTION METHODS

- A. 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 are not necessarily limited to, the following: defects, obstructions, encrustations, mineral deposits, debris, sediment, lateral connections, and any location determined not to be clean.
- B. The direction of the camera should be noted. Per NASSCO standards, inspections in the downstream direction are preferred.
- C. The display shall always begin with the numbering from upstream manhole to downstream manhole. If a reverse setup is attempted, the same numbering system will be used, but the direction of camera will be switched.
- D. The television camera shall be a self-propelled unit.
- E. The rate of camera travel shall be slow enough to allow a thorough inspection of each pipe joint, tee connection, structural deterioration, defect, I/I source, deposits in the sewer line, and to record observations.
- F. The camera travel speed shall not exceed a rate of 30 feet per minute.
- G. Lighting during the inspection should adequately, but not excessively, illuminate the immediate area.

3.11 RECORDING OF FEATURES AND DEFECTS

- A. The CCTV Inspection shall capture the following minimum information:
 - 1. Starting point in the launch manhole panning up to see the general condition of the manhole and other incoming/outgoing pipes.
 - 2. Ending point at the downstream manhole (or upstream manhole for reverse setups) panning up to see the general condition of the manhole and other incoming/outgoing pipes.
 - 3. Defects and Points of Interest: The camera shall be stopped at each defect or other feature. The camera lens shall be rotated, panned and/or tilted to clearly show each defect or feature. The Contractor shall capture defects with still photographs.
 - 4. Service Connections: The camera shall be stopped at each service connection. The camera lens shall be rotated, panned and/or tilted to clearly show each connection. The Contractor shall capture service connections with still photographs.

3.12 INSPECTION AND DOCUMENTATION

- A. PACP Pipe Run Report:
 - 1. A separate inspection form, otherwise known as a pipe run report, shall be produced for inspections of each complete sewer length between manholes.
 - 2. The Pipe Run Report shall be completed in accordance with the latest NASSCO PACP requirements.
 - 3. General information should be documented on CCTV inspection field forms prior to beginning inspection activity for each pipe run section, including:
 - (a) Project name.
 - (b) Operator's name.
 - (c) Operator's NASSCO PACP certificate number.

- (d) Inspection date/time (i.e., the date that the camera initiated or completed its inspection).
- (e) Pipe diameter.
- (f) Pipe material.
- (g) Direction of inspection (upstream/downstream).
- (h) Upstream and downstream manhole numbers.
- (i) Street location.
- (j) Inspection footage.
- (k) An alphanumeric tape/media number.
- (l) The level of cleaning before, or after, the investigation.
- (m) It should be noted if the pipe was cleaned before, or after, CCTV work.
- 4. The information documented on CCTV inspection field forms for each pipe run section should include, at a minimum, the following:
 - (a) A description of each service connection, type of each service connection, and defect observed.
 - (b) The location of each service connection and defect reported as the distance from the start of the inspection.
 - (c) The location of each service connection and defect reported with respect to the pipe axis.
 - (d) A reference to each photograph taken. Each photograph reference should include:
 - The location of the photograph from the start of the inspection.
 - A description of the defect or connection.
 - A reference to the electronic photograph file name.
- 5. The field form format shall be that produced by a City approved software with PACP coding.

B. Video:

- 1. Electronic video shall be made for each line segment inspection.
- 2. All video recordings shall become the property of the City upon inspection completion and acceptance. The video cost shall be included in the unit price. Each video shall be prefaced with the following minimum information:
 - (a) Inspection date.
 - (b) Inspection time.
 - (c) Prevailing weather conditions.
 - (d) Upstream/Downstream manholes indicating connectivity.
 - (e) Direction of inspection.
 - (f) Pipe diameter.
 - (g) Pipe material.
- 3. The videos shall include a report of the current inspection distance relative to the starting position.
- 4. The audio recording shall state the following minimum information:
 - (a) Date of inspection.
 - (b) Time of inspection.
 - (c) Description of weather during the inspection.
 - (d) Operator name.
 - (e) Nearest street name.
 - (f) Upstream and downstream manhole numbers.
 - (g) Direction of the inspection in relation to the direction of flow.
 - (h) Pipe diameter and material type.
 - (i) Description of each service connection and pipe defect.

- C. Photographs:
 - 1. Digital photographs shall be taken of each significant structural defect, I/I source, and service connection.
 - 2. The location of each photograph along with photograph file name shall be recorded.
 - 3. Photographs shall be supplied as JPEG images or another approved format.
 - 4. Digital photograph files are to be named as described in paragraph 2.05. D.
- D. PACP Microsoft Access Database:
 - 1. Technical: The PACP Microsoft Access Database shall be written in the latest version. The video and photo reference location/path shall be limited to one single folder named 'Video' and 'Picture', respectively. In no event shall files be password protected or otherwise inaccessible to the City, with any incorrect field or data entries the responsibility of the Contractor.
 - 2. Header: The PACP Microsoft Access Database shall include, at a minimum, all the PACP mandatory header fields and the following non-mandatory or City-specific changes to the header fields:
 - (a) Field 1 – Name of the Contractor in a format agreed upon with the City. (Note, this is different than the Field 1 requirement in NASSCO).
 - (b) Field 7 – P/O Number. Defined as the Inspector's contract number assigned by the CITY in four (4)-digit format.
 - (c) Field 8 – Work Order Number. Work order number or inspection number if assigned by the CITY.
 - (d) Field 14 – Weather.
 - (e) Field 20 – Inspection Technology Used.
 - (f) Field 25 – Pipe Segment Reference. (Upstream Access Point UNITID_ Downstream Access Point UNITID).
 - (g) Field 35 – Lining Method, if applicable.
 - (h) Field 38 – Total Length (Anticipated Length from CITY GIS). Note, this field is only to be completed in the event of an MSA or partial survey.
 - (i) Field 39 – Length Surveyed.
 - 3. All header fields shall be completed using the PACP abbreviations and units as defined in NASSCO PACP.
 - 4. Inspection Form:
 - (a) The CCTV inspection form within the PACP access database shall be completed in accordance with NASSCO requirements and include the following additions:
 The "Video Time" shall be included at the appropriate time in the CCTV video that represents the defect or feature code.
 The remarks column shall be used to identify Drop Connections, Diversion Structure, Lamp Holes, Grit Chambers, etc.
- E. If specified, the artificial intelligence (AI) software shall be used to analyze the CCTV footage in order to identify and classify each defect. The reporting of results shall be as described herein. The contractor shall rectify all discrepancies between the original pipe run report and the AI software pipe run report. The contractor shall document and track the discrepancies in order to calculate the percent accuracy of the operator and the AI software over time.
- F. MACP Manhole Report:
 - 1. A manhole inspection form shall be produced for each manhole inspected.
 - 2. The Manhole Report shall be completed in accordance with the latest NASSCO MACP requirements.

3. General information shall be documented on the manhole inspection form prior to beginning the inspection for each manhole. This information includes:
 - (a) Project name.
 - (b) Operator's name.
 - (c) Operator's NASSCO MACP certificate number.
 - (d) Inspection date/time.
 - (e) Unique Manhole identifier/UNITID.
 - (f) Manhole diameter.
 - (g) Manhole material.
 - (h) Pipe sizes in/out.
 - (i) Flow direction in/out.
 - (j) Street/cross street location.
4. Digital photographs shall be taken of each significant structural defect, I/I source, and service connection.
5. Photographs shall be supplied as JPEG images or another approved format.
6. Digital photograph files are to be named as described in paragraph 2.05. D.
- G. MACP Microsoft Access Database:
 1. Technical: The MACP Microsoft Access Database shall be written in the latest version. The photo reference location/path shall be limited to one single folder named 'Picture'. In no event shall files be password protected or otherwise inaccessible to the City, with any incorrect field or data entries being the sole responsibility of the Contractor.
 2. Header: The MACP Microsoft Access Database shall include, at a minimum, all the MACP mandatory header fields and the following non-mandatory or City-specific changes to the header fields:
 - (a) Field 1 – Name of the Contractor in a format agreed upon with the City. (Note, this is different than the Field 1 requirement in NASSCO).
 - (b) Field 7 – P/O Number. Defined as the Inspector's contract number assigned by the CITY in four (4)-digit format.
 - (c) Field 8 – Work Order Number. Work order number or inspection number if assigned by the CITY.
 - (d) Field 14 – Weather.
 - (e) Field 20 – Inspection Technology Used.
 - (f) Field 27 – Inflow Potential from Runoff.
 - (g) Field 28 – Locations Details.
 - (h) Field 72 – Frame Depth.
 - (i) Field 88 – Wall Diameter (Length).
 - (j) Field 72 – Frame Depth.
 - (k) Field 88 – Wall Diameter (Length).
 - (l) Field 118 – Structure ID (Pipe/Lateral Segment Reference).
 3. All header fields shall be completed using the MACP abbreviations and units as defined in NASSCO MACP.
 4. Inspection Form:
 - (a) The Manhole inspection form within the MACP access database shall be completed in accordance with NASSCO requirements and include the following addition:
 - (i) Field 106 shall be used to identify Diversion Structures, Lamp Holes and Grit Chambers.
 - (ii) Field 119 shall be used to identify Drop Connections.

- H. LACP Lateral Report (if specified in Section 01015):
1. A separate inspection form, otherwise known as a lateral report, shall be produced for inspections of each lateral.
 2. The Lateral Report shall be completed in accordance with the latest NASSCO LACP requirements.
 3. General information should be documented on the Lateral inspection field forms prior to beginning the inspection of each lateral. This information includes:
 - (a) Project name.
 - (b) Operator's name.
 - (c) Operator's NASSCO LACP certificate number.
 - (d) Inspection date/time (i.e., the date that the camera initiated or completed its inspection).
 - (e) Lateral diameter.
 - (f) Lateral material.
 - (g) Location of lateral from upstream and downstream manhole numbers.
 - (h) Location of lateral with respect to pipe axis.
 - (i) Type of service lateral: residential or commercial.
 - (j) Street/cross street location.
 - (k) Inspection footage.
 - (l) An alphanumeric tape/media number.
 4. The information documented on Lateral inspection field forms for each lateral should also include, at a minimum, the following:
 - (a) A description of each lateral service connection, type of each service connection (tap, saddle, etc.) and defects observed.
 - (b) The location of each lateral defect reported as the distance from the start of the lateral inspection.
 - (c) A reference to each photograph taken. Each photograph reference should include:
 - (i) The location of the photograph from the start of the lateral inspection.
 - (ii) A description of the defect or connection.
 - (iii) A reference to the electronic photograph file name.
 5. The lateral field form format shall be that produced by a City approved software with LACP coding.
- I. Lateral Video:
1. Electronic video shall be made for each lateral inspection.
 2. All video recordings shall become the property of the City upon inspection completion and acceptance. The video cost shall be included in the unit price. Each video shall be prefaced with the following minimum information:
 - (a) Inspection date.
 - (b) Inspection time.
 - (c) Prevailing weather conditions.
 - (d) Upstream/Downstream manholes from lateral.
 - (e) Lateral diameter.
 - (f) Lateral material.
 3. The videos shall include a report of the current inspection distance relative to the starting position.
 4. The audio recording shall state the following minimum information:
 - (a) Date of inspection.
 - (b) Time of inspection.
 - (c) Description of weather during the inspection.

- (d) Operator name.
- (e) Nearest street name.
- (f) Upstream and downstream manhole numbers.
- (g) Lateral diameter and material type.
- (h) Description of each lateral service connection and connection defects.
- J. Photographs:
 - 1. Digital photographs shall be taken of each significant structural defect, I/I source, and connection.
 - 2. The location of each photograph along with photograph file name shall be recorded.
 - 3. Photographs shall be supplied as JPEG images or another approved format.
 - 4. Digital photograph files are to be named as described in paragraph 2.05. D.
- K. LACP Microsoft Access Database:
 - 1. Technical: The LACP Microsoft Access Database shall be written in the latest version. The video and photo reference location/path shall be limited to one single folder named 'Video' and 'Picture', respectively. In no event shall files be password protected or otherwise inaccessible to the City, with any incorrect field or data entries being the sole responsibility of the Contractor.
 - 2. Header: The LACP Microsoft Access Database shall include, at a minimum, all the LACP mandatory header fields and the following non-mandatory or City-specific changes to the header fields:
 - (a) Field 1 – Name of the Contractor in a format agreed upon with the City. (Note, this is different than the Field 1 requirement in NASSCO).
 - (b) Field 7 – P/O Number. Defined as the Inspector's contract number assigned by the CITY in four (4)-digit format.
 - (c) Field 8 – Work Order Number. Work order number or inspection number if assigned by the CITY.
 - (d) Field 14 – Weather.
 - (e) Field 20 – Inspection Technology Used.
 - (f) Field 25 – Pipe Segment Reference. (Upstream Access Point UNITID_ Downstream Access Point UNITID).
 - (g) Field 35 – Lining Method, if applicable.
 - (h) Field 39 – Length Surveyed.
 - 3. All header fields shall be completed using the LACP abbreviations and units as defined in NASSCO LACP.
 - 4. Lateral Inspection Form:
 - (a) The CCTV Lateral inspection form within the LACP access database shall be completed in accordance with NASSCO requirements and include the following additions:
 - (i) The "Video Time" shall be included at the appropriate time in the CCTV Lateral video that represents the defect or feature code.

3.13 2D LASER/LIDAR PROFILING INSPECTION

- A. CCTV Preparation: Per CCTV inspection requirements, which includes relevant header information such as asset name, manholes, type, etc. as required in this Section. This CCTV inspection shall be used in conjunction with the profiling to complete the analysis of the pipeline.
- B. Profile Inspection: Header Details shall comply with CCTV inspection requirements by the City. Standard manufacturer's headings will normally suffice, with City approval. Header Field 'Profile Direction' shall also be included. Valid inputs are

“Upstream” or “Downstream”. Flow Depth for Ovality Analysis flow shall not exceed 1/3 full. For Corrosion Analysis of the pipe walls, flow shall not exceed 1/3 full and shall be performed during lowest flow period. The camera head will be configured to a central position in the pipe (+/-15%). Laser ring or 2D LIDAR sensor shall be clear, central and take up between approximately 2/3 and 3/4 of the vertical screen. Lights shall be turned off. Distance counter shall be displayed. Distance counter shall not overlap the laser ring. All other text shall be removed from screen. Camera shall be in Home position (0.0) for the entirety of the profile inspection. Recording shall be from start manhole to end manhole. Profiling shall be performed in either a forward or reverse direction however this shall be clearly displayed in the header details of the profile inspection. The camera and laser system shall be moved through the pipe at a constant speed not to exceed 10 meters or 30 feet per minute. The tractor shall not stop in the pipe during the profile inspection. The camera shall not perform pan or tilt during profile inspection. Pan and tilt shall be performed during the CCTV lights on inspection.

- C. Calibration: Calibration shall be performed using the same CCTV camera and video recording medium as used for the inspection. The calibrator shall be assembled as per manufacturer’s instructions and shall be performed using the exact CCTV camera and laser configuration used in the profile inspection. The calibrator shall be clearly viewed (focused) and without glare on screen. The calibrator shall be recorded in the horizontal position and in the vertical position. The video image shall be included in the submitted Inspection video.
- D. CCTV Camera Lens Correction: To validate camera lens correction, a flat “Lens correction grid” shall be placed perpendicular to camera lens recorded using the same CCTV camera and video recording medium as used for the inspection. All text shall be removed from the screen. The checkers shall be clearly viewed (focused) and without glare on screen. The video image shall be recorded and be included in the submitted Inspection video.
- E. Software Analysis: The inspection video shall be loaded into the profiling software. The correct camera option shall be selected based on CCTV camera used in the profile inspection. The selected camera option shall be automatically stamped into the data file so that the settings cannot be changed. The camera setting shall be displayed in the profiling data file.
 - 1. Horizontal and vertical calibration shall be performed on the calibration segment of the inspection video. The profile pipe selection shall be from start of pipe asset (beside start manhole) to end of pipe asset (beside end manhole), and selected using the start and end markers in the profile software. The profile software shall be tuned to the laser ring so as to provide maximum number of profile points. A water/debris mask shall be positioned to mask the highest water/debris point in the pipe.
 - 2. The data file shall be recorded at 25 to 30 profile cross-sections per second and linked to the profile inspection segment of the video. The recorded video shall be used to provide quantitative information of pipe diameter, ovality and corrosion.
- F. Laser Profile Data: A NASSCO/PACP certified CCTV operator with profiler software training (Ovality analysis only) or a qualified profiler analyst employed by the equipment manufacturer shall be used to analyze and report structural condition of pipeline using all or some of the following sensors: laser, CCTV. Due to the complex nature of corrosion, all Corrosion and/or Wall Loss Reports must be created by a qualified profiler analyst employed by the equipment manufacturer.

- G. **Ovality Reports: The Condition Analysis of Plastic Pipe: Ovality** (as per ASTM F1216). Reports shall be presented as an Ovality Observation Report - a line graph displaying Ovality of the pipe over the length of the inspected pipe asset. Where water or debris exists, the software shall use a mask for the non-structural segment to calculate Ovality. A 'Match to Reference Shape and Size' observation shall be shown for each pipe highlighting a cross-section where the actual pipe shape and size closest matches (as determined by engineer):
1. The As-Built diameter, or
 2. The median calculated diameter over the entire pipe length
 3. Cross-sectional observations should be taken where the structural Ovality threshold exceeds 5% (or as directed by the municipality).
 4. Project reports are to be shown as One Mile Ovality Flat Reports – made up of a colored flat graph and a line graph that clearly shows ovality over the 5% threshold (or as directed by the municipality).
 5. The flat graph is a colored map of the circular dimensions of the pipe over the length of the inspected pipe asset. Measured pipe ID that coincides with expected values must be coded white.
 6. Areas where the data is greater than the pipe ID must be colored on a yellow/red color scale. Areas where the data is smaller than the pipe ID must be colored on a blue scale. The line graph will be aligned with the flat graph, clearly showing ovality above the desired threshold.
 7. **Deflection Reports – Alternative Option for Condition Analysis of Plastic Pipe**
 - a. X and Y Diameter Reports shall be presented as an XY Deflection Observation Report – a line graph displaying and XY deflection of the pipe over the length of the inspected pipe asset. Where water or debris exists, the software shall use a mask for the non-structural segment to calculate the X and Y diameters. A 'Match to Reference Shape and Size' observation shall be shown for each pipe highlighting a cross-section where the actual pipe shape and size closest matches the median calculated diameter for each cross-section
 - b. Cross-sectional observations should be taken where the X and Y deflection threshold exceeds 5% (or as directed by the municipality).
- H. **Corrosion Reports: The Analysis of Concrete Pipe – Corrosion, Wall Loss and Buildup Reports** shall be presented in a Flat Observations Report. A color map of the circular dimensions of the pipe over the length of the inspected pipe asset. Measured pipe ID that coincides with expected values must be coded white. Material loss (corrosion), as measure by increasing pipe ID must be colored on a yellow/red color scale, with red color set to ½ of the expected wall thickness. Material gain (buildup), as measured by decreasing pipe ID, must be on a blue color scale. A "Match to Reference Shape and Size" observation should be shown for each pipe highlighting a cross-section where the actual pipe shape closest matches the reference shape and size. Cross-sectional observations should be taken to highlight areas of worst corrosion. Due to the complex nature of corrosion, all Corrosion Reports must be created by a qualified profiler analyst employed by the equipment manufacturer.

3.14 SONAR INSPECTION

- A. The purpose of the Sonar inspection shall be to document conditions as specified in this Section and as a pre-cleaning evaluation. The Contractor shall document sewer line operational and structural conditions and/or cleaning results.

- B. The Contractor shall keep Sonar Inspection Logs providing location records of the sewer mains inspected. The Logs shall be kept and maintained by the Contractor in a digital format. These location records shall clearly show the stationing location from manhole to manhole. Hard copies of the inspection reports shall be bound and submitted to the City 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.
- C. The Contractor shall use CCTV to assess the condition of the pipe above the flowline and sonar inspection to assess the condition below the flowline. The Contractor shall provide a digital video file of the inspection. The digital video files must include the location of the line segment at the time the inspection is performed. At a minimum, the video file shall also display manhole numbers and footage at all times. The purpose of the digital recording is to provide a visual record of all line segments that are inspected. Slow motion and stop-motion features shall also be provided. The Contractor shall have all digital video and necessary playback equipment readily accessible for review by the City during the project. The digital video file shall be a deliverable and shall be required for completion of the work for each segment inspected. The digital video files (recorded on the approved digital storage media) shall be indexed with the line segment and labeled appropriately on the disc. Video recordings shall be processed by the Contractor and delivered to the City after completion of the Sonar inspection for review. Video and reports shall be submitted via hard copy, CD-ROM, removable hard drive or DVD Data disk.
- D. The Contractor shall provide pipeline reports containing visual profile, profile comparison and dimension data of significant defects where flows are greater than 12-inches in depth. The report shall include longitudinal pipeline cross sections showing the debris profile and depth, volume and cross-sectional area along the length of pipe.

3.15 3D LIDAR INSPECTION

- A. CCTV Preparation: Per CCTV inspection requirements, which includes relevant header information such as asset name, manholes, type, etc. as required in this Section. This CCTV inspection shall be used in conjunction with the profiling to complete the analysis of the pipeline.
- B. LIDAR Inspection: Header Details shall comply with CCTV inspection requirements by the City. Standard manufacturer's headings will normally suffice, with City approval. Header Field 'Profile Direction' shall also be included. Valid inputs are "Upstream" or "Downstream". Flow Depth for Ovality Analysis flow shall not exceed 1/3 full. For Corrosion Analysis flow shall not exceed 1/3 full and shall be performed during lowest flow period. The camera head will be configured to a central position in the pipe (+/-15%). Recording shall be from manhole to manhole. Scanning shall be performed in either a forward or reverse direction. Scans shall be taken when the robotic unit is stopped and stabilized to reduce shift in the point cloud scans. For Ovality, Wall Loss and Corrosion assessment, a scan must be taken every 5-6 linear feet and must be tagged with the tether distance to determine location the scan was taken in the pipe. For Alignment, Bend Radius, and Virtual Mandrel Analysis, a scan must be taken every 2-3 linear feet and must be tagged with the tether distance to determine location the scan was taken in the pipe.
- C. LIDAR Data: Due to the complex nature of LIDAR data. All reports must be created by a qualified profiler analyst employed by the equipment manufacturer. This

includes Ovality, Wall Loss, Corrosion, Alignment, Bend Radius, and Virtual Mandrel Reports.

- D. Ovality Reports: The Condition Analysis of Plastic Pipe: Ovality (as per ASTM 1216). Reports shall be presented as an Ovality Observation Report - a line graph displaying Ovality of the pipe over the length of the inspected pipe asset. Where water or debris exists, the software shall use a mask for the non-structural segment to calculate Ovality. A 'Match to Reference Shape and Size' observation shall be shown for each pipe highlighting a cross-section where the actual pipe shape and size closest matches (as determined by engineer):
 1. The As-Built diameter, or
 2. The median calculated diameter over the entire pipe length
 3. Cross-sectional observations should be taken where the structural Ovality threshold exceeds 5% (or as directed by the municipality).
 4. Project reports are to be shown as One Mile Ovality Flat Reports – made up of a colored flat graph and a line graph that clearly shows ovality over the 5% threshold (or as directed by the municipality).
 5. The flat graph is a colored map of the circular dimensions of the pipe over the length of the inspected pipe asset. Measured pipe ID that coincides with expected values must be coded white.
 6. Areas where the data is greater than the pipe ID must be colored on a yellow/red color scale. Areas where the data is smaller than the pipe ID must be colored on a blue scale. The line graph will be aligned with the flat graph, clearly showing ovality above the desired threshold.
 7. Deflection Reports – Alternative Option for Condition Analysis of Plastic Pipe
 - a. X and Y Diameter Reports shall be presented as an XY Deflection Observation Report – a line graph displaying and XY deflection of the pipe over the length of the inspected pipe asset. Where water or debris exists, the software shall use a mask for the non-structural segment to calculate the X and Y diameters. A 'Match to Reference Shape and Size' observation shall be shown for each pipe highlighting a cross-section where the actual pipe shape and size closest matches the median calculated diameter for each cross-section
 - b. Cross-sectional observations should be taken where the X and Y deflection threshold exceeds 5% (or as directed by the municipality).
- E. Corrosion and Wall Loss Reports: The Analysis of Concrete Pipe – Corrosion, Wall Loss and Buildup Reports shall be presented in a Flat Observations Report. A color map of the circular dimensions of the pipe over the length of the inspected pipe asset. Measured pipe ID that coincides with expected values must be coded white. Material loss (corrosion), as measure by increasing pipe ID must be colored on a yellow/red color scale, with red color set to ½ of the expected wall thickness. Material gain (buildup), as measured by decreasing pipe ID, must be on a blue color scale. A "Match to Reference Shape and Size" observation should be shown for each pipe highlighting a cross-section where the actual pipe shape closest matches the reference shape and size. Cross-sectional observations should be taken to highlight areas of worst corrosion. Due to the complex nature of corrosion, all Corrosion Reports must be created by a qualified profiler analyst employed by the equipment manufacturer. Deliverables shall include, but not limited to, electronic files, pdf documents, Microsoft Excel spreadsheets, or other formats requested by the City/Design Professional.

- F. Alignment, Bend Radius, and Virtual Mandrel Reports: The Analysis of a pipe in preparation for rehabilitation through lining, slip-lining, or geopolymers shall be presented via plan drawings and 3D models. All LIDAR scans must be aligned and constrained to survey-grade coordinates of the access points. Any bends, horizontal or vertical deflection, or curvature of the pipe shall be noted by the location in the pipe and the radius or degree of the bend. For Virtual Mandrel Analysis, liner manufacturer specifications such as the internal diameter (ID), outer diameter (OD), joint deflection, and length of the liner segment must be provided in order to process and determine successful rehabilitation.

3.16 MULTI-SENSOR INSPECTION

- A. Equipment shall be calibrated and deployed per the manufacturers' specifications. Each inspection record and recording shall be limited to a single (1) sewer segment. Combining multiple sewer segment inspections in one (1) recording shall not be permitted.
- B. The Contractor shall keep Multi-Sensor Inspection Logs providing location records of the gravity lines inspected. The Logs shall be kept and maintained by the Contractor in a digital format. These location records shall clearly show the stationing location from manhole to manhole. Hard copies of the inspection reports shall be bound and submitted to the City with the digital data.
- C. The multiple inspection technologies shall be used to develop a visual representation of internal pipe conditions above the flow line using Lidar-laser measurement and below the flow line using sonar measurement, combined with high-definition video inspection. The Contractor shall provide a digital video file of the inspection. The digital video files must include the location of the line segment at the time the inspection is performed. At a minimum, the video file shall also display manhole numbers and footage at all times. The purpose of the digital recording is to provide a visual record of all line segments that are inspected. Slow motion and stop-motion features shall also be provided. The Contractor shall have all digital video and necessary playback equipment readily accessible for review by the City during the project. The digital video file shall be a deliverable and shall be required for completion of the work for each segment inspected. The digital video files (recorded on the approved digital storage media) shall be indexed with the line segment and labeled appropriately on the disc. Video recordings shall be processed by the Contractor and delivered to the City after completion of the Sonar inspection for review. Video and reports shall be submitted via hard copy, CD-ROM, removable hard drive or DVD Data disk.
- D. Where other sensors are used in conjunction with the CCTV, Contractor shall provide the required reports as specified in 3.13, 3.14, and/or 3.15.

3.17 FELL INSPECTION

- A. The inspection shall be performed on one sewer line section (i.e., manhole to manhole or clean out to mainline) at a time. Flow within the section is irrelevant except within the area of the inspection probe, which will be 100 percent flooded to within three (3) feet of the probe in both directions.
- B. The probe shall be pulled through the line a uniform rate in compliance with operator discretion. The rate of inspection should not be greater than 60 feet per minute, and the rate should not exceed the capability of encapsulating the probe with water.
- C. For each gravity line inspected, executing the FELL testing shall begin with a light flushing of the gravity line and then using a hydraulic jet hose and reel to pull the

FELL probe through the pipe. The gravity line shall be flushed from the downstream manhole, the nozzle removed at the upstream manhole, a Sliding Funnel Plug shall be attached to the hose, and the FELL probe shall be attached to the Plug. The hydraulically powered jet truck shall then pull the probe through the pipeline while simultaneously providing the water necessary for the probe to electrically examine the pipe walls.

- D. All data will be fed back to a PC via a standard coaxial cable. Once the data is collected on the laptop computer, it shall be uploaded to a Cloud-Based portal where it will be instantly processed and available for Owner/engineer/contractor and staff to view. This portal shall be a secure site and only accessible by Owner code and pathway security.
- E. The equipment manufacturer's custom and proprietary algorithms shall be used to grade the size and type of each leak, defects, or possible defects, and graphically display the defect grade size, type and frequency for each manhole-to-manhole pipeline section. In addition, the manufacturer's software shall provide an estimated GPM gallons per minute, and GPD gallons per day infiltration rate per defect and for the entire pipeline segment being assessed. All shall be in accordance with ASTM 2550-13.
- F. Contractor shall provide the fully analyzed Focused Electrode Leak Locating pipe testing results to the Owner within 72 hours of testing each section of pipe via uploading each scan to the Owner's licensed viewing platform or document management system with the following information:
 1. Owner and State.
 2. Date of Inspection.
 3. Location of Inspection.
 4. Pipeline size, type, and overall length.
 5. Graph showing:
 - a. Defect start / end and overall length (ft.).
 - b. Potential GPM infiltration estimation based on the hydrogeological approach.
 - c. Percentage of potential GPM infiltration per defect.
 - d. Defect Threshold (Small, Medium, Large).
 - e. Overall chart indicating GPM Summary in Detail.
- G. If specified by the City, Premium Reporting shall be provided. CCTV of the installed CIPP shall be obtained and reviewed in conjunction with the processing of FELL results. Defects shall be categorized and assigned to the main line or service connections with their associated GPM and GPD infiltration rates showing the following information:
 1. Minor flow and percentage of Total Flow.
 2. Moderate flow and percentage of Total Flow.
 3. Severe flow and percentage of Total Flow.
 4. Total GPM.
 5. Total GPD.
 6. Total GPD / IDM.
- H. Acceptance of all testing shall be at the sole discretion of the City/Design Professional. The City will be responsible for the review and analysis of the post CIPP CCTV and FELL testing.
- I. Correction of defects identified shall be at the sole discretion of the City.

3.18 DELIVERABLES

- A. All information developed as part of this section shall be considered a record document. Management and submittal of this information shall conform to this Section, Section 00700 – General Conditions, Article 6, Contractor’s Responsibilities and Section 01020 – Record Documents.

3.19 CLEAN UP

- A. The Contractor shall keep premises free from accumulation of waste materials, rubbish, and other debris generated by Contractor’s operations.
- B. Cleanup shall be conducted in accordance with Section 01566 – Cleanup Operations.

3.20 MEASUREMENT AND PAYMENT

- A. Unless otherwise specified in the Contract Documents, all work associated with cleaning and the inspection technology or technologies utilized shall be considered ancillary and will not be measured for payment. All labor, material, equipment and deliverables costs shall be included in the Bid.

END OF SECTION

DIVISION II
CONSTRUCTION AND MATERIAL SPECIFICATIONS
SECTION 2700 STRUCTURES

APPROVED AND ADOPTED THIS 23RD DAY OF MAY 2001

KANSAS CITY METROPOLITAN CHAPTER
OF THE AMERICAN PUBLIC WORKS ASSOCIATION

2701	GENERAL	1
2701.1	Purpose.....	1
2701.2	Scope.....	1
2702	SPECIFICATIONS	1
2702.1	Jurisdiction in Kansas	1
2702.2	Jurisdiction in Missouri	1
2703	SPECIAL AGGREGATE CONCRETE –BRIDGE DECK, SIDEWALK, BARRIERSAND CURBS, DIAPHRAGMS, AND APPROACH SLAB	2
2703.1	General.....	2
2703.2	General Concrete Control & Quality	2
2703.3	Materials	2
2703.4	Concrete Mix	3
2703.5	Sampling and Testing	4
2703.6	Placing, Finishing and Curing.....	5
2703.7	Field Testing	5
2703.8	Payment	6

2700

2702.2

SECTION 2701 GENERAL

2701.1 Purpose: The purpose of these specifications is to provide uniformity in the Metropolitan Kansas City Area for the Public Works structures which are designed and constructed for the many separate municipal and county jurisdictions included therein.

2701.2 Scope: These specifications are intended to cover the construction procedures and materials for the bridges, culverts, retaining walls and other miscellaneous structures routinely addressed within the various jurisdictions. Procedural and administrative items covered in The General Conditions and the Supplemental Conditions shall supersede such items covered in the specifications referenced below unless specifically noted in the project Special Provisions.

SECTION 2702 SPECIFICATIONS

2702.1 Jurisdiction in Kansas: For jurisdictions in Kansas, the current edition of the Standard Specifications for State Road and Bridge Construction, State Highway Commission of Kansas shall apply. This specification is available from:

Kansas Department of Transportation
Bureau of Fiscal Services
Docking State Office Building
7th Floor
Topeka, Kansas 66612
(913) 296-3545

2702.2 Jurisdiction in Missouri: For jurisdiction in Missouri, the current edition of the Missouri Standard Specifications for Highway Construction, Missouri Highway and Transportation Commission shall apply except as modified herein. This specification is available from:

Missouri Highways and Transportation Commission
1-(573) 751-2860

2703

2703.3

SECTION 2703 SPECIAL AGGREGATE CONCRETE: Bridge Deck, Sidewalk, Barriers and Curbs, Diaphragms, and Approach Slabs.

2703.1 General: All new bridge deck shall be full depth special aggregate concrete constructed as shown on the plans. Bridge sidewalk, barrier and curb, diaphragms, and approach slab shall also be special aggregate concrete.

2703.2 General Concrete Control and Quality: The current editions of the following Bulletins and Sections of the "CONCRETE STANDARDS" issued by the Mid-West Concrete Industry Board, Inc., are made a part hereof by reference. However, when the provisions of this specification for Special Aggregate Concrete differ from the provisions of such "Bulletins" and "Sections", the provisions of this Specification shall govern.

Section 3-1 Air Entraining Admixtures

Section 3-1 Materials-Fine Aggregate

Section 4-1 Concrete Mix Design, Tables, Air Entrained Concrete

Section 4-4 Concrete Pavement

Section 8 Placing Concrete

Section 9 Curing and Protection

Section 10 Cold Weather Concrete

Section 11 Hot Weather Concrete

Copies of the current MCIB Bulletins and Sections are available for inspection at the office of the City Engineer and may be obtained from the Secretary of the MCIB.

All work shall be done under the supervision of a qualified superintendent experienced in concrete construction.

2703.3 Materials

- A. **Portland Cement:** Portland Cement shall conform to ASTM Designation C 150 for Type I. Type IP cement or Type I (PM) cement shall not be used in the special aggregate concrete mix.
- B. **Fine Aggregate:** Fine aggregate shall conform to MCIB Section 1. Method of sampling and testing shall conform to the applicable portions of Section 10 of ASTM Designation C33, Concrete Aggregates.
- C. **Special Aggregate (Coarse Aggregates):** The special aggregate shall be Iron Mountain Trap Rock, Nepheline Syenite, Sioux Quartzite (quarried South Dakota or Minnesota), or approved equal. The gradation of the aggregate shall conform to the following:

Sieve Designations (Square Openings)	Percentage Passing (By Weight)
1 – inch sieve (25.0mm)	100
¾ - inch sieve (19.0mm)	90-97
½ - inch sieve (12.5mm)	45-70
3/8 – inch sieve (9.5mm)	20-55
No. 4 Sieve (4.75mm)	0-10
No. 8 Sieve (2.36mm)	0-5

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2703.4

The fineness modules for the aggregate shall not vary more than plus or minus 0.20 from the fineness modulus of the gradation on which the mix is designed. The combined weight of the sulfides such as Pyrite, Marcasite and Chalcopyrite shall not exceed 0.1% of the weight of special aggregate sample. The material finer than the No. 200 (75 μ m) sieve shall not exceed one (1) percent of the weight of special aggregate sample.

D. Mixing Water: Water for mixing concrete shall be clean and free from injurious amounts of sewage, oil, acid, alkali, salt or organic matter. (Only potable water will be acceptable without testing.)

E. Air-Entraining Agent: Air-entraining agents used to produce specified amounts of air-entrainment shall conform to applicable requirements of ASTM Designation C260 and MCIB Section 1.

F. Admixtures: Admixtures used shall meet ASTM Designation C494, Chemical Admixtures for Concrete. Water-reducing admixtures shall be Type A except when the ambient air temperature is 80°F (27°C) and forecast to rise, a Type D water-reducing and retarding admixtures shall be used. Calcium Chloride shall not be used.

G. Class F fly ash or slag shall be added as necessary to offset any ASR potential in the mix. Fly Ash shall conform to ASTM C 618. Slag shall conform to ASTM C989, Strength Grade 120.

2703.4 Concrete Mix: The Contractor shall submit a tentative special aggregate concrete mix, designed by a competent testing laboratory, to the Engineer for approval before the use of special aggregate concrete. After a mix has been approved, it shall be subject to additional adjustment in the field by the Engineer whenever necessary to produce a mixture of proper workability, uniform consistency, and acceptable density and strength. The tentative special aggregate concrete mix design shall include the following:

- A. Complete tests of the fine aggregate and the special aggregate showing their conformance to these specifications
- B. Source of aggregates and location of ready mix plant
- C. Weights of all materials used for one cubic yard (meter) of fresh mixed concrete (aggregate weights shall be based on saturated, surface dry materials)
- D. Brand names of the cement, the air entraining agent, the water reducer and/or retarder
- E. Air content of the tentative mix design
- F. Slump in inches (mm) of the tentative mix design.
- G. Special aggregate concrete shall conform to the basic requirements table below:

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2703.5

Item Mix No.	Special Aggregate Concrete	
	SA-1	SA-2
28 Day f'c	4,000 psi (27.58MPa)	4,500 psi (31.03MPa)
Cement (lbs/CY)	634 (376.2 K/m ³)	683 (405.2 K/m ³)
Course Aggregate	Special Aggregate	Special Aggregate
Fine Aggregate	(Missouri or Kaw River)	(Missouri or Kaw River)
Slump	Max. 4" (100mm)	Max. 4" (100mm)
Air Entrainment	6% -1+2	6% -1+2
Max W/C Ratio	.385	.385
Admixtures (Water-Reducing or Water-Reducing and Retarding)		

- H. The required average compressive strength (fcr) shall be 5,200 psi for the SA- 1 mix and 5,700 psi for SA-2 mix as set forth in ACI 301 (American Concrete Institute Manual of Concrete Practice).
- I. The special aggregate concrete shall have a minimum of 634 pounds of cement per cubic yard (376.2 K/m³) of fresh mixed concrete for Mix No. SA-1 and a minimum of 683 pounds of cement per cubic yard (405.2 K/m³) of fresh mixed concrete for Mix No. SA-2. The air content shall be 6 percent plus 2 or minus 1 percent tolerance.
- J. Mixing water shall not exceed 4.34 gallons per 94 pound (19.3L per 50 kilo) sack of cement. Moisture in excess of Saturated Surface Dry (SSD) in the aggregate shall be considered as part of the mixing water. Water which is absorbed by the aggregates before placing shall not be included as part of the mixing water.
- K. The mix shall be designed to produce a three (3) inch (75mm) slump and shall be rejected at the job site if the slump exceeds four (4) inches (100mm).
- L. The relative proportions of fine and coarse aggregates in the mix shall be determined by ACI 211.1 (American Concrete Institute Manual of Concrete Practice).

2703.5 Sampling and Testing

- A. The special aggregate mix design and materials test reports shall be dated within 90 days prior to placement and submitted for approval no later than 21 days before placement.
- B. Only approved ready mix plants with mix designs, certifications and materials test reports will be allowed to supply ready mix concrete. Only one plant shall supply concrete for each deck.
- C. The ready mix plant shall have the cement and aggregate scales calibrated by an independent scale calibration company. The plant scales shall be calibrated yearly or as deemed necessary by the City.
- D. Methods of sampling and testing aggregate shall conform to the applicable portions of Section 10 of ASTM Designation C33, Concrete Aggregates
- E. Submit compressive strength of test specimens made and cured in accordance with ASTM Designation C192, Making and Curing Concrete Test Specimens in the

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Laboratory and tested in accordance with ASTM Designation C39, Compressive Strength of Cylindrical Concrete Specimens. A minimum of one specimen shall be tested at seven days and two specimens at twenty-eight days.

- F. Measuring Air Content. The air content shall be measured in accordance with the Standard Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method, ASTM Designation C173, or the Standard Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method, ASTM Designation C231, at the option of the Engineer.
- G. Alkali Silica Reaction. Combined aggregates when mixed with proposed cementitious materials shall exhibit a mean mortar bar expansion at 14 days of no more than 0.10% when tested in accordance with ASTM C1260. Coarse and fine aggregate blending should be the same as proposed in the submitted concrete mix. Submit reports.

2703.6 Placing, Finishing, and Curing

- A. Special aggregate concrete shall be placed in accordance with MCIB.
- B. Ready-Mixed Concrete: All special aggregate concrete used in this work shall be ready-mix concrete. Ready-mix concrete shall be mixed and transported in accordance with the Standard Specifications for Ready-Mixed Concrete, ASTM C94. Any concrete, which is not plastic and workable when placed in the work, will be rejected.
- C. Full Depth Special Aggregate Deck: The Contractor shall place a full depth special aggregate deck. Pre-stressed panels are not required to be special aggregate.
- D. Finish and Curing: After surface irregularities have been corrected, the concrete surface shall be given a uniformly textured surface finish by use of a Kansas Mop. The finished texture shall consist of transverse grooves approximately 0.125 inches (3.2mm) deep spaced at ½ inch centers (13mm). The Kansas Mop and the manner and time of its use shall provide a uniform surface texture without tearing or unduly roughening the concrete.
- E. Curing of the special aggregate concrete shall be a continuously applied wet cure for a minimum of 120 hours. The special aggregate concrete shall be covered with a wet burlap or wet cotton mat covering with water applied to the mats as necessary to maintain a wet condition.

2703.7 Field Testing: All concrete testing shall be done by the City or by an independent laboratory for the City at the City's expense.

- A. Three cylinders shall be taken on each continuous pour for every 50 cubic yards (35 cubic meters), or fraction thereof, placed in one continuous operation. The cylinders shall be made in accordance with AASHTO T23-73 (ASTM C-31) procedures. The set of three cylinders shall be identified as to time and location of placement. One cylinder of the set shall be tested at seven

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days and the other two cylinders tested at twenty-eight days. All tests shall be performed in accordance with AASHTO T22-92 (ASTM C39-96) procedures.

During concrete placement, if more than 100 cubic yards is to be placed in a single day, the contractor shall supply a water tank to cure all test cylinders in for the first 24 hours after the pour. The tanks shall be of sufficient size to hold three 6"X12" cylinders for every 50 cubic yards poured that day and to allow for the water to maintain a temperature between 60°F and 80°F after being filled with water from the ready mix delivery trucks. The contractor shall be responsible for protecting persons from entering the tanks.

- B. Special Aggregate Concrete deficient in the required 28 Day f'c strength shall be removed and replaced. Testing of special aggregate concrete shall be limited to cylindrical concrete specimens for compressive strength made at the time of placement of the fresh concrete. No coring of the special aggregate concrete deck will be allowed. If Contractor desires additional concrete cylinders for quality assurance in removing falsework and formwork, they shall be made and tested in accordance with the previous standards at the contractor's expense. Generally, the concrete shall obtain seventy-five (75) percent of the minimum 28 day compressive strength prior to removal of false work or formwork. Deviations from this requirement must be approved by the Engineer.
- C. Any load of concrete, in which the air content does not conform to the requirements of the above item entitled "Concrete Mix", shall be rejected and removed from the job site.

2703.8 Payment: Special Aggregate Concrete, measured to the nearest 0.1 cubic yard (0.1 m³), complete in place, shall be paid for at the contract unit price bid for "Special Aggregate Concrete" as listed in the Bid Form – Unit Prices. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.

SECTION 02702 – TESTING REQUIREMENTS FOR SANITARY SEWER: MAINS AND MANHOLES

PART 1 - GENERAL

1.01 SUMMARY

- A. This section covers the testing of all sewer mains and manholes. The Contractor shall provide all materials, labor and equipment to complete the testing requirements in accordance with this section. All costs pertaining to testing shall be included in the lump sum bid.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section, these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

- A. Section 01015 – Specific Project Requirements.
- B. Section 01300 – Submittals.
- C. Section 02687 – Laser Profiling of Sewer Mains.
- D. Section 03362 – Manhole Rehabilitation.
- E. Section 03370 – Sanitary Sewer Manhole Construction.
- F. Section 05010 – Sanitary Sewer Manhole Castings.

1.04 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the Work.

1.05 INFORMATION PROVIDED BY THE CITY

- A. As provided in the Contract Documents.

1.06 CODES and STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. The version of the codes and standards in effect at the time of the Notice to Bidders shall be used, except as noted on the Drawings or in the Specific Project Requirements section of these specifications.
- B. American Society for Testing and Materials (ASTM):
 - ASTM C828 – Low-Pressure Air Testing of Vitrified Clay Pipe Lines.
 - ASTM C969 – Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
 - ASTM C1244 – Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.
 - ASTM F1417 – Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.
- C. American Water Works Association (AWWA):
 - AWWA C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.07 CONTRACTOR SUBMITTALS

- A. Submit the following in accordance with Section 01300 – Submittals:
 - 1. Testing plan, procedures and schedule.
 - 2. Testing equipment.

PART 2 - PRODUCTS

Not Used.

PART 3 – EXECUTION

3.01 GENERAL

- A. The City/Design Professional must witness the pressure and leakage test for it to be a valid test.
- B. All sewer main joints and all manholes shall be watertight and free from leaks.
- C. There is zero allowable leakage. All defects causing infiltration/exfiltration shall be corrected at no additional cost to the City.

3.02 SAFETY

- A. All work shall be performed in accordance with applicable Occupational Safety and Health Administration (OSHA) standards.

3.03 SEWER PIPE ALIGNMENT AND GRADE TESTING

- A. The alignment, grade and visible defects shall be checked as follows:
 - 1. Prior to inspection, the Contractor shall clean and flush the sewer main with clear water to remove excess mortar, joint sealant, dirt, debris etc.
 - 2. All sewer mains shall be mandrel tested to determine ovality, the presence of any misaligned, displaced, or broken pipes and other defects.
 - 3. All defects shall be corrected prior to conducting the pressure and leakage test.

3.04 PRESSURE AND LEAKAGE TEST FOR INFILTRATION/EXFILTRATION

- A. Sewer pipe infiltration/exfiltration testing:
 - 1. There shall be zero leakage on the infiltration/exfiltration test.
 - 2. The Contractor shall perform hydrostatic or air pressure tests on all sewers before acceptance by the City. The Contractor shall provide all materials, labor and equipment required including, but not limited to, the following: water, necessary piping connections, test equipment, water meter, pressure gauges, bulkheads, and fittings required for hydrostatic or air pressure testing.
 - 3. Pressure and leakage testing for Infiltration/Exfiltration testing shall be conducted. Where evidence of infiltration/exfiltration is discovered by the Contractor or by the City/Design Professional, the Contractor shall repair or replace the defective reach of pipeline at no additional cost to the City. Following repair of the pipeline, the Contractor shall re-test and make additional repairs until zero infiltration/exfiltration is achieved.

4. Pressure and leakage testing for Infiltration/Exfiltration shall be performed by the Contractor using the methods as set forth below. The required testing shall be successfully performed on carrier conduits prior to filling the void between the casing and the carrier conduits with sand or the sealing of the ends of the casing conduits.

- a. Air Testing of Gravity Systems:

- (1) Each section of gravity pipeline between manholes and/or structures after backfill shall be tested as outlined below.
- (2) Contractor shall furnish all materials, labor and equipment required including necessary piping connection, test pumping equipment, pressure gauges, bulkheads, regulator to avoid over pressurization, and all miscellaneous items required.
- (3) The pipe plug for introducing air to the sewer line shall be equipped with two taps. 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. The second tap will be fitted with valves and fittings to accept a pressure test gauge indicating internal pressure in the sewer pipe. 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. The pressure test gauge valve may also be used to indicate loss of air pressure due to leaks in the sewer line.
- (4) The pressure test gauge shall meet the following minimum specifications:

Size (diameter)	4-1/2 inches
Pressure Range	0-15 psi
Figure Intervals	1 psi increments
Minor Subdivisions	0.05 psi
Pressure Tube	Bourdon Tube or diaphragm.
Accuracy	+/-0.25% of maximum scale
Dial	White coated aluminum with black lettering, 270degree arc and mirror edge.
Pipe Connection	Male 1/2 inch N.P.T.

Calibration data will be supplied with all pressure test gauges. Certification of pressure test gauge will be required from the gauge manufacturer. This certification and calibration data will be available to the City/Design Professional whenever air tests are performed.

- (5) Plug ends of line and cap or plug all connections to withstand internal pressure. One of the plugs provided must have two taps for connecting equipment. After connecting air control equipment to the air hose, monitor air pressure so that internal pressure does not exceed 5.0 psig. After reaching 4.0 psig, throttle the air supply to maintain between 4.0 and 3.5 psig for at least two (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, the pressure is allowed to decrease to 3.5 psig. At 3.5 psig, begin timing to determine the time required for pressure to drop to 2.5 psig. If the time, in seconds, for the air pressure to decrease from 3.5 psig to 2.5 psig is greater than that shown in the table below, the pipe shall be presumed free of defects.

Minimum Test Times in Plastic Pipe

Pipe Diameter (in)	Minimum Time (min:secc)	Length for Minimum Time (ft)	Time for Longer Length (sec)
4	3:46	597	.380 L
6	5:40	398	.854 L
8	7:34	298	1.520 L
10	9:26	239	2.374 L
12	11:20	199	3.418 L
15	14:10	159	5.342 L
18	17:00	133	7.692 L
21	19:50	114	10.470 L
24	22:40	99	13.674 L
27	25:30	88	17.306 L
30	28:20	80	21.366 L
33	31:10	72	25.852 L
36	34:00	66	30.768 L
42	39:48	57	41.883 L
48	45:34	50	54.705 L
54	51:02	44	69.236L
60	56:40	40	85.476L

L = Total Length

If air test fails to meet above requirements, repeat test as necessary after all leaks and defects have been repaired and backfilled.

Before the manhole vacuum test is performed and in areas where ground water is known to exist, install a one-half inch diameter capped pipe nipple, approximately 10" long, through manhole wall above one of the sewer lines entering the manhole. This shall be done at the time the sewer is installed. Immediately prior to the performance of the line acceptance test, ground water level shall be determined by removing pipe cap, blowing air through pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to pipe nipple. The hose shall be held vertically and a measurement of height in feet of water shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. If the air pressure required for the test is greater than 9 psig, the air test method will not be allowed. Instead, an infiltration test shall performed by the Contractor.

- (6) If Polyvinyl Chloride (PVC) gravity sewer pipe is used it shall be air-tested in accordance with the requirements of ASTM F-1417.

- b. Hydrostatic Tests for Pressure Systems (Sewer Force Mains):
 - (1) Conformance Procedure: The Contractor shall perform hydrostatic pressure and leakage tests for all sewer force mains. The test shall conform to AWWA C600 procedures except as modified herein. There shall be zero leakage/drop in pressure.
 - (2) Sectionalizing: Test in segments between sectionalizing valves, between a sectionalizing valve and a test plug, or between test plugs. Contractor shall furnish and install test plugs at no additional cost to the City, including all anchors, braces, and other devices to withstand hydrostatic pressure on plugs. Contractor shall be responsible for any damage to public or private property caused by failure of plugs. Limit fill rate of line to available venting capacity. Fill rate shall be regulated to limit velocity in lines when flowing full to not more than 0.05 to 1.0 fps.
 - (3) Pressure and Leakage Test: Conduct at 1.5 times the maximum operating pressure, but not less than 100 psi, for a minimum of two hours:
 - $L = (0.0000075 SD(P)^{1/2})/2$ where
 - L = 2 hour allowable make-up water (gallons)
 - S = length of pipe tested (ft.)
 - D = nominal pipe diameter (in)
 - P = test pressure (psig)

3.05 SEWER PIPE DEFLECTION TESTING

- A. The mandrel testing shall be conducted again thirty days after final trench backfill.
- B. The mandrel device shall be cylindrical in shape and constructed with nine (9) evenly spaced arms or prongs. Mandrels with fewer arms will be rejected as not sufficiently accurate. The rigid mandrel shall have an outside diameter (O.D.) equal to 95 percent of the inside diameter (I.D.) of the pipe. The inside diameter of the pipe, for the purpose of determining the outside diameter of the mandrel, shall be the average outside diameter minus two minimum wall thicknesses for O.D. controlled pipe and the average inside diameter for I.D. controlled pipe. Dimensions shall be per appropriate standard. The "D" mandrel dimension shall carry a tolerance of + or - 0.01 inch. Allowances for pipe wall thickness tolerances or ovality (from heat, shipping, poor production, etc.) shall not be deducted from the "D" dimension but shall be counted in as a part of the five (5) percent or lesser deflection allowance. Contact length (L) shall be measured between points of contact on the mandrel arm. The length shall not be less than twelve inches.
- C. The mandrel shall be hand-pulled by the Contractor through all flexible sewer lines. Any sections of sewer not passing the mandrel test shall be uncovered and the Contractor, at no additional cost to the City, shall repair or replace the sewer to the satisfaction of the Engineer. These repaired segments shall be re-tested by the Contractor.
- D. Following a successful thirty day mandrel test, all sewer mains shall be Laser Profiled, see SECTION 02687.

3.06 MANHOLE TESTING

- A. All new manholes and fully rehabilitated manholes with pipe end seals installed shall be tested for infiltration/exfiltration by vacuum testing. All vacuum testing shall be performed in the presence of the City/Design Professional. Notification by the Contractor to the City/Design Professional shall be made 5 days in advance of testing. All visible defects and leaks shall be repaired by the Contractor prior to testing and then again during the warranty period.

- B. Vacuum testing is required on all new manholes and fully rehabilitated manholes with a main line diameter of less than 42 inches.
- C. Prior to payment for new manholes and fully rehabilitated manholes rehabilitation, the manholes shall pass the vacuum test as identified in this specification.
- D. The initial vacuum test on new manholes or structure shall be conducted prior to backfilling. Vacuum testing after backfilling should be performed only after a successful non-backfill test has been completed. The Contractor shall not vacuum test backfilled manholes in the presence of ground water. All pipes entering the manhole shall be plugged at least eight (8) inches into the sewer pipe. The plug must be inflated at a location beyond the manhole/pipe gasket.
 - (1) All plugs shall be adequately braced to prevent the plug or pipe from being dislodged and drawn into the manhole.
 - (2) A vacuum of at least 10-1/2 inches of mercury shall be drawn on the manhole. The valve on the vacuum line to the manhole shall be shut and the vacuum line disconnected. The vacuum line valve shall be opened and the vacuum adjusted to 10 inches of mercury.
 - (3) The pressure gauge shall be liquid filled having a 3.5 inch diameter face with a reading from zero to 30 inches of mercury. The test equipment shall be capable of having two gauges connected. The gauge supplied with the test equipment shall match the reading of a gauge furnished by the City/Design Professional.
 - (4) The time for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury shall not be less than the following values for the manhole to be considered as passing the vacuum test:

Manhole Depth	Time in Minutes
10 feet or less	2
10.1 to 15 feet	2.5
15.1 to 25 feet	3

- (5) If a manhole fails the vacuum test, the manhole shall be repaired with a City approved product and re-tested. This procedure shall be continued until all defects have been repaired and the manhole successfully passes the vacuum test.

3.07 WARRANTY

- A. The Contractor shall warranty all work during the Performance and Maintenance period. All defects including infiltration/exfiltration found during the warranty period shall be corrected immediately at no additional cost to the City.

END OF SECTION

SECTION 02937

GREEN STORMWATER INFRASTRUCTURE SITE ACTIVITY PLAN
12/22

PART 1 GENERAL

1.01 PURPOSE

- A. The purpose of Section 02937 Green Stormwater Infrastructure Site Activity Plan is to thoroughly plan construction sequencing, prepare, control and protect the green stormwater infrastructure sites, install the green stormwater infrastructure components (GSI Components) as defined in Section 00800 Supplementary Conditions, stabilize disturbed area, and establish the green stormwater infrastructure facilities.

1.02 MEASUREMENT AND PAYMENT

- A. The cost for development and implementation of the Site Activity Plan shall be subsidiary to other project administrative costs.

1.03 RELATED SECTIONS

- A. The sections listed below form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

00700	General Conditions
00800	Supplementary Conditions
02938	Green Stormwater Infrastructure Control and Protection
02939	Green Stormwater Infrastructure Earthwork
02948	Green Stormwater Infrastructure Media Liners
02953	Green Stormwater Infrastructure Non-Native Seeding and Sodding
02955	Green Stormwater Infrastructure Outlets
02956	Green Stormwater Infrastructure In-Situ Infiltration Testing
02957	Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

- A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Owner.

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION
(APWA)

APWA 2150

(2017) Division II Construction and
Material Specification, Erosion and
Sediment Control

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

SITE ACTIVITY PLAN

STORMWATER RUNOFF MANAGEMENT PLAN

SITE ACCESS AND UTILIZATION PLAN

GREEN STORMWATER INFRASTRUCTURE MAINTENANCE PLAN

QUALITY ASSURANCE QUALIFICATIONS

SD-10 Operation and Maintenance Data

SITE ACTIVITY PLAN UPDATES

1.06 QUALITY ASSURANCE

A. Qualifications

1. The Contractor shall develop and control the Site Activity Plan. The Contractor is responsible for installation and establishment of all green stormwater infrastructure components.
2. **QUALITY ASSURANCE QUALIFICATIONS**; submit qualifications with a minimum of three (3) references for related project work meeting the experience requirements and documentation of required certifications described in Part 1.06 of the following Sections: **02951** Green Stormwater Infrastructure Plants, **02952** Green Stormwater Infrastructure Native Grass and Wildflower Seeding, **02953** Green Stormwater Infrastructure Non-Native Seeding and Sodding,

B. Erosion and Sediment Control

1. The Contractor shall assume that implementation measures specified in the Site Activity Plan are independent of erosion and sediment control as required under the Owner's General Operating Permit with the Missouri Department of Natural Resources (Permit No: MOR100006).
2. The Contractor shall utilize **APWA 2150** in conjunction with Section **02938** Green Stormwater Infrastructure Control and Protection as part of this Site Activity Plan, and to the extent necessary to control and protect green stormwater infrastructure.

1.07 QUALITY CONTROL

- A. The Contractor shall be responsible for updating the Site Activity Plan during the project at an interval at least as frequent as every 30 days.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

- A. Not applicable.

PART 2 PRODUCTS

2.01 MATERIALS AND METHODS

- A. Materials and methods identified by Contractor in the Site Activity Plan are subject to approval by Owner prior to Part 3.

2.02 ALTERNATE SITE ACTIVITY PLAN MATERIALS OR METHODS

- A. The Contractor may propose alternative methods or materials for implementation of the Site Activity Plan during the project, provided that such methods provide equal or improved measures, as determined by the Owner. The Contractor shall submit documentation as requested by the Owner to evaluate the alternative.

PART 3 EXECUTION

3.01 PREPARATION

- A. A Site Activity Plan is a collection of documents which address stormwater runoff during construction, summarize means of access to the Site, identify the anticipated Site utilization and identify maintenance activities to be performed. The Contractor may combine the Site Activity Plan with requirements of APWA 2150, so long as the information required of both is clearly defined.
- B. All preconstruction submittals per Part 1.05, shall be submitted and accepted prior to commencement of Work.

3.02 INSTALLATION

- A. The Contractor shall develop and submit a SITE ACTIVITY PLAN within 30 days of Notice to Proceed which shall include but not be limited to the information defined per the following:
- B. GREEN STORMWATER INFRASTRUCTURE CONSTRUCTION SCHEDULE: Shall be included and maintained as part of the Project Schedule requirements per Section 00700. The Green Stormwater Infrastructure Construction Schedule shall include additional detail on specific phasing of construction activities for all GSI Components. The Green Stormwater Infrastructure Construction Schedule shall include but not be limited to timelines for all green stormwater infrastructure materials:
 - 1. Procurement of Material including lead times for all green stormwater infrastructure materials to be used onsite;
 - 2. Installation of GSI Components;

3. Bypass/Diversion of Stormwater Runoff;
 4. Green Stormwater Infrastructure Establishment, per Section 02957 Green Stormwater Infrastructure Establishment;
 5. Site Stabilization Activities
- C. **STORMWATER RUNOFF MANAGEMENT PLAN:** Shall include a markup to a Drawing(s) with appropriate existing and proposed topographic information with notes to fully illustrate drainage patterns on the Site, and the impact of drainage patterns on the green stormwater infrastructure installation and establishment. Stormwater Runoff Management Plan shall be integrated with control and protection requirements as specified by Section 02938 Green Stormwater Infrastructure Control and Protection to manage stormwater runoff within the Site. Stormwater runoff shall not be allowed to discharge into a green stormwater infrastructure facility until authorized by the Owner. Unless approved by the Owner, green stormwater infrastructure shall not be used for collection or conveyance of stormwater during construction. Contractor shall provide means and methods to control stormwater and protect green stormwater infrastructure through the Establishment Period, including installation, inspection, and maintenance. Stormwater Runoff Management Plan shall include but not be limited to the following:
1. Delineation of Green Stormwater Infrastructure Boundaries including all green stormwater infrastructure components;
 2. Site Drainage Patterns of stormwater runoff within the Site extents including means and methods to divert stormwater runoff away from green stormwater infrastructure extents;
 3. Control of Stormwater Runoff as defined in Section 02938 Green Stormwater Infrastructure Control and Protection;
 4. Protection of Green Stormwater Infrastructure as defined in Section 02938 Green Stormwater Infrastructure Control and Protection.
- D. **SITE ACCESS AND UTILIZATION PLAN:** Shall include a markup to a Drawing(s) with appropriate existing and proposed topographic information to fully illustrate access routes and storage locations to limit Site compaction and sedimentation to retain the integrity of the green stormwater infrastructure facility. The Contractor shall coordinate with all trades to prevent vehicle travel across green stormwater infrastructure footprint, as defined in the Drawing(s) and/or within green stormwater infrastructure components. Site Access and Utilization Plan shall include but not be limited to the following:
1. Project Phasing identified graphically with the intent of protecting the green stormwater infrastructure;
 2. Delineation of Green Stormwater Infrastructure Protection Boundaries per Section 02938 Green Stormwater Infrastructure Control and Protection;

3. Delineation of Tree Protection Zones including tree protection methods, addressing construction access within tree protection zones per Section 02949 Green Stormwater Infrastructure Existing Tree Protection;
 4. Anticipated Site Traffic Patterns including Site access, haul roads, delivery of materials and any temporary facilities;
 5. Anticipated Compaction Areas and Contractor's plans for decompaction and/or removal and replacement of any soils not planned for excavation;
 6. Maintenance of Utilities on Site during Work, including but not limited to, flow in sewers and water courses;
 7. Identification of Storage Areas for material and fuel storage, laydown/equipment staging, material stockpiling, and temporary facility areas;
 8. Material Schedule of how stored materials will be protected, including maximum permissible storage durations, and a description of how materials will be disposed of, if applicable;
 9. Description of the Equipment and Methods used to for excavation and placement with respective materials within the limits of the green stormwater infrastructure, in a manner that does not put the function of the green stormwater infrastructure facility at risk per Section 02939 Green Stormwater Infrastructure Earthwork.
- E. **GREEN STORMWATER INFRASTRUCTURE MAINTENANCE PLAN:** Shall include specific maintenance activities by green stormwater infrastructure component to be performed by the Contractor during the Establishment Period. Maintenance Plan shall include Contractor proposed frequency of activities identified on the attached Green Stormwater Infrastructure Maintenance Form to meet service level standards defined in Section 02957 Green Stormwater Infrastructure Establishment. Frequencies may include weekly, bi-weekly, monthly, quarterly, semi-annual, and annual maintenance activities, subject to approval by the Owner. The Contractor shall submit updated tasks and associated frequencies to meet Section 02957 Green Stormwater Infrastructure Establishment Part 3.06 as part of **SITE ACTIVITY PLAN UPDATES** for approval by Owner. Contractor shall use a standard template provided by Owner for Green Stormwater Infrastructure Maintenance Plan including but not limited to the following items:
1. Maintenance Activities proposed and associated frequency for each activity;
 2. Inspection Log will be recorded at the time of the activity and shall include the following:
 - a. Project identification including project name, contract number, inspector name and contact, date and time of inspection, and weather conditions at the time of inspection;

- b. Description of Tasks completed including objective of tasks, completion status, and related notes;
 - c. Cumulative rainfall during the previous 24 hours and the current week and observed water level in the green stormwater infrastructure footprint;
 - d. General inspection notes including but not limited to observed presence of mosquito larvae, animal burrowing, soil loss, sedimentation, invasive species, dying/dead plants, or general damage to the green stormwater infrastructure facility.
3. Material Log including quantities of materials used during inspection and maintenance activities. Material utilization documentation shall be recorded at the time of the activity.

3.03 TOLERANCES

- A. Not applicable.

3.04 DISPOSAL OF MATERIAL

- A. All debris and excess material shall be disposed of off Site by the Contractor in a manner complying with local ordinances and antipollution laws. Waste shall not be buried on the Site or disposed of into storm drains, sanitary sewers, streams or waterways.
- B. Materials may be temporarily stockpiled in an area within the limits of construction that do not disrupt construction activities, create any nuisances or safety hazards, or otherwise restrict access to the Site.
- C. Waste materials shall not be stored in areas designated for green stormwater infrastructure.
- D. Burning of waste materials shall not be allowed within the Site extents unless Contractor obtains a permit for open burning of trade wastes from the Air Pollution Control Section of Kansas City Health Department. Burning shall not be permitted within green stormwater infrastructure extents or tree protection zones.

3.05 PROTECTION

- A. Protection of green stormwater infrastructure facility per Section 02938 Green Stormwater Infrastructure Control and Protection shall be included by Contractor in the Site Activity Plan, through all phases of construction and during the Establishment Period.
- B. Areas serviced and/or maintained shall be promptly cleaned up on the same working day as Work is performed to a suitable condition. All equipment or tools used in the performance of this Work shall be removed from the location and any spillage swept and removed from the area the same working day as Work is performed.

- C. Protect landscape from damage. Maintain protection during the Work and to meet requirements of Section 02957 Green Stormwater Infrastructure Establishment. Landscape damaged during construction shall be treated, repaired, or replaced within 48 hours by Contractor, weather and planting season permitting and as approved by Owner.

3.06 MAINTENANCE

- A. SITE ACTIVITY PLAN UPDATES shall be submitted with each Application for Payment at not more than 30-day intervals through Establishment Period. Updates to the Site Activity Plan should reflect any changes to the schedule submittal, stormwater runoff management plan, Site access and utilization plan, or maintenance plans provided in previous Site Activity Plan submittals.
- B. Maintenance of Site Activity Plan shall be the responsibility of the Contractor until Certificate of Achievement of Full Operation, as defined in Section 00800 Supplementary Conditions.
- C. Green stormwater infrastructure facility shall be maintained per Part 3.02, E. through the duration of the Establishment Period.

3.07 POST-CONSTRUCTION TESTING

- A. Not applicable.

3.08 WARRANTY

- A. The Contractor shall be responsible for maintaining record copies of all material verification forms such as load tickets, invoices, sales receipts, and/or similar items to verify type and quantity of material delivered to the Site. The Owner reserves the right to request verification of any material delivered to the Site throughout the duration of the Establishment Period.

-- End of Section --



GREEN STORMWATER INFRASTRUCTURE SITE COMPONENTS

Bid #2

Project Title: Green Infrastructure Project 1-2 Paseo Gateway/KCU

Project Number: 81000975

Contractor:

Date:

See Designer Tabs

Filter Blank Rows

See Contractor Tabs

Clear Filter

GSI SITES	
GSI Site Name	GSI Practice
Paseo Gateway	Extended Wet Detention Basin
Paseo Gateway - continued	Extended Wet Detention Basin

GSI COMPONENTS	
<input checked="" type="checkbox"/>	GSI-1 Inlets
<input checked="" type="checkbox"/>	GSI-2 Energy Dissipation & Pollutant Rem
<input checked="" type="checkbox"/>	GSI-3 Above Grade Barriers
<input type="checkbox"/>	GSI-4 Permeable Pavements
<input checked="" type="checkbox"/>	GSI-5 Soil & Aggregate Media
<input checked="" type="checkbox"/>	GSI-6 Media Liners
<input checked="" type="checkbox"/>	GSI-7 Landscaping
<input checked="" type="checkbox"/>	GSI-8 Piping
<input checked="" type="checkbox"/>	GSI-9 Outlets
<input type="checkbox"/>	GSI-10 Storage Chambers
<input checked="" type="checkbox"/>	GSI-11 Detention/ Retention Basins
<input checked="" type="checkbox"/>	GSI-12 Pond Recirculation/Aeration System
<input checked="" type="checkbox"/>	GSI-13 Site Amenities
<input checked="" type="checkbox"/>	GSI-14 Control Structure/Baffle Box Clean



GREEN STORMWATER INFRASTRUCTURE CONSTRUCTION SCHEDULE

Bid #2

Project Title: Green Infrastructure Project 1-2 Paseo Gateway/KCU

Project Number: 81000975

Contractor:

Date:

Filter Blank Component Rows

Clear Filter

GSI Site Name	GSI Component Category	GSI Component Product/Description	Material Procurement Lead Time	Begin Installation Date	Complete Installation Date	Notes
Paseo Gateway	GSI-1 Inlets	Concrete structure				
	GSI-2 Energy Dissipation & Pollutant Removal	Riprap				
	GSI-2 Energy Dissipation & Pollutant Removal	Trash rack				
	GSI-2 Energy Dissipation & Pollutant Removal	Stone cobbles				
	GSI-3 Above Grade Barriers	Black steel fence				
	GSI-3 Above Grade Barriers	Back steel gate				
	GSI-3 Above Grade Barriers	Retaining walls				
	GSI-5 Soil & Aggregate Media	Pea gravel				
	GSI-5 Soil & Aggregate Media	Top soil				
	GSI-6 Media Liners	Impermeable clay liner				
	GSI-7 Landscaping	Turfgrass sod				
	GSI-7 Landscaping	Trees				
	GSI-7 Landscaping	Native plants				
	GSI-7 Landscaping	Irrigation				
	GSI-8 Piping	Concrete pipe				
	GSI-9 Outlets	CMAC Control Panel				
	GSI-9 Outlets	Slide gate				

GREEN STORMWATER INFRASTRUCTURE CONSTRUCTION SCHEDULE

Bid #2

GSI Site Name	GSI Component Category	GSI Component Product/Description	Material Procurement Lead Time	Begin Installation Date	Complete Installation Date	Notes
	GSI-9 Outlets	Actuator				
	GSI-9 Outlets	Level transmitter				
Paseo Gateway - continued	GSI-11 Detention/ Retention Basins	Fine grading				
	GSI-11 Detention/ Retention Basins	retaining walls				
	GSI-11 Detention/ Retention Basins	Limestone blocks				
	GSI-12 Pond Recirculation/Aeration System	Recirculation piping				
	GSI-12 Pond Recirculation/Aeration System	Pump Intake				
	GSI-12 Pond Recirculation/Aeration System	Pump vault				
	GSI-12 Pond Recirculation/Aeration System	Pump				
	GSI-12 Pond Recirculation/Aeration System	Pump stainer basket				
	GSI-13 Site Amenities	Pedestrian bridge footing				
	GSI-13 Site Amenities	Dock piers				
	GSI-13 Site Amenities	Weir veneer				
	GSI-13 Site Amenities	Weir cap				
	GSI-13 Site Amenities	Concrete Stairs				
	GSI-13 Site Amenities	Lighting				
	GSI-13 Site Amenities	Pedestrian bridge				
	GSI-13 Site Amenities	Concrete maintenance paths				
	GSI-13 Site Amenities	Wood dock				
	GSI-14 Control Structure Access	Control box				



GREEN STORMWATER INFRASTRUCTURE MAINTENANCE SCHEDULE

Bid #2

Project Title: Green Infrastructure Project 1-2 Paseo Gateway/KCU

Project Number: 81000975

Contractor:

Date:

Filter Applicable Components

See All Components

Sample Frequency

Filter Required Tasks Only

See All Tasks

Reset Tasks

GSI Component	Required Tasks	Frequency	Time of Year	Responsible Party	GSI Sites Included	Required
GSI-1 Inlets	Inspect for standing water, sediment, debris, trash, blockages, and structural integrity				Paseo Gateway	x
	Remove sediment, debris, trash, blockages					x
	Repair damage					x
GSI-2 Energy Dissipation & Pollutant Removal	Inspect integrity and record debris depth				Paseo Gateway	x
	Remove sediment, debris, and trash					x
	Repair erosion or other damage					x
	Replace riprap at end of pipes					x
	Refer to baffle box manufacturer O&M Manual for Baffle box maintenance requirements					x
GSI-3 Above Grade Barriers	Inspect structural integrity				Paseo Gateway	x
	Repair structural, erosion or other damage					x
GSI-5 Soil & Aggregate Media	Inspect during or immediately following rain event for trash, debris, flow blockages, erosion paths, and sediment				Paseo Gateway	x
	Remove sediment, debris, and trash					x
	Replace settled or excavated materials, repair erosion/damage					x
	Inspect for vegetation health, bare spots, weeds, overgrowth, unkept edges, and mulch coverage					x
	Apply pre-emergent herbicide					x
	Remove weeds					x

**GREEN STORMWATER INFRASTRUCTURE
MAINTENANCE SCHEDULE**

Bid #2

GSI Component	Required Tasks	Frequency	Time of Year	Responsible Party	GSI Sites Included	Required
GSI-7 Landscaping	Manage disease and pests				Paseo Gateway	x
	Remove algae and other aquatic weeds					x
	Maintain clean landscape edges					x
	Mow perimeter					x
	Mow turf grass areas					x
	Water vegetated areas					x
	Remove dead plants					x
	Install new plants					x
	Refresh mulch					x
	Remove debris and trash					x
	Prune trees for compact growth					x
	Trim plants near intersection					x
	Spring pruning of perennials and grasses					x
	Start up irrigation system (spring)					x
	shutdown/winterize irrigation system (late autumn)					x
GSI-8 Piping	Inspect for standing water, structural integrity, secure access points, record debris depth				Paseo Gateway	x
	Remove sediment, debris, trash, blockages					x
	Repair damage					x
GSI-9 Outlets	Inspect for sediment, trash, debris, blockages, structural integrity, and outlet control mechanism				Paseo Gateway	x
	Clear flow paths and remove sediment, trash, debris, and blockages					x
	Repair damage					x
	Refer to slide gate, actuator, and level transmitter manufacturer O & M manuals					x

**GREEN STORMWATER INFRASTRUCTURE
MAINTENANCE SCHEDULE**

Bid #2

GSI Component	Required Tasks	Frequency	Time of Year	Responsible Party	GSI Sites Included	Required
	Refer to control panel manufacturer O&M Manual					x
GSI-11 Detention/ Retention Basins	Inspect and record sediment depth				Paseo Gateway - continued	x
	Remove sediment when it is 1' below the pond outlet pipes					x
	Inspect side slopes for erosion					x
	Inspect for erosion around foundations in pond					x
	Repair erosion or other damage					x
	Remove floating debris and trash					x
GSI-12 Pond Recirculation/Aeration System	Inspect pump vault for structural integrity				Paseo Gateway - continued	x
	Remove debris and trash from pump intake pre-filter					x
	Remove blockage					x
	Empty pump strainer baskets					x
	Refer to pump strainer basket manufacturer O&M Manual, included in appendices, for additional					x
	Refer to pump manufacturer O&M Manual					x
	Refer to recirculating pump O&M Manual for maintenance on recirculation piping/discharge location					x
GSI-13 Site Amenities	Reseal pedestrian bridge and dock decking				Paseo Gateway - continued	x
	Keep sidewalks clear of debris, trash, and plant litter					x
	Reseal concrete sidewalks and stairs					x
GSI-14 Control Structure/Baffle Box Cleaning Access	Vacuum truck to park on Paseo Blvd and Cliff Drive and use hose to access control structures					x
	Utilize access gate along Paseo Blvd. for inspection and maintenance					x
	Vacuum truck to park on Paseo Blvd and Cliff Drive and use hose to access and clean baffle boxes					x



GREEN STORMWATER INFRASTRUCTURE
QUALITY ASSURANCE QUALIFICATIONS

Bid #2

Project Title: Green Infrastructure Project 1-2 Paseo Gateway/KCU

Project Number: 81000975

Contractor: _____

Date: _____

Specification Number	Specification Name	Experience Requirement	Responsible Prime/Subcontractor	Reference Number	Project Location	Owner Name	Contact Number	Completion Date	Dollar Value
02939	GSI Earthwork	<i>Landscaping/ GSI experience, within previous 3 years</i>		1					
				2					
				3					
02942	GSI Above Grade Barriers	<i>ACI Certified Flatwork Finisher and Technician</i>		Attach list of ACI certified flatwork finisher and technician personnel dedicated to project.					
02942	GSI Above Grade Barriers	<i>5 years experience with type of above grade barrier specified</i>		1					
				2					
				3					
02946	GSI Aggregate Media	<i>3 years GSI installation experience</i>		1					
				2					
				3					
02947	GSI Growing Media & Soil Amendments	<i>5 years landscaping/GSI installation experience</i>		1					
				2					
				3					
02949	GSI Existing Tree Protection	<i>Experienced tree service firm; certified Arborist</i>		1					
				2					
				Attach list of certified arborist personnel dedicated to project.					
02950	GSI Selective Vegetation Removal	<i>Horticulturist; landscape removal experience; Experienced tree service</i>		1					
				2					
				Attach list of certified horticulturist personnel dedicated to project.					

**GREEN STORMWATER INFRASTRUCTURE
QUALITY ASSURANCE QUALIFICATIONS**

Bid #2

Specification Number	Specification Name	Experience Requirement	Responsible Prime/Subcontractor	Reference Number	Project Location	Owner Name	Contact Number	Completion Date	Dollar Value
02951	GSI Plants	5 years landscaping/GSI experience		1					
				2					
				3					
02952	GSI Native Grass and Wildflower Seeding	5 years recent native seed install/establishment experience; B.S. in related		1					
				2					
				Attach list of field supervisor personnel dedicated to the project with B.S. degree in Horticulture, Botany, Soil Physics, Agronomy, General Agriculture, Agricultural or Biological Engineering, or related field.					
02953	GSI Non-Native Seeding and Sodding	Seeding/sodding experience		1					
				2					
				3					
02956	GSI In-Situ Infiltration Testing	Infiltration testing experience		1					
				2					
				3					

SECTION 02938

GREEN STORMWATER INFRASTRUCTURE CONTROL AND PROTECTION

12/22

PART 1 GENERAL

1.01 PURPOSE

- A. The purpose of Section 02938 Green Stormwater Infrastructure Control and Protection is to provide control of stormwater collection, conveyance, and runoff to green stormwater infrastructure installations within the Site, and to protect the green stormwater infrastructure during construction and through the Establishment Period, as defined in Section 02957 Green Stormwater Infrastructure Establishment.
- B. This section shall work in conjunction with the Stormwater Runoff Management Plan, as described in Section 02937 Green Stormwater Infrastructure Site Activity Plan.
- C. This section does not replace Owner or Contractor erosion and sediment control regulatory responsibilities. Green stormwater infrastructure for protection shall be identified graphically in the Drawings.
- D. Definitions
 - 1. Control of Stormwater Runoff: Measures, means, and methods of collection and conveyance of stormwater.
 - 2. Protection of Green Stormwater Infrastructure: Measures, means, and methods of preserving the condition, stormwater management capabilities, and general landscape health of green stormwater infrastructure.

1.02 MEASUREMENT AND PAYMENT

- A. The cost for development and implementation of green stormwater infrastructure control and protection shall be subsidiary to Work being performed.

1.03 RELATED SECTIONS

- A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937 Green Stormwater Infrastructure Site Activity Plan

02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

- A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless

otherwise indicated by [Design Professional](#).

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION
(APWA)

[APWA 2150](#)

(2017) Division II Construction and
Material Specification, Erosion and
Sediment Control

1.05 SUBMITTALS

- A. Not applicable.

1.06 QUALITY ASSURANCE

- A. Not applicable.

1.07 QUALITY CONTROL

- A. Temporary Control of Stormwater Runoff measures and temporary Protection of Green Stormwater Infrastructure means and methods shall be evaluated by the Contractor with Site Activity Plan updates, as defined in Section [02937](#) Green Stormwater Infrastructure Site Activity Plan, through the duration of the Establishment Period.
- B. Control and Protection measures evaluation and updates shall be recorded as follows for the specified periods:
 - 1. Stormwater Runoff Management Plan from the Notice to Proceed until Certificate of [Achievement of Full Operation](#) is issued.
 - 2. Green Stormwater Infrastructure Maintenance Plan from Certificate of [Achievement of Full Operation](#) through the Establishment Period.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

- A. Delivery, storage, and handling of materials associated with temporary Control of Stormwater Runoff and temporary Protection of Green Stormwater Infrastructure shall meet the requirements of [APWA 2150](#), or as identified in the Drawings.
- B. Manufactured products shall be delivered, stored and handled per the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials used for temporary Control of Stormwater Runoff and temporary Protection of Green Stormwater Infrastructure shall meet the requirements of [APWA 2150](#), or as identified in the Drawings. The Contractor may propose alternative materials, provided that such methods provide equal or improved measures of Control as determined by [Design Professional](#).

PART 3 EXECUTION

3.01 PREPARATION

- A. Prior to Work, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area.
- B. Contractor shall submit a description of measures for Control of Stormwater Runoff and Protection of Green Stormwater Infrastructure proposed for all green stormwater infrastructure components, as identified in the Runoff Management Plan as defined in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.02 INSTALLATION

- A. Contractor shall provide all specific temporary Control of Stormwater Runoff measures and temporary Protection of Green Stormwater Infrastructure, means and methods as defined by the Site Activity Plan.
- B. Control and protection shall be installed prior to Work performed upstream of any green stormwater infrastructure component per the schedule and sequencing identified in the Site Activity Plan.
- C. Control of Stormwater Runoff and Protection of Green Stormwater Infrastructure shall include the following minimum methods for applicable green stormwater infrastructure components:
 - 1. Flow control at green stormwater infrastructure inlets including protection of entire boundary for facilities accepting overland flow;
 - 2. Flow control at green stormwater infrastructure outlets;
 - 3. Sediment, debris and dust control within the green stormwater infrastructure.

3.03 TOLERANCES

- A. Not applicable.

3.04 DISPOSAL OF MATERIAL

- A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

- A. Not applicable.

3.06 MAINTENANCE

- A. The Contractor shall maintain temporary Control of Stormwater Runoff and Protection of Green Stormwater Infrastructure until the entire upstream area is fully stabilized.

- B. The Contractor shall be responsible for removing, replacing, and cleaning of control and protection measures throughout the duration of Work to maintain control and protection of the green stormwater infrastructure facility. Contractor shall inspect and repair control and protection measures and remove sediment after each storm event. Removed sediment shall not be deposited to an area that will contribute sediment to the GSI. Removed sediment shall be disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.
- C. Excessive damage or lack of Control of Stormwater Runoff and/or Protection of Green Stormwater Infrastructure will result in not meeting required service level of performance per Section 02957 Green Stormwater Infrastructure Establishment.

3.07 POST-CONSTRUCTION TESTING

- A. Not applicable.

3.08 WARRANTY

- A. Not applicable.

-- End of Section --

SECTION 02946

GREEN STORMWATER INFRASTRUCTURE AGGREGATE MEDIA
12/22

PART 1 GENERAL

1.01 PURPOSE

A. Aggregate media serves as one of the primary storage and filtration media in a green stormwater infrastructure facility. Voids in the media allow for stormwater to move through it, providing filtration, infiltration and storage functions. Aggregate media may also provide separation between coarser and finer media or provide structural stability for other components. Typically, aggregate layers should have decreasing particle size for each successive layer beneath it.

B. Definitions

1. Sand: A fine aggregate with particles finer than 3/8-inch sieve.
2. Storage Aggregate Media: Layer of double-washed aggregate, designed for stormwater storage. (In permeable pavement applications, storage aggregate media may also need to be designed for traffic load.)
3. Choker Course: Layer of double-washed aggregate, placed above the storage aggregate media, that filters out sediment particles prior to the storage aggregate media. (In permeable pavement applications, the choker course fills some of the surface voids of the larger sized storage aggregate media and stabilizes the surface prior to paving.)
4. Jointing Material: Double-washed aggregate, typically used to fill the joints between pavers.
5. Bedding Material: Thin layer of double-washed aggregate, typically used to level pavers.
6. Aggregate Base: Double-washed aggregate that provides structural support.

1.02 MEASUREMENT AND PAYMENT

- A. The Contractor shall provide all labor, material, and equipment required for aggregate media installation and testing, dictated in the Drawings and specified herein. Aggregate media shall be paid for by Unit Price and measured as follows:

Aggregate Media Measurement and Payment Units

Item	Unit
Sand	Cubic Yard

Item	Unit
Storage Aggregate	Cubic Yard
Choker Course	Cubic Yard
Jointing Material	Cubic Yard
Bedding Material	Cubic Yard
Aggregate Base	Cubic Yard

1.03 RELATED SECTIONS

- A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

- 02937 Green Stormwater Infrastructure Site Activity Plan
- 02938 Green Stormwater Infrastructure Control and Protection
- 02939 Green Stormwater Infrastructure Earthwork
- 02948 Green Stormwater Infrastructure Media Liners
- 02949 Green Stormwater Infrastructure Existing Tree Protection
- 02950 Green Stormwater Infrastructure Selective Vegetation Removal
- 02954 Green Stormwater Infrastructure Piping
- 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing
- 02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

- A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of Contract Documents, unless otherwise indicated by the [Design Professional](#).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
INTERNATIONAL

[ASTM C33/C33M](#) Standard Specification for Concrete Aggregates

1.05 SUBMITTALS

[SD-01 Preconstruction Submittals](#)

COMPLETION OF EXCAVATION NOTIFICATION

COMPLETION OF MEDIA INSTALLATION NOTIFICATION

SD-06 Test Reports

TESTING AGENCY CONTACT

SD-07 Certificates

SAND CERTIFICATION

STORAGE AGGREGATE MEDIA CERTIFICATION

CHOKER COURSE CERTIFICATION

JOINTING MATERIAL CERTIFICATION

BEDDING MATERIAL CERTIFICATION

AGGREGATE BASE CERTIFICATION

FINISHED GRADE SURVEY VERIFICATION

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Work shall be performed by a qualified installer whose work has resulted in the successful installation of green stormwater infrastructure facilities with a minimum of three (3) years recent experience.
- B. Testing Agency Qualifications
 - 1. An independent agency, acceptable to the authorities having jurisdiction, qualified for testing indicated.
 - 2. TESTING AGENCY CONTACT; All testing and analysis shall be at the expense of the Contractor. Submit all material testing results specified including the following contact information for the testing agency used:
 - a. Testing Agency Name;
 - b. Testing Agency Address;
 - c. Testing Agency Phone;
 - d. Material Tested.

1.07 QUALITY CONTROL

- A. Prior to procurement of material and delivery to the Site, the Contractor shall submit required testing results showing material is in conformance with this Specification.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

- A. Upon delivery to the Site, the Contractor shall submit material delivery receipts to the Owner for record. Delivery receipts must

include sufficient information to verify the material delivered is consistent with the approved submittals. If delivery receipts do not provide sufficient detail, the Contractor is responsible for verifying with the supplier that the correct material was delivered and providing the Owner with appropriate documentation.

- B. Contractor shall prevent mixing of dissimilar materials during unloading, stockpiling, and placement activities.
- C. All stockpiled material shall be covered and protected from contaminants, wind and water erosion. Stockpiles shall be located away from stormwater drainage paths and low-lying areas that collect water or are susceptible to erosion.
- D. Any graded aggregate that has been stored shall be remixed prior to delivery to Site to provide sufficient retention of gradation requirements.
- E. After delivery and prior to placement, the Owner reserves the right to collect samples of the aggregate media. If the media is found to be outside the parameters specified in Part 2, or outside the accepted testing submittals, the Contractor shall replace the media at no additional cost to the Owner.

PART 2 PRODUCTS
2.01 SAND

- A. Sand shall be clean, double washed fine aggregate meeting the following gradation requirements:

Sand Gradation Requirements Based on ASTM C33/C33M

Sieve Size	Passing (Percent by Weight)
9.5 mm (3/8 inch)	100
4.75 mm (No. 4)	95 - 100
2.36 mm (No. 8)	80 - 100
1.18 mm (No. 16)	50 - 85
600 um (No. 30)	25 - 60
300 um (No. 50)	5 - 30
150 um (No. 100)	0 - 10
75 um (No. 200)	0 - 3

- B. **SAND CERTIFICATION**; Submit certification that sand is clean, double washed and meeting the specified gradation requirements. Submittal shall include material supplier name, address and phone.

2.02 STORAGE AGGREGATE MEDIA

- A. Storage aggregate media shall be No. 2, No. 3, No. 56, No. 57, or No. 67 stone as specified in the Drawings.

- B. Storage aggregate media shall be double-washed, hard, durable, rounded, or sub-angular particles of proper size and gradation, and shall be free from sand, silt, clay, excess fines, and other deleterious materials.
- C. Storage aggregate media shall meet **ASTM C33/C33M** grading requirements for coarse aggregates as follows:

Storage Aggregate Gradation Requirements Based on **ASTM C33/C33M**

Sieve Size	Passing (Percent by Mass)				
	No. 2	No. 3	No. 56	No. 57	No. 67
75 mm (3 inch)	100	-	-	-	-
63 mm (2-1/2 inch)	90 - 100	100	-	-	-
50 mm (2 inch)	35 - 70	90 - 100	-	-	-
37.5 mm (1-1/2 inch)	0 - 15	65 - 70	100	100	-
25 mm (1 inch)	-	0 - 15	90 - 100	95 - 100	100
19 mm (3/4 inch)	0 - 5	-	40 - 85	-	90 - 100
12.5 mm (1/2 inch)	-	0 - 5	10 - 40	25 - 60	-
9.5 mm (3/8 inch)	-	-	0 - 15	-	20 - 55
4.75 mm (No. 4)	-	-	0 - 5	0 - 10	0 - 10
2.36 mm (No. 8)	-	-	-	0 - 5	0 - 5
1.18 mm (No. 16)	-	-	-	-	-
300 um (No. 50)	-	-	-	-	-
75 um (No. 200)	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2

- D. **STORAGE AGGREGATE MEDIA CERTIFICATION**; Submit certification that aggregate is clean, double washed and meeting the specified gradation. Submittal shall include supplier name, address and phone. Gradation reports shall include the following aggregates:

1. No. 2
2. No. 3
3. No. 56
4. No. 57
5. No. 67

2.03 CHOKER COURSE

- A. Choker course shall be No. 57, No. 7, No. 8, No. 89 or No. 9 stone, or sand, as specified in the Drawings.
- B. Choker course material shall be double-washed, hard, durable, particles of proper size and gradation, and shall be free from sand, silt, clay, excess fines, and other deleterious material.
- C. Stone Choker course shall meet **ASTM C33/C33M** gradation requirements as follows:

Choker Course Gradation Requirements Based on **ASTM C33/C33M**

Sieve Size	Passing (Percent by Mass)				
	No. 57	No. 7	No. 8	No. 89	No. 9
37.5 mm (1-1/2 inch)	100	-	-	-	-
25 mm (1 inch)	95 - 100	-	-	-	-
19 mm (3/4 inch)	-	100	-	-	-
12.5 mm (1/2 inch)	25 - 60	90 - 100	100	100	-
9.5 mm (3/8 inch)	-	40 - 70	85 - 100	90 - 100	100
4.75 mm (No. 4)	0 - 10	0 - 15	10 - 30	20 - 55	85 - 100
2.36 mm (No. 8)	0 - 5	0 - 5	0 - 10	5 - 30	10 - 40
1.18 mm (No. 16)	-	-	0 - 5	0 - 10	0 - 10
300 um (No. 50)	-	-	-	0 - 5	0 - 5
75 um (No. 200)	0 - 2	0 - 2	0 - 2	0 - 2	0 - 2

- D. Sand shall be per Part 2.01
- E. **CHOKER COURSE CERTIFICATION**; Submit certification that aggregate is clean, double washed and meeting the specified gradation. Submittal shall include supplier name, address and phone. Gradation reports shall include the following aggregates:

1. No. 57
2. No. 7
3. No. 8
4. No. 89
5. No. 9
6. Sand

2.04 JOINTING AND BEDDING MATERIAL

- A. Jointing and Bedding Material shall be No. 7, No. 8, No. 89, or No. 9 stone, or sand, as specified in the Drawings.
- B. Jointing and Bedding Material shall be double-washed, hard, durable particles of proper size and gradation, and shall be free from sand, silt, clay, excess fines, and other deleterious material.
- C. Jointing and Bedding Material shall meet **ASTM C33/C33M** gradation requirements as follows:

Jointing and Bedding Material Gradation Requirements Based on **ASTM C33/C33M**

Sieve Size	Passing (Percent by Mass)			
	No. 7	No. 8	No. 89	No. 9
19 mm (3/4 inch)	100	-	-	-
12.5 mm (1/2 inch)	90 - 100	100	100	-
9.5 mm (3/8 inch)	40 - 70	85 - 100	90 - 100	100
4.75 mm (No. 4)	0 - 15	10 - 30	20 - 55	85 - 100
2.36 mm (No. 8)	0 - 5	0 - 10	5 - 30	10 - 40
1.18 mm (No. 16)	-	0 - 5	0 - 10	0 - 10
300 um (No. 50)	-	-	0 - 5	0 - 5
75 um (No. 200)	0 - 2	0 - 2	0 - 2	0 - 2

- D. Sand shall be per Part 2.01.
- E. **JOINTING MATERIAL CERTIFICATION**; Submit certification that aggregate is clean, double washed and meeting the specified gradation. Submittal shall include supplier name, address and phone. Gradation reports shall include the following aggregates:

1. No. 7
2. No. 8
3. No. 89
4. No. 9
5. Sand

F. **BEDDING MATERIAL CERTIFICATION**; Submit certification that aggregate is clean, double washed and meeting the specified gradation. Submittal shall include supplier name, address and phone. Gradation reports shall include the following aggregates:

1. No. 7
2. No. 8
3. No. 89
4. No. 9
5. Sand

2.05 AGGREGATE BASE

- A. Aggregate base shall be No. 57, No. 7, or No. 8 stone as specified in the Drawings.
- B. Aggregate base material shall be double-washed, hard, durable particles of proper size and gradation, and shall be free from sand, silt, clay, excess fines, and other deleterious material
- C. Aggregate base shall meet **ASTM C33/C33M** gradation requirements as follows:

Aggregate Base Gradation Requirements Based on **ASTM C33/C33M**

Sieve Size	Passing (Percent by Mass)		
	No. 57	No. 7	No. 8
37.5 mm (1-1/2 inch)	100	-	-
25 mm (1 inch)	95 - 100	-	-
19 mm (3/4 inch)	-	100	-
12.5 mm (1/2 inch)	25 - 60	90 - 100	100
9.5 mm (3/8 inch)	-	40 - 70	85 - 100
4.75 mm (No. 4)	0 - 10	0 - 15	10 - 30
2.36 mm (No. 8)	0 - 5	0 - 5	0 - 10

1.18 mm (No. 16)	-	-	0 - 5
300 um (No. 50)	-	-	-
75 um (No. 200)	0 - 2	0 - 2	0 - 2

D. **AGGREGATE BASE CERTIFICATION**; Submit certification that aggregate is clean, double washed and meeting the specified gradation. Gradation reports shall include the following aggregates:

1. No. 57
2. No. 7
3. No. 8

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking

1. All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of the Contractor. The Contractor shall set construction stakes, establishing lines, slopes, elevations, and continuous profile grades. The Contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.
2. Contractor shall submit survey verification per Section 02939 Green Stormwater Infrastructure Earthwork.

B. **Project Conditions**: Project conditions shall be in accordance with Section 02939 Green Stormwater Infrastructure Earthwork.

C. Control and Protection

1. The footprint of the facility shall be kept reasonably dry and stormwater runoff to the facility shall be limited throughout the duration of Work to the maximum extent practicable. Prior to aggregate media placement activities, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified in the Runoff Management Plan, per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.
2. Blocking of curbs, curb cuts, inlets, and other temporary protection and control measures may be necessary to divert stormwater away from the green stormwater infrastructure facility during construction.
3. Unless designated for removal in the Drawings, protect all trees and vegetation per Sections 02949 Green Stormwater Infrastructure Existing Tree Protection and 02950 Green

Stormwater Infrastructure Selective Vegetation Removal,
respectively.

3.02 INSTALLATION

A. Excavation

1. Excavation methods used shall conform to Section 02939 Green Stormwater Infrastructure Earthwork.
2. Contractor shall conduct pre-construction infiltration testing per Section 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing after excavation is complete and prior to placement of soil and/or aggregate materials.
3. **COMPLETION OF EXCAVATION NOTIFICATION**; Notify the **Design Professional** within 48 hours of completion of excavation and prior to placement of all media layers.

B. Storage Aggregate Media and Choker Course Placement

1. Contractor shall place aggregate media in loose six (6) inch lifts, hand-raked to the lines and grades specified in the Drawings.
2. **COMPLETION OF MEDIA INSTALLATION NOTIFICATION**; Notify the **Design Professional** within 48 hours of completion of installation of each media layer and prior to placement of any additional aggregate media layers.

C. Jointing and Bedding Material Placement

1. Contractor shall place aggregate media in loose lifts, hand-raked to the lines and grades specified in the Drawings.
2. **COMPLETION OF MEDIA INSTALLATION NOTIFICATION**; Notify the **Design Professional** within 48 hours of completion of installation of each media layer and prior to placement of any additional aggregate media layers.

3.03 TOLERANCES

A. The Contractor must place materials based on the line and grade specified in the Drawings within the following tolerances:

1. Horizontal Tolerance: 0.1 feet
2. Vertical Tolerance: 0.1 feet

B. **FINISHED GRADE SURVEY VERIFICATION**; Submit survey of finished grade elevation to the **Design Professional** for review. Survey elevation shall be taken at specific point locations identified in the Drawings.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

- A. Immediately protect the aggregate media from contamination by undesired materials, trash, debris, water containing cement, clay, silt or materials that will alter the composition of the material by covering with plastic or plywood.
- B. The Contractor shall implement temporary control and protection measures per Section 02938 Green Stormwater Infrastructure Control and Protection to protect the green stormwater infrastructure facility until vegetation is fully established.
- C. All protection measures shall be submitted to the Design Professional for acceptance.

3.06 MAINTENANCE

- A. The Contractor shall maintain the green stormwater infrastructure facility and adjacent areas disturbed during construction through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment, and per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

- A. Owner reserves the right to collect a sample of the material for independent testing at any time during the Establishment Period.

3.08 WARRANTY

- A. The Contractor shall warrant the green stormwater infrastructure aggregate media through the duration of the Establishment Period.
- B. If at any time during the Establishment Period the media fails to infiltrate due to improper erosion control, maintenance activities or frequencies, the Contractor shall replace the media and fully restore the green stormwater infrastructure facility and any damaged components as determined by the Design Professional, at no additional cost to the Owner.

-- End of Section --

SECTION 02947

GREEN STORMWATER INFRASTRUCTURE GROWING MEDIA AND SOIL AMENDMENTS
12/22

PART 1 GENERAL

1.01 PURPOSE

- A. Growing media serves as one of the primary storage and filtration media in a green stormwater infrastructure facility that includes a well-mixed blend of soil to support vegetation. Voids in the media allow for stormwater to move through it, providing filtration, infiltration and storage function.
- B. This section also includes topsoil material and testing requirements and provisions for stripping of existing topsoil, removal of soil horizons, materials, substitutions and supplements, storage, redistribution, and fine grading. Approved topsoil shall be placed in all landscape areas to be planted unless otherwise specified in the Drawings.
- C. Definitions
 - 1. Growing Media: Soil that has been designed to meet specific engineering properties including, but not limited to infiltration, strength, and nutrient levels.
 - 2. Bioretention Soil Media: An engineered soil media with specific proportions of topsoil and compost designed to encourage infiltration and promote plant growth.
 - 3. Amended Native Soil Media: An engineered soil media where soil from the site has been modified to provide specific engineering properties.
 - 4. Topsoil: The uppermost layer of soil that contains a majority of the soil's organic matter and microorganisms, making the soil more amenable to sustaining vegetation. Topsoil can be used independently as a native site soil or imported material, or as a component of the bioretention soil media.
 - 5. Soil Amendment: A material added to a soil to improve its physical properties. Soil amendments included in this specification are compost, lime, and sulfur.
 - 6. Compost: A product resulting from the controlled biological decomposition of organic matter that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth. Compost can be used as a soil amendment, or as a component of bioretention soil media and/or amended native soil media.
 - 7. Lime: A soil amendment typically used to increase the pH of the growing media.
 - 8. Sulfur: A soil amendment used to decrease the pH of the

growing media.

9. Structural Soil Media: An engineered soil media that includes crushed stone to meet strength and stability requirements.

1.02 MEASUREMENT AND PAYMENT

- A. The Contractor shall provide all labor, material, and equipment required for growing media installation and testing, dictated in the Drawings and specified herein. Growing media shall be paid for by Unit Price and measured by Cubic Yard.

Soil Media Measurement and Payment Units

Bioretention Soil Media	Cubic Yard
Amended Native Soil	Cubic Yard
Topsoil	Cubic Yard
Compost	Cubic Yard
Lime	Pounds
Sulfur	Pounds
Structural Soil	Cubic Yard

1.03 RELATED SECTIONS

- A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

- 02937 Green Stormwater Infrastructure Site Activity Plan
- 02938 Green Stormwater Infrastructure Control and Protection
- 02939 Green Stormwater Infrastructure Earthwork
- 02946 Green Stormwater Infrastructure Aggregate Media
- 02951 Green Stormwater Infrastructure Plants
- 02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding

1.04 REFERENCE STANDARDS

- A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference

standards in effect as of date of Contract Documents, unless otherwise indicated by the [Design Professional](#).

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION
OFFICIALS (AASHTO)

[AASHTO T-99](#)

Standard Method of Test for
Moisture-Density Relations of Soils
Using a 2.5-kg (5.5-lb) Rammer and a
305-mm (12-in.) Drop

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
INTERNATIONAL

[ASTM D698](#)

Standard Test Methods for Laboratory
Compaction Characteristics of Soil
Using Standard Effort (12,400
ft-lbf/ft³ (600 kN-m/m³))

[ASTM D4972](#)

Standard Test Method for pH of Soils

[ASTM D5084](#)

Standard Test Methods for
Measurement of Hydraulic
Conductivity of Saturated Porous
Materials Using a Flexible Wall
Permeameter

[ASTM D5268](#)

Standard Specification for Topsoil
Used for Landscaping and
Construction Purposes

[ASTM D6913](#)

Standard Specification for
Particle-Size Distribution
(Gradation) of Soils Using Sieve
Analysis

[ASTM D7503](#)

Standard Test Method for Measuring
the Exchange Complex and Cation
Exchange Capacity of Inorganic
Fine-Grained Soils

[ASTM F1632](#)

Standard Test Method for Particle
Size Analysis and Shape Grading of
Golf Course Putting Green and Sports
Field Rootzone Mixes

[ASTM F1647](#)

Standard Test Methods for Organic
Matter Content of Athletic Field
Rootzone Mixes

TESTING METHODS FOR THE EXAMINATION OF COMPOSTING AND
COMPOST (TMECC)

[TMECC 2.02](#)

Laboratory Sample Preparation

[TMECC 3.09](#)

Total Solids and Moisture

TMECC 4.02	Nitrogen
TMECC 4.03	Phosphorus
TMECC 4.04	Potassium
TMECC 4.05	Secondary and Micro-Nutrient Content
TMECC 4.06	Heavy Metals and Hazardous Elements
TMECC 4.07	Other Elements
TMECC 4.10	Electrical Conductivity for Compost
TMECC 4.11	Electrometric pH Determinations for Compost
TMECC 5.02	Indicator Ratios
TMECC 5.07	Loss on Ignition Organic Matter Method
TMECC 5.08	Respirometry
TMECC 7.01	Coliform Bacteria

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)

USDA NRCS	Natural Resources Conservation Service, United States Department of Agriculture, Soil Classification System
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CODE OF FEDERAL REGULATIONS (CFR)

40 CFR	Title 40: Protection of Environment
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1.05 SUBMITTALS

SD-01 Preconstruction Submittals

COMPLETION OF EXCAVATION NOTIFICATION

SD-04 Samples

BIORETENTION SOIL MEDIA SAMPLE

AMENDED NATIVE SOIL MEDIA SAMPLE

TOPSOIL MEDIA SAMPLE

STRUCTURAL SOIL MEDIA SAMPLE

SD-06 Test Reports

TESTING AGENCY CONTACT

POST-CONSTRUCTION INFILTRATION TEST RESULTS

SD-07 Certificates

IMPORTED TOPSOIL CERTIFICATION

NATIVE TOPSOIL CERTIFICATION

COMPOST CERTIFICATION

BIORETENTION SOIL MEDIA CERTIFICATION

AMENDED NATIVE SOIL MEDIA CERTIFICATION

STRUCTURAL SOIL CERTIFICATION

FINISHED GRADE SURVEY VERIFICATION

SD-11 Closeout Submittals

MATERIAL VERIFICATION FORMS

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Work shall be performed by a qualified installer with a minimum five (5) years of recent experience whose work has resulted in the successful installation of green stormwater infrastructure facilities, establishment of plant life, grading and shaping of landscape features, planting beds, lakes and wetlands or other comparable amenities. Installer shall be skilled in the landscape trade and specifically skilled in green stormwater infrastructure. Contractor shall maintain a qualified field supervisor on site at all times.
- B. Testing Agency Qualifications
 - 1. An independent agency, acceptable to the authorities having jurisdiction, qualified for testing indicated. The testing agency shall be accredited by the American Association for Laboratory Accreditation and on the United States Golf Association (USGA) preferred labs list.
 - 2. **TESTING AGENCY CONTACT**; All testing and analysis shall be at the expense of the Contractor. Submit all material testing results specified including the following contact information for the testing agency used:
 - a. Testing Agency Name;
 - b. Testing Agency Address;
 - c. Testing Agency Phone;
 - d. Material Tested.

1.07 QUALITY CONTROL

- A. Prior to procurement of material and delivery to the Site, the Contractor shall submit required testing results showing material is in conformance with this Specification.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

- A. Upon delivery to the Site, the Contractor shall submit material delivery receipts to the Owner for record. Delivery receipts must include sufficient information to verify the material delivered is consistent with the approved submittals. If delivery receipts do not provide sufficient detail, the Contractor is responsible for verifying with the supplier that the correct material was delivered and providing the Owner with appropriate documentation.
- B. Contractor shall prevent mixing of dissimilar materials during unloading, stockpiling, and placement activities.
- C. Materials shall not be delivered to the site and work cannot proceed until the submittals have been accepted by the [Design Professional](#).
- D. All stockpiled material shall be covered and protected from contaminants, wind and water erosion. Stockpiles shall be located away from stormwater drainage paths and low-lying areas that collect water or are susceptible to erosion. Soil material shall not be stockpiled to a height exceeding four (4) feet, or for greater than 14 days. Where soil is stockpiled for greater than 14 days, the Contractor shall re-sample material and submit for testing per Part 1.05. Where stockpiling of topsoil for greater than 14 days is required, the [Design Professional](#) may approve the temporary distribution of the soil materials to an approved area within the Site. Such action will not permanently diminish the capability of the topsoil of the host site. The material shall be distributed in a condition more suitable for redistribution than if stockpiled long-term.
- E. The Contractor shall not handle, move, or work growing media when saturated or frozen.
- F. After delivery and prior to placement, the [Design Professional](#) reserves the right to collect samples of the growing media. If the media is found to be outside the parameters specified in Part 2, or outside the submitted test reports and/or certificates, the Contractor shall replace the media at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 BIORETENTION SOIL MEDIA

- A. Bioretention soil media shall be a mixture of topsoil and compost. Material tests are required for each individual component of the bioretention soil media prior to mixing as specified in Parts 2.03 and 2.04.
- B. Bioretention soil media shall be certified to meet the following mixing composition of each component:

Bioretention Soil Media Components

Component	Composition (Percent by Volume)
Topsoil	85 - 90
Compost	10 - 15

1. Topsoil component of the bioretention soil media shall be per Part 2.03. Contractor shall provide topsoil certification submittal for topsoil component prior to mixing of bioretention soil media.
 2. Compost component of the bioretention soil media shall be per Part 2.04. Contractor shall provide compost certification submittal for compost component prior to mixing of bioretention soil media.
- C. The bioretention soil media shall meet the following requirements after thorough mixing of all components:

Bioretention Soil Media Testing Requirements

Item	Criteria	Test Method (or Approved Equal)
Very Fine Sand	</= 15% by weight passing 0.10 millimeter (No. 140) sieve and retained on the 0.05 millimeter (No. 270) sieve	ASTM F1632
Silt (0.05 - 0.002 mm)+ Very Fine Sand	</= 40% by weight	ASTM F1632
Saturated Hydraulic Conductivity	>/= Design Professional to specify minimum value inches/hour	ASTM D5084 compacted to 85 percent density per ASTM D698
pH	6.0 - 8.0	ASTM D4972
Total Phosphorus (P2O5)	</= 60 ppm	TMECC 4.03-A
Total Potassium (K2O)	>/= 78 ppm	TMECC 4.04-A
Magnesium	>/= 32 ppm	TMECC 4.05-Mg
Conductivity (Soluble Salts)	</= 1.5 mmhos/cm (dS/m)	TMECC 4.10-A
Cation Exchange Capacity	>/= 15	ASTM D7503

- D. Design Professional to input mix design and individual component testing and submittal requirements and parameters if Design Professional elects to use bioretention soil media mix outside the parameters of this specification.

- E. **BIORETENTION SOIL MEDIA CERTIFICATION**; Submit testing agency certification that the bioretention soil media is within the parameters specified after thorough mixing of all components. Test reports shall be specific to bioretention soil media designated for project use and shall be dated within three (3) months of submittal date. At a minimum, test report shall include the following:
1. Material supplier name, address and phone;
 2. Percent by volume mix ratio of topsoil and compost components;
 3. Percent by volume composition of sand, silt, clay and organic matter;
 4. Percent by weight of very fine sand passing 0.10 millimeter (No. 140) sieve and retained on 0.05 millimeter (No. 270) sieve;
 5. Saturated Hydraulic Conductivity;
 6. pH;
 7. Total Phosphorus;
 8. Total Potassium;
 9. Magnesium;
 10. Conductivity (Soluble Salts);
 11. Cation Exchange Capacity.
 12. Design Professional to input additional submittal requirements, as applicable
- F. **BIORETENTION SOIL MEDIA SAMPLE**; One (1) gallon sample of soil mixture.

2.02 AMENDED NATIVE SOIL MEDIA

- A. Amended native soil may be used in place of bioretention soil media only when specified by the **Design Professional**.
- B. Amended native soil shall consist of 50Design Professional to input percent composition percent native topsoil meeting the requirements of Part 2.03 and 50 Design Professional to input percent composition percent compost meeting the requirements of Part 2.04.
- C. Native soil shall be mechanically scarified to the depth specified in the Drawings and thoroughly mixed with compost.
- D. **AMENDED NATIVE SOIL MEDIA CERTIFICATION**; Submit testing agency certification that the amended native soil media was mixed using specified by volume composition of native topsoil and compost.
- E. **AMENDED NATIVE SOIL MEDIA SAMPLE**; One (1) gallon sample of soil

mixture.

2.03 TOPSOIL

A. Imported Topsoil

1. Topsoil shall be fertile, friable and free of weeds, weed propagules, roots, rock, clay lumps, cinders, concrete, brick, plastics, metals, litter, debris, herbicides, and other deleterious material.
2. Topsoil requirements shall be consistent with loam, sandy clay loam, or clay loam soil properties.
3. Topsoil pH shall be between 6 and 8 per [ASTM D4972](#)
4. Topsoil shall be between 10 percent and 20 percent organic matter by dry weight per [ASTM F1647](#).
5. Topsoil gradation shall be determined per [ASTM D6913](#) or approved equal meeting the following gradation requirements:

Topsoil Gradation Requirements

Sieve Size	Passing (Percent by Weight)
19.0 mm (3/4 inch)	100
75 micrometers (No. 200)	0 - 25

6. Topsoil composition shall be determined per [ASTM F1632](#) or approved equal meeting the following requirements:

Topsoil Composition Requirements

Component (Particle Size)	Composition (Percent by Weight)
Sand (2.0 - 0.05 mm)	35 - 60
Silt (0.05 - 0.002 mm)	20 - 30
Clay (<0.002 mm)	20 - 35

7. **IMPORTED TOPSOIL CERTIFICATION;** At least 30 days prior to starting Work, submit testing agency certification that topsoil is within the parameters specified prior to mixing with other growing media components. Test reports shall be specific to topsoil media designated for project use and shall be dated within six (6) months of submittal date. At a minimum certification shall include the following:
 - a. Material supplier name, address and phone;
 - b. Gradation;
 - c. Percent by volume composition of sand, silt, clay and organic matter;

d. pH.

8. **TOPSOIL MEDIA SAMPLE**; One (1) gallon sample of soil mixture.

B. Native Topsoil

1. Native site topsoil may be used in lieu of imported topsoil if material meets the requirements of Part 2.03, A., and/or is deemed acceptable by the **Design Professional**.
2. Native topsoil may only be obtained from well-draining sites with onsite topsoil depths of four (4) inches or greater.
3. If native topsoil does not meet requirements of Part 2.03, A., native topsoil shall be amended at the Contractor's expense by amendments identified herein per testing agency recommendations.
4. If native topsoil is amended, resubmit test results after the topsoil mixture has been thoroughly blended. If the material is deemed unsuitable by the **Design Professional**, the material shall be reconditioned as recommended by the testing agency.
5. **NATIVE TOPSOIL CERTIFICATION**; At least 30 days prior to starting Work, submit testing agency certification that topsoil is within the parameters specified prior to mixing with other growing media components. At a minimum test report shall include the following:
 - a. Gradation;
 - b. Percent by volume composition of sand, silt, clay and organic matter;
 - c. pH;
 - d. Amendment product data and mix ratios.

2.04 SOIL AMENDMENTS

A. Compost

1. Compost shall be a locally sourced homogeneous and friable mixture of partially decomposed organic matter, resulting from composting.
2. Compost supplier shall participate in the US Composting Council's Seal of Testing Assurance (STA) Program, which requires testing through specific approved labs using test methods from the TMECC manual to characterize compost.
3. The Compost shall meet the following requirements:

Compost Testing Requirements

Characteristic	Acceptable Range	Test Method (or Approved Equal)
Stability (Carbon Dioxide Evolution Rate)	< 4 mg CO ₂ -C/g OM per day	TMECC 5.08-B
Oxygen Uptake	< 150 mg O ₂ /kg volatile solids per hour	TMECC 5.08-A
pH	6.0 - 8.5	TMECC 4.11-A
Conductivity (Soluble Salts)	< 4.0 mmhos/cm (dS/m)	TMECC 4.10-A
Particle Size	98 percent passing 3/8" (10 mm) sieve (by dry weight)	TMECC 2.02-B
Organic Matter	30 percent - 60 percent (by mass)	TMECC 5.07-A
Foreign Matter*	< 1 percent (by mass)	*Foreign matter is defined as any matter over 2 mm in any dimension that results from human intervention and having organic or inorganic constituents such as metal, glass, clay and synthetic polymers (i.e. plastic and rubber).
Trace Metals	< Ceiling Concentrations	40 CFR 503.13 or TMECC 4.06
Moisture Content (percent dry weight)	40 percent - 60 percent	TMECC 3.09-A
Salmonella (Pathogen)	< 3 MPN/4 grams (by dry weight)	TMECC 7.01-B
Fecal Coliform Bacteria (Pathogen)	< 1,000 MPN/gram (by dry weight)	TMECC 7.01-B

4. **COMPOST CERTIFICATION**; Submit testing agency certification that compost is within the parameters specified prior to mixing with other growing media components. Test reports shall be specific to media designated for project use and shall be dated within six (6) months of submittal date. At a minimum test report shall include the following:

- a. Material supplier name, address, phone, and verification of participation in the STA Certified

Compost program;

- b. Stability (Carbon Dioxide Evolution Rate);
- c. Oxygen Uptake;
- d. pH;
- e. Conductivity (Soluble Salts);
- f. Particle Size;
- g. Organic Matter;
- h. Foreign Matter;
- i. Trace metals;
- j. Moisture Content;
- k. Salmonella;
- l. Fecal Coliform Bacteria.

B. Lime shall be ground agricultural limestone, a minimum of 90 percent passing the 2.36 millimeter (No. 8) sieve and a minimum of 65 percent calcium carbonate equivalent.

C. Sulfur

- 1. Sulfur shall be granular and biodegradable, containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through 3.35 millimeter (No. 6) sieve and a maximum of ten (10) percent passing through 425 micrometer (No. 40) sieve.
- 2. Iron sulfate shall be granulated ferrous sulfate, containing a minimum of 20 percent iron and a minimum of ten (10) percent sulfur.
- 3. Aluminum sulfate shall be commercial grade and unadulterated.

D. Not applicable

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking

- 1. All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of the Contractor. The Contractor shall set construction stakes, establishing lines, slopes, elevations, and continuous profile grades. The Contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.
- 2. Contractor shall submit survey verification per Section 02939

Green Stormwater Infrastructure Earthwork.

B. Project Conditions

1. Project conditions shall be in accordance with Section 02939 Green Stormwater Infrastructure Earthwork.
2. When conditions detrimental to the proper growth of plant material are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Design Professional prior to installation.

C. Control and Protection

1. The footprint of the facility shall be kept reasonably dry and stormwater runoff to the facility shall be limited throughout the duration of Work to the maximum extent practicable. Prior to growing media placement activities, the perimeter of the Site shall be protected against runoff and sedimentation from contributing drainage area with measures identified in the Runoff Management Plan, per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.
2. Blocking of curbs, curb cuts, inlets, and other temporary protection and control measures may be necessary to divert stormwater away from the Site during construction.
3. Unless designated for removal in the Drawings, protect all trees and vegetation per Sections 02949 Green Stormwater Infrastructure Existing Tree Protection and 02950 Green Stormwater Infrastructure Selective Vegetation Removal.

3.02 INSTALLATION

A. Excavation

1. Excavation methods used shall conform to Section 02939 Green Stormwater Infrastructure Earthwork.
2. Contractor shall conduct pre-construction infiltration testing per Section 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing after excavation is complete and prior to placement of soil and/or aggregate materials.
3. COMPLETION OF EXCAVATION NOTIFICATION; Notify the Design Professional within 48 hours of completion of excavation and prior to placement of all media layers.

B. Bioretention Soil Media Placement

1. The growing media shall have a moisture content low enough to prevent visible clumping and compaction during placement.
2. Contractor shall place engineered soil media in horizontal lifts not to exceed six (6) inches for the entire green stormwater infrastructure facility. Each lift shall be lightly watered to encourage settling.

3. If the growing media becomes contaminated with undesired materials during construction, the undesired materials shall be removed and replaced with uncontaminated growing media at the Contractor's expense. If the Design Professional deems that any of the material placed is not in conformance with this specification, then the Contractor shall remove the material in question and replace with clean material meeting requirements of part 2.01.
4. To account for settling, Contractor shall install a two (2) to three (3) inch surcharge lift of growing media over the entire green stormwater infrastructure facility. Surcharge lift shall be allowed to settle for a minimum of 48 hours prior to bringing green stormwater infrastructure to finished grade.
5. Mechanical compaction of the growing media is not permitted. Compaction of the growing media shall not exceed 85 percent density per ASTM D698.

C. Amended Native Soil Media Placement

1. The growing media shall have a moisture content low enough to prevent visible clumping and compaction during placement.
2. Native soil shall be mechanically scarified to the depth specified in the Drawings and thoroughly mixed with compost.
3. If the growing media becomes contaminated with undesired materials during construction, the undesired materials shall be removed and replaced with uncontaminated growing media at the Contractor's expense. If the Design Professional deems that any of the material placed is not in conformance with this specification, then the Contractor shall remove the material in question and replace with clean material meeting requirements of part 2.01.
4. Mechanical compaction of the growing media is not permitted. Compaction of the growing media shall not exceed 85 percent density per ASTM D698.

D. Topsoil Placement

1. Topsoil that is a component of the bioretention soil media shall be mixed as specified per part 2.01.
2. Stripping of native topsoil shall be as follows:
 - a. The full depth of topsoil shall be stripped from all grading areas, using a phased approach where appropriate.
 - b. Topsoil up to a minimum depth of six (6) inches or the entire "A" horizon of the applicable soil series being disturbed as published in the Published County Soil Survey or other detailed soil survey, shall be stripped and stockpiled from all areas to be excavated or filled.

3. Imported or native topsoil to be used independently shall be placed on the as follows:
 - a. Scarify subgrade to a depth of six (6) inches.
 - b. Place Topsoil to a minimum depth of six (6) inches. Limit excavation to areas that will be installed within the same day.
 - c. Contractor shall not leave pits open and will be required to clearly mark or warn the public of their locations.
 - d. Backfill topsoil with amendments thoroughly mixed to a minimum depth to meet grades as shown in the Drawings. Do not backfill or excavate if fill or sub-grade is frozen.
4. Topsoil Distribution
 - a. Place topsoil in three (3) inch lifts. Achieve an approximately uniform, stable thickness, finished grading, and surface-water drainage systems. Lightly water topsoil after placement to encourage settling.
 - b. Prevent excess compaction of the materials.
 - c. Protect the materials from wind and water erosion before and after seeding or planting.
 - d. Maintain positive surface drainage. Fill low spots with topsoil except where depressions are indicated in the Drawings.
 - e. Manually spread topsoil around trees, permanent structures, and paving to prevent damage to adjacent trees and structures.

E. Structural Soil Media Placement

1. Do not proceed with installation of structural soil material until all walls, curb, footings, and utility work in the area have been installed unless Site elements depend on structural soil for foundation support. Do not over-excavate compacted subgrades of adjacent pavement or structures.
2. Underdrain shall be installed within aggregate media as specified in the Drawings and per Sections 02946 Green Stormwater Infrastructure Aggregate Media and 02954 Green Stormwater Infrastructure Piping.
3. Install Structural Soil in six (6) inch lifts and compact each lift. Compact all materials to peak dry density from a standard compaction curve per AASHTO T-99. No compaction shall occur when moisture content exceeds maximum defined in the Structural Soil Media Composition Requirements specified herein. Delay compaction 48 hours if moisture content exceeds maximum allowable and protect Structural Soil during delays in compaction with plastic or plywood.

3.03 TOLERANCES

- A. The Contractor must place materials based on the line and grade specified in the Drawings within the following tolerances:
 - 1. Horizontal Tolerance: 0.1 feet
 - 2. Vertical Tolerance: 0.1 feet
- B. **FINISHED GRADE SURVEY VERIFICATION**; Submit survey of finished grade elevation to the **Design Professional** for review. Survey elevation shall be taken at specific point locations identified in the Drawings.

3.04 DISPOSAL OF MATERIAL

- A. Materials no longer in use shall be removed and disposed of by Contractor per Section **02937** Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

- A. Immediately protect the growing media from contamination by undesired materials, trash, debris, water containing cement, clay, silt or materials that will alter the composition of the material by covering with media liner, plastic or plywood.
- B. The Contractor shall implement temporary control and protection measures per Section **02938** Green Stormwater Infrastructure Control and Protection to protect the Site until vegetation is fully established.
- C. Vegetation shall be installed immediately following installation of topsoil per Section **02951** Green Stormwater Infrastructure Plants, and **02952** Green Stormwater Infrastructure Native Grass and Wildflower Seeding and, and/or **02953** Green Stormwater Infrastructure Non-Native Seeding and Sodding. If Site conditions limit vegetation of facility immediately following installation of soil, Contractor shall implement additional measures to cover and protect the growing media for duration of exposure.
- D. All protection measures shall be submitted to the **Design Professional** for acceptance.
- E. Fully clean all non-vegetated areas where growing media has deposited, including but not limited to pavement.

3.06 MAINTENANCE

- A. The Contractor shall maintain the green stormwater infrastructure facility and adjacent areas disturbed during construction through the Establishment Period as defined in Section **02957** Green Stormwater Infrastructure Establishment, and per the schedule identified in Section **02937** Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

- A. The Contractor shall conduct post-construction infiltration testing per Section 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing at up to three (3) testing locations once all soil and aggregate media has been installed and prior to installation of vegetation. Contractor shall conduct testing within ten (10) days of installation of surface media and submit POST-CONSTRUCTION INFILTRATION TEST RESULTS.
- B. Average post-construction infiltration rate shall meet or exceed pre-construction infiltration rates and shall be no less than 0.25 inches per hour. Design Professional to specify design infiltration rate with no single test less than 0.25 inches per hour. Design Professional to specify design infiltration rate.
- C. Owner reserves the right to collect a sample of the material for independent testing at any time during the Establishment Period.
- D. Growing media that fails to meet post-construction infiltration requirements shall be remediated as recommended by the Design Professional. Amended media shall then be retested per Section 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing. This procedure shall be repeated by the Contractor until the media meets post-construction infiltration requirements at the discretion of the Design Professional.

3.08 WARRANTY

- A. MATERIAL VERIFICATION FORMS; At least 10 working days prior to the Final Inspection, the Contractor shall submit copies of material verification forms, such as load tickets, invoices, sales receipts, and/or similar items to verify quantity of material delivered to the site.
- B. The Contractor shall warrant the green stormwater infrastructure growing media through the duration of the Establishment Period. A random five (5) gallon sample of growing media may be collected by the Design Professional anytime during the first year after placement for testing and verification.
- C. If at any time during the Establishment Period soil loss occurs or media fails to infiltrate due to improper erosion control, maintenance activities or frequencies, the Contractor shall replace the media and fully restore the green stormwater infrastructure facility and any damaged components as determined by the Design Professional, at no additional cost to the Owner.

-- End of Section --

SECTION 02948

GREEN STORMWATER INFRASTRUCTURE MEDIA LINERS

12/22

PART 1 GENERAL

1.01 PURPOSE

- A. Media liners are synthetic or clay liners used to provide stabilization and/or separation of soil and aggregate media within a green stormwater infrastructure facility, and to limit mixing of media layers. Media liners can be permeable or impermeable, allow or prevent stormwater infiltration, stabilize media layers, and protect adjacent infrastructure.

1.02 MEASUREMENT AND PAYMENT

- A. The Contractor shall provide all labor, material, and equipment required to install media liners as depicted in the Drawings and as specified herein. Media liners shall be measured in the units of Square Yards and shall be paid for by Unit Price.

1.03 RELATED SECTIONS

- A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

- 02937 Green Stormwater Infrastructure Site Activity Plan
- 02938 Green Stormwater Infrastructure Control and Protection
- 02939 Green Stormwater Infrastructure Earthwork
- 02946 Green Stormwater Infrastructure Aggregate Media
- 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments
- 02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

- A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design Professional.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
INTERNATIONAL

ASTM D698

Standard Test Methods for Laboratory
Compaction Characteristics of Soil
Using Standard Effort (12,400
ft-lbf/ft³ (600 kN-m/m³))

ASTM D751	Standard Test Methods for Coated Fabrics
ASTM D1238	Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
ASTM D3786/D3786M	Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
ASTM D4491/D4491M	Standard Test Method for Water Permeability of Geotextiles by Permittivity
ASTM D4533/D4533M	Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D4632/D4632M	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
ASTM D5084	Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
ASTM D5884/D5884M	Standard Test Method for Determining Tearing Strength of Internally Reinforced Geomembranes
ASTM D5885/D5885M	Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry
ASTM D6241	Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D7003/D7003M	Standard Test Method for Strip Tensile Properties of Reinforced Geomembranes
ASTM D7004/D7004M	Standard Test Method for Grab Tensile Properties of Reinforced Geomembranes

ASTM D7238 Standard Test Method for Effect of
Exposure of Unreinforced Polyolefin
Geomembrane Using Fluorescent UV
Condensation Apparatus

ASTM E96/E96M Standard Test Method for Water Vapor
Transmission of Materials

GEOSYNTHETIC RESEARCH INSTITUTE (GRI)

GRI GM 22 Standard Specification for Test
Methods, Required Properties and
Testing Frequencies for Scrim
Reinforced Polyethylene Barriers
Used in Exposed Temporary
Applications

GRI GT 13(a) Standard Specification for Test
Methods and Properties for
Geotextiles Used as Separation
between Subgrade Soil and Aggregate

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

MEDIA LINER PLACEMENT NOTIFICATION

SD-03 Product Data

MANUFACTURER INFORMATION

SD-06 Test Reports

IMPERMEABLE CLAY LINER FIELD VERIFICATION

SD-07 Certificates

MANUFACTURER QUANTITY CERTIFICATION

MANUFACTURER QUALITY CERTIFICATION

IMPERMEABLE CLAY LINER MATERIAL CERTIFICATION

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. The manufacturer shall have previously demonstrated ability to produce the media liner by having at least two (2) years continuous experience in the manufacturing of the media liner and successfully manufactured a minimum of ten (10) million square feet of the media liner.
2. MANUFACTURER QUANTITY CERTIFICATION; Submit manufacturer certification verifying a minimum of 10 million square feet of the media liner being manufactured as of the date of the submittal.

3. **MANUFACTURER QUALITY CERTIFICATION**; Submit manufacturer certification, verifying that the quality of the resin used to manufacture the media liner meets the requirements specified in Part 2.

1.07 QUALITY CONTROL

- A. Quality control certificates, signed by the manufacturer's quality assurance manager, shall be documented for each roll delivered to the Site and shall include the following:
 1. Manufacturer Name;
 2. Product Identification;
 3. Thickness;
 4. Roll Dimension;
 5. Roll Number;
 6. Lot Number;
 7. Sampling Procedures;
 8. Sampling Frequency;
 9. Test Results of conformance sampling.
- B. Conformance sampling shall be completed at a minimum frequency of one (1) sample every 50,000 square feet of media liner delivered. If the results of any test do not conform to the requirements of this specification, retesting to determine conformance or rejection shall be done in accordance with the manufacturing protocol as set forth in the manufacturer's quality assurance at no additional cost to the Owner.
- C. **MANUFACTURER INFORMATION**; Submit manufacturer instructions for each product, including, but not limited to fabrication, delivery and handling, installation and protection. Include the following manufacturer information:
 1. Supplier name, address and phone;
 2. Documents for material warranty;
 3. Documents for media liner workmanship, including, but not limited to batch identifications and associated roll numbers;
 4. Origin, identification and production information for the resin used in the media liner, including, but not limited to the supplier's name, brand name and production plant for the resin;
 5. Media liner properties including but not limited to weight, grab tensile strength, grab tensile elongation, tongue tear, California Bearing Ratio (CBR) puncture, bursting strength, water vapor transmission, high pressure oxidative induction

time, and ultraviolet resistance as specified in Part 2.

6. Product warranty documentation

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

- A. Upon delivery to the Site, the Contractor shall submit material delivery receipts to the Owner for record. Delivery receipts must include sufficient information to verify the material delivered is consistent with the approved submittals. If delivery receipts do not provide sufficient detail, the Contractor is responsible for verifying with the supplier that the correct material was delivered and providing the Owner with appropriate documentation.
- B. Materials shall be wrapped with a protective cover to avoid damage due to handling, water, sunlight, and contaminants. The Contractor shall be responsible for replacement of damaged or unacceptable material as identified by the [Design Professional](#) at no additional cost to the Owner.
- C. During storage, the media liner shall be elevated off the ground and adequately covered to protect them from dirt, grease, moisture, mud, mechanical abrasions, and excessive heat that may damage the media liner material. The Contractor shall avoid dragging the media liner on rough soil subbase. Media liner shall be stored on a prepared surface (not wooden pallets) and shall not be stacked more than two (2) rolls high.

PART 2 PRODUCTS

2.01 IMPERMEABLE CLAY LINER

- A. Impermeable clay liner shall be [provided by the City](#).
- B. Impermeable clay liner shall have a hydraulic conductivity less than or equal to [Design Professional](#) to specify allowable hydraulic conductivity, as measured per [ASTM D5084](#), when compacted at 95% Standard proctor.
- C. [IMPERMEABLE CLAY LINER MATERIAL CERTIFICATION](#); Submit testing agency report at least 60 days prior to installation demonstrating that Impermeable Clay Liner meets requirements specified. At a minimum test report shall include the following:
 - 1. Material supplier name, address, and phone
 - 2. Compaction Curve per [ASTM D698](#)
 - 3. Maximum Dry Unit Weight per [ASTM D698](#)
 - 4. Optimum water content per [ASTM D698](#)
 - 5. Hydraulic Conductivity per [ASTM D5084](#) in cm/s at specified compaction per [ASTM D698](#) at water content less than optimum water content
 - 6. Hydraulic Conductivity per [ASTM D5084](#) in cm/s at specified compaction per [ASTM D698](#) at water content greater than optimum water content

PART 3 EXECUTION

3.01 PREPARATION

- A. Surveying and Staking: All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of the Contractor. The Contractor shall set construction stakes, establishing lines, slopes, elevations, and continuous profile grades. The Contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.
- B. Soil Preparation: Remove and dispose of stones larger than one (1) inch in any dimension, sticks, roots, litter, debris, extraneous matter per Part 3.04.
- C. Project Conditions
 - 1. Media liner placement shall not proceed at an ambient temperature below 32 degrees Fahrenheit or above 100 degrees Fahrenheit unless authorized, in writing, by the [Design Professional](#). Media liner placement shall not be performed during precipitation, in an area of ponded water, or excessive winds that adversely affect the media liner placement.
 - 2. [MEDIA LINER PLACEMENT NOTIFICATION](#); Notify the [Design Professional](#) at least 48 hours prior to placement of media liner.
- D. Control and Protection: Prior to installation, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified per Sections [02937 Green Stormwater Infrastructure Site Activity Plan](#) and [02938 Green Stormwater Infrastructure Control and Protection](#).

3.02 INSTALLATION

- A. Excavation: Facility shall be excavated to the dimensions, side slopes, and elevations specified in the Drawings.
- B. Anchor Trench: Anchor trench shall be constructed as shown in the Drawings or as recommended by the manufacturer.
- C. Liner Placement
 - 1. Impermeable Clay Liner
 - a. Impermeable clay liner shall be installed in accordance with manufacturer's recommendations.
 - b. Install impermeable clay liner in up to 12-inch lifts and compact each lift.
 - c. Compact each lift to attain a hydraulic conductivity required based on results of [IMPERMEABLE CLAY LINER MATERIAL CERTIFICATION](#).

- d. **IMPERMEABLE CLAY LINER FIELD VERIFICATION**; Conduct at least one (1) nuclear density test per **ASTM D6938** for every 5,000 square feet of impermeable clay liner installed at the time of installation. Submit report demonstrating that installed impermeable clay liner meets requirements specified. At a minimum test report shall include the following:
 - 1) Material supplier name, address, and phone
 - 2) Operator name, organization, address, and phone
 - 3) Test location transcribed on Drawing with Test Number or Test Identification
 - 4) Dry density for each test conducted
 - 5) Water content for each test conducted
 - 6) Percent compacted for each test conducted
- e. Impermeable clay liner that is damaged or does not meet requirements shall be repaired or replaced immediately by the Contractor at no additional cost to the Owner.

- D. Backfill: Install over media liner to finished grade per Section , as shown in the Drawings.

3.03 TOLERANCES

- A. The Contractor shall place product(s) based on the line and grade specified in the Drawings within the following tolerances:
 - 1. Horizontal Tolerance: 0.1 feet
 - 2. Vertical Tolerance: 0.1 feet

3.04 DISPOSAL OF MATERIAL

- A. Materials no longer in use shall be removed and disposed of by Contractor per Section **02937** Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

- A. The Contractor shall implement temporary control and protection measures per Section **02938** Green Stormwater Infrastructure Control and Protection to protect the green stormwater infrastructure facility until the entire upstream tributary area is fully stabilized.
- B. All protection measures shall be submitted to the **Design Professional** for acceptance.

3.06 MAINTENANCE

- A. The Contractor shall maintain the green stormwater infrastructure facility per Section **02957** Green Stormwater Infrastructure

Establishment, and per the schedule identified Section 02937
Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

- A. The Contractor shall furnish the Owner with a written warranty from the manufacturer/supplier (Warrantor) that shall warrant the material against manufacturing defects and material degradation.
- B. Should a defect occur, which is covered under warranty, the Warrantor shall bear all costs for the repair, relocation and replacement of the media liner. The Contractor shall be responsible for coordination with the Warrantor for replacement of any defective products or material.

-- End of Section --

SECTION 02949

GREEN STORMWATER INFRASTRUCTURE EXISTING TREE PROTECTION
12/22

PART 1 GENERAL

1.01 PURPOSE

- A. This Section includes the protection and trimming of existing trees that interfere with, or are affected by, execution of the Work, whether temporary or permanent construction.
- B. Definitions
1. Tree Protection Zone: Area surrounding individual trees or groups of trees to remain during Work, and defined by the Drip Line of individual trees or the perimeter Drip Line of groups of trees, unless otherwise indicated.
 2. Drip Line: Area defined by the outermost circumference of the tree canopy.
 3. Diameter Breast Height (DBH): The outside bark diameter of an existing tree measured 4.5 feet above the ground, on the uphill side of the tree.
 4. Caliper: Diameter of the stem or trunk of a tree measured above existing grade. For trees up to 4.5 inches in diameter, Caliper shall be measured six (6) inches above existing grade. If the Caliper measured at six (6) inches is greater than 4.5 inches, the Caliper shall be measured at 12 inches above existing grade.
 5. Tree Removal: Demolition of existing tree, including cutting down the tree, grubbing the stump, and removing and disposing of the demolished tree material from the Site.

1.02 MEASUREMENT AND PAYMENT

- A. The Contractor shall provide all labor, material, and equipment required for protection of existing trees, dictated in the Drawings and specified herein. Existing tree protection shall be paid for by Unit Price Lump Sum Price and measured as follows:

Existing Tree Protection Measurement and Payment Units

Item	Unit
Tree Protection Fencing	Linear Feet
Tree Removal	Each
Tree Replacement	Each 2-inch caliper replacement tree

1.03 RELATED SECTIONS

- A. The following sections form a part of this specification to the

extent referenced. The specifications are referred to within the text by the numeric designation only.

- 02937 Green Stormwater Infrastructure Site Activity Plan
- 02946 Green Stormwater Infrastructure Aggregate Media
- 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments
- 02948 Green Stormwater Infrastructure Media Liners
- 02951 Green Stormwater Infrastructure Plants
- 02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding
- 02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

- A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by [Design Professional](#) Owner.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- | | |
|------------|--------------------------------------------------------------------------------------------|
| ANSI Z60.1 | The American Standard for Nursery Stock |
| ANSI A300 | Tree Care Operations: Standard Practices for Tree, Shrub and Other Woody Plant Maintenance |

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

TREE REPLACEMENT PLAN

TREE REMOVAL IDENTIFICATION

TREE PROTECTION PRE-CONSTRUCTION CONFERENCE

1.06 QUALITY ASSURANCE

- A. Tree Service Qualifications: Work shall be performed by an experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Work and that will assign an experienced, qualified Arborist to the Work. The Arborist shall be certified by the International Society of Arboriculture.
- B. Tree Pruning Standards: Comply with [ANSI A300](#) Part 1, "Trees, Shrubs and other Woody Plant Maintenance-Standard Practices (Pruning)."

1.07 QUALITY CONTROL

- A. A qualified Arborist as identified in Part 1.06, A. shall be on the Site on a full-time basis during execution of tasks related to tree protection.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

- A. Do not store construction materials, debris, or excavated material inside Tree Protection Zone(s).
- B. Site utilization shall protect root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials, and, protecting root systems from ponding, eroding, compaction or excessive wetting caused by dewatering operations.
- C. Do not permit vehicles or foot traffic within Tree Protection Zone(s).

PART 2 PRODUCTS

2.01 TREE PROTECTION FENCING

- A. Tree protection fencing shall be Mesh Construction Fencing by Conweed or approved equal. Tree protection fencing shall be orange in color and minimum 48 inches in height Fence posts shall be Metal T-Posts.

2.02 TREE REPLACEMENT

- A. **TREE REMOVAL IDENTIFICATION**; Submit any trees to be removed not specifically identified for removal in the Drawings. Tree removal identification submittal shall include the following:
 - 1. Location of tree with northing/easting points;
 - 2. Species of tree;
 - 3. DBH of tree;
 - 4. And purpose for removal.
- B. **TREE REPLACEMENT PLAN**; Contractor shall submit a tree replacement plan for all trees removed not specifically identified for removal in the Drawings. Tree replacement plan shall include the following:
 - 1. Location of replacement tree(s) with northing/easting points;
 - 2. Species of replacement tree(s);
 - 3. And Caliper of replacement tree(s).
- C. Replacement trees shall be in accordance with Section 02951 Green Stormwater Infrastructure Plants.

PART 3 EXECUTION

3.01 PREPARATION

- A. Trees, tree roots and limbs within the construction limits shall be protected against injury or damage through the duration of the Work. All trees and vegetation shall remain and be protected unless designated otherwise by the [Design Professional](#) Owner.
- B. Any trees damaged or destroyed during construction due to construction activities shall be treated or removed at the Contractor's expense per Part 3.02, E. and/or F.
- C. Construction Access
 - 1. Submit construction access location and duration of temporary access within Tree Protection Zone(s) per Section [02937](#) Green Stormwater Infrastructure Site Activity Plan.
 - 2. There shall be no construction traffic within the Tree Protection Zone(s). If no other access is obtainable, place four (4) foot by eight (8) foot sheets of three-quarter (3/4) inch plywood atop nine (9) inches of shredded wood pulp or mulch over entire area proposed for vehicular traffic.
 - 3. After removal of mulch and plywood, Contractor shall aerate the surface soil, per Part 3.02, E.
 - 4. All disturbed areas shall be re-sodded per Section [02953](#) Green Stormwater Infrastructure Non-Native Seeding and Sodding or pavement restored in-kind.
- D. Project Conditions
 - 1. Tree protection fencing shall be installed prior to construction operations.
 - 2. Proceed with Work only when existing and forecasted weather conditions are suitable for Work.
- E. [TREE PROTECTION PRE-CONSTRUCTION CONFERENCE](#): Before tree protection and trimming operations begin, the Contractor shall conduct a meeting with the [Design Professional](#) Owner at the Site to review tree protection and trimming procedures and responsibilities. Contractor shall submit tree protection methods to be used during construction.

3.02 INSTALLATION

- A. Tree Protection
 - 1. Install tree protection fencing around Tree Protection Zone(s) to protect remaining trees and vegetation from damage due to Work. Maintain tree protection fencing and remove when Work is complete.
 - 2. Preferred Fencing Installation Method: Where trees are located in open areas not constricted by existing pavement,

utilities or proposed grading, the tree protection fencing shall be installed a minimum of one (1) foot outside the Drip Line of the tree.

3. Alternative Fencing Installation Method 1: Where trees are located in areas constricted by utilities or proposed grading, the tree protection fencing shall be installed as close to the Drip Line as possible OR as follows:

Alternative Fencing Installation Method 1 by Tree Size

Tree Size (DBH)	Fence Placement Requirement
Small Trees (<9 inches)	Minimum of 5 feet from face of tree along the side of constriction. All other sides shall be 1 foot outside the dripline of the tree.
Medium (10 inches to 15 inches)	Minimum of 10 feet from the face of the tree along the side of constriction. All other sides shall be 1 foot outside the Drip Line of the tree.
Large (>15 inches)	Minimum of 15 feet from the face of the tree along the side of constriction. All other sides shall be 1 foot outside the Drip Line of the tree.

4. Alternative Fencing Installation Method 2: Where trees are located adjacent to existing pavement, install tree protection fencing adjacent to pavement. All other sides shall be a minimum of one (1) foot outside the Drip Line of the tree.
5. Alternative fencing installation method shall be submitted to the [Design ProfessionalOwner](#).

B. Excavation

1. Do not excavate within Tree Protection Zone(s), unless otherwise indicated in the Drawings or approved by the [Design ProfessionalOwner](#).
2. Install shoring or other protective support systems to minimize sloping excavations within the vicinity of the Tree Protection Zone(s). Do not allow soil loss from Tree Protection Zone(s) in instances where the Drip Line is a point of beginning for excavation or grading operations. If soil loss occurs, Contractor shall correct the problem within 24 hours of occurrence.
3. Where excavation is required within the Drip Line of the tree, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover

and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

4. Where utility trenches are required within Tree Protection Zone(s), tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.
5. Roots damaged during excavation or trenching activities shall be pruned per Part 3.02, D.

C. Regrading

1. Regrading in the vicinity of an existing tree shall be based on lowering, minor and moderate fill conditions, as defined in the following subsections. Roots damaged by regrading activities shall be pruned per Part 3.02, D.
2. Grade Lowering: Where new finished grade is indicated below existing grade around trees, slope grade away from trees as recommended by Arborist, unless otherwise indicated in the Drawings.
3. Minor Fill: Where existing grade is six (6) inches or less below finished grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations. Do not operate equipment within Tree Protection Zone(s) when fine grading topsoil is placed above existing grade.
4. Moderate Fill: Where existing grade is more than six (6) inches but less than 12 inches below finished grade, place storage aggregate media No. 57 stone per Section 02946 Green Stormwater Infrastructure Aggregate Media, permeable liner per Section 02948 Green Stormwater Infrastructure Media Liners, and topsoil per Section 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments on existing grade as follows:
 - a. Carefully place storage aggregate media No. 57 stone against tree trunk approximately two (2) inches above finished grade and extend not less than 18 inches from tree trunk on all sides. For balance of area within Drip Line, place storage aggregate media No. 57 stone up to six (6) inches below finished grade.
 - b. Place permeable liner with edges overlapping 6 inches minimum.
 - c. Place remaining fill layer of topsoil to finished grade. Do not compact storage aggregate media No. 57 stone or topsoil. Hand grade to required finish elevations.

D. Root Pruning

1. Root Pruning shall take place only where the roots of existing trees have been damaged by regrading or trenching operations and as directed by the Arborist.

2. If construction is to occur within the root zone of existing plant material, root pruning and special plant care, including fertilizing and watering, will be required.
3. Do not cut main lateral roots or taproots. Cut only smaller roots that interfere with installation of Work. Do not break or chop.
4. Prior to root pruning, remove all weeds.
5. Root prune using an approved mechanical root pruning saw prior to regrading operations, as directed by the Arborist. Air Spading excavation consisting of hand and/or pneumatic excavation may be required as directed by Arborist.
6. For plant material that is to remain in place, if the roots of that plant material are exposed during construction, the damaged root ends are to be removed by cutting them off cleanly.
7. Initial watering shall be performed on all trees, which are designated for root pruning. Water trees immediately after pruning by thoroughly saturating root balls and continue to keep root balls thoroughly saturated during first three (3) weeks following root pruning. After the first three (3) weeks, water as required, according to weather conditions, to keep root balls in a moist condition during growing seasons, through the duration of the Work. Test root balls for optimal moisture once per week using a soil auger.
8. All pruning shall be overseen by an Arborist. All pruning shall be done according to the National Arborist Association's Pruning Standards.
9. Any damage to the root zone, as determined by the Arborist, will be compensated by pruning an equivalent amount of the top vegetative growth of the material within one (1) week following root damage, fertilization and supplemental watering.

E. Tree Repair

1. Promptly repair trees damaged by construction operations within 24 hours of occurrence. Treat damaged trunks, limbs, and roots according to Arborist's written instructions.
2. If soil within the Tree Protection Zone(s) becomes compacted during construction, aerate the surface soil a minimum of ten (10) feet outside of the Drip Line and no closer than three (3) feet from the tree trunk. Drill holes two (2) inches in diameter a minimum of 12 inches deep at 24 inches on center or use a turf aerator that is approved by the [Design Professional](#). Backfill holes with an equal mix of augered soil and sand.

F. Tree Replacement

1. Contractor shall obtain written approval from the [Design](#)

ProfessionalOwner prior to removal of trees not specifically indicated for removal in the Drawings.

2. Trees not indicated for removal in the Drawings that die or are damaged during construction operations shall be removed and replaced at the Contractor's expense if the Design ProfessionalOwner determines that the trees are incapable of restoring to normal growth pattern.
3. Trees removed shall be replaced with Design Professional to specify required diameter at a rate, as follows:

Tree Replacement Requirements

Size of Tree Removed (DBH)	Rate of Replacement (2-inch Caliper)
1 inch - 5 inches	2:1
6 inches - 10 inches	3:1
11 inches - 16 inches	4:1
17 inches - 23 inches	5:1
24 inches - 31 inches	6:1
32+ inches	8:1

4. Replacement trees shall be planted per Section 02951 Green Stormwater Infrastructure Plants and maintained per Section 02957 Green Stormwater Infrastructure Establishment.

3.03 TOLERANCES

- A. Trees shall be measured according to ANSI Z60.1 with branches and trunks or canes in their normal position.
- B. Do not prune to obtain required sizes.
- C. Replacement tree Calipers shall measure equal to or greater than size specified in Part 3.02, F.

3.04 DISPOSAL OF MATERIAL

- A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

- A. The Contractor shall maintain tree protection through the duration of Work in the vicinity of the Tree Protection Zone(s) per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.06 MAINTENANCE

- A. Remove tall grass or weeds by mowing and pickup all trash within

the Tree Protection Zone(s) for the duration of Work.

- B. Contractor shall be responsible for the health of the tree(s) identified for protection through the duration of the Establishment Period, as defined in Section 02957 Green Stormwater Infrastructure Establishment.
- C. Vegetative maintenance shall be per Section 02957 Green Stormwater Infrastructure Establishment.

3.07 POST-CONSTRUCTION TESTING

- A. Not applicable.

3.08 WARRANTY

- A. Trees, tree roots and limbs within the extents of Work shall be protected against injury or damage through the duration of the Establishment Period. Any trees located in the Tree Protection Zone(s) that die or show more than 25 percent canopy dieback shall be removed and replaced at Contractor's expense per Part 3.02, F.
- B. Contractor is responsible for installed plant material warranty per Section 02951 Green Stormwater Infrastructure Plants.

-- End of Section --

SECTION 02951

GREEN STORMWATER INFRASTRUCTURE PLANTS

12/22

PART 1 GENERAL

1.01 PURPOSE

- A. The purpose of Section 02951 Green Stormwater Infrastructure Plants is to provide requirements for landscaping vegetation and materials including but not limited to trees, shrubs, groundcovers, grasses and perennials, fertilizer, mulches and landscape edgings.
- B. Definitions
 - 1. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they are grown, with ball size not less than sizes as shown in the Drawings; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.
 - 2. Container-Grown Stock: Healthy, vigorous, well-rooted Plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container, but free from circling or girdling roots. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for kind, type, and size of plant required.
 - 3. Finished Grade: Elevation of finished surface of soil and aggregate media per Section 02946 Green Stormwater Infrastructure Aggregate Media or Section 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments, as applicable.
 - 4. Plants: As referenced herein is applicable to trees, shrubs, groundcovers, grasses and perennials. Plants producing wood as a structural tissue are categorized as woody plants. Plants that have no persistent woody stem above ground are categorized as herbaceous plants.
 - 5. Root Flare: Place where the topmost root emerges from the trunk.
 - 6. Tree Crown: Mass of foliage and branches growing outward from the trunk of the tree.
 - 7. Caliper: Diameter of the stem or trunk of a tree measured above existing grade. For trees up to 4.5 inches in diameter, Caliper shall be measured six (6) inches above existing grade. If the Caliper measured at six (6) inches is greater than 4.5 inches, the Caliper shall be measured at 12 inches above existing grade.

1.02 MEASUREMENT AND PAYMENT

- A. The Contractor shall provide all labor, material, and equipment required for Plants, depicted in the Drawings and specified herein. Plants shall be paid for by **Unit Price** and measured as follows:

Plants Measurement and Payment Units

Item	Unit
Trees	Each
Shrubs	Each
Grasses	Each
Perennials	Each
Groundcovers	Each

1.03 RELATED SECTIONS

- A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

00700	General Conditions
02937	Green Stormwater Infrastructure Site Activity Plan
02938	Green Stormwater Infrastructure Control and Protection
02942	Green Stormwater Infrastructure Above Grade Barriers
02946	Green Stormwater Infrastructure Aggregate Media
02947	Green Stormwater Infrastructure Growing Media and Soil Amendments
02947	Green Stormwater Infrastructure Topsoil
02948	Green Stormwater Infrastructure Media Liners
02957	Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

- A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by **Design Professional**.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z60.1	The American Standard for Nursery Stock
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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
INTERNATIONAL

ASTM A641/A641M

Standard Specification for
Zinc-Coated (Galvanized) Carbon
Steel Wire

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

PLANTING LAYOUT

SD-03 Product Data

MISCELLANEOUS PRODUCTS DATA

SD-04 Samples

LANDSCAPE EDGING SAMPLE

MULCH SAMPLE

SD-07 Certificates

PLANT MATERIAL CERTIFICATION

SD-11 Closeout Submittals

AS-BUILT DRAWINGS

1.06 QUALITY ASSURANCE

A. Installer Qualifications

1. Installer: A qualified landscape installer who has completed landscaping work similar in material, design, and extent to that indicated for this Work and with a record of successful landscape establishment.
2. Field Supervisor: Installer's field supervision is required to maintain an experienced full-time supervisor on Site when planting is in progress. Field supervisor shall have at a minimum five (5) years of experience supervising landscaping work similar in material, design, and extent to that indicated for this project and with a record of successful landscape establishment.

1.07 QUALITY CONTROL

- A. Contractor shall notify the Design Professional of sources of planting materials a minimum of 30 days in advance of delivery to Site per requirements of Section 02937 Green Stormwater Infrastructure Site Activity Plan.
- B. The Design Professional may observe Plants either at place of growth or at Site before planting for compliance with requirements for genus, species, variety, size, and quality.

- C. The **Design Professional** retains right to observe Plants further for size and condition of ball and root systems, insects, injuries, and latent defects, and to reject unsatisfactory or defective material at any time during progress of Work. The Contractor shall remove rejected Plants immediately from Site.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

- A. Upon delivery to the Site, the Contractor shall submit material delivery receipts to the Owner for record. Delivery receipts must include sufficient information to verify the material delivered is consistent with the approved submittals. If delivery receipts do not provide sufficient detail, the Contractor is responsible for verifying with the supplier that the correct material was delivered and providing the Owner with appropriate documentation.
- B. The Contractor shall notify the **Design Professional** of the location of plant materials to be used and allow the Design Professional the opportunity to inspect them either at the place of growth or at the site before planting, for compliance with requirements for genus, species, variety, size, and quality. The Design Professional retains the right to further inspect trees and shrubs for size and condition of root balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during progress of work.
- C. Provide protective covering to prevent wind damage during transportation to Site. Do not drop any plant materials during loading, unloading, transportation, and delivery. Plant materials shall be tightly packed during transportation; if a full load of Plants is not required, packaging substitutes and braces shall be placed in such a way as to prevent any rolling or movement during the transportation period. Acceptable braces include: wood cross members, large stable rocks, shredded landscape mulch, and topsoil.
- D. All planting material shall be delivered with certificates of inspection required by USDA and State of Missouri. Comply with regulations applicable to planting material. Deliver Plants freshly dug or well rooted in their containers, to conditions specified in Part 2. All plants delivered to the site must be clearly labeled with botanical and common names for proper identification. A minimum of one (1) label per species or container is required. Trees and shrubs shall be individually labeled.
- E. Deliver Plants after preparations for planting have been completed and install immediately. If planting is delayed more than six (6) hours after delivery, set planting materials in a sheltered location, protect from weather and mechanical damage, and keep roots moist.
 - 1. Handle Balled and Burlapped Stock only by root ball; never move stock by gripping stems or foliage.
 - 2. Set balled stock on ground and cover ball with planting soil, wood mulch, or other acceptable material.

3. Do not remove Container-Grown Stock from containers before time of planting.
4. Water plant materials as often as necessary to maintain root systems in a moist condition.

F. Trees and Shrubs

1. Do not prune trees and shrubs before delivery, except as approved by the [Design Professional](#). Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage.
2. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape.

- G. Deliver fertilizers, herbicides, fungicides and pesticides in manufacturer's original unopened and undamaged containers. They shall be clearly marked to identify brand name, contents and order number on each package. Store all materials in a protected, dry location at temperatures in accordance with manufacturer's recommendation. Materials shall be stacked and stored in accordance with manufacturer's recommendation.

PART 2 PRODUCTS

2.01 PLANTS

- A. Plants shall be of quantity, size, genus, species, and variety shown in the Drawings and in compliance with [ANSI Z60.1](#). Plant material of a larger size may be used (at no additional cost to the Owner) if acceptable to the Owner, with a proportionate increase in size of roots or balls.
- B. Furnish nursery-grown Plants complying with [ANSI Z60.1](#), with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement. All plant materials shall be grown at recognized nurseries located within the same USDA Plant Hardiness Zone as the project Site.
- C. Plant material shall be grown from the project site eco-region per the Missouri Department of Natural Resources office. Resale plant suppliers shall not be used as sources unless the Contractor can certify that the required plant materials are not available from a growing nursery. When utilized, the Contractor shall submit the name and location of the growing nursery from where the trees or shrubs were obtained.
- D. Planting materials shall not be substituted unless otherwise approved by the [Design Professional](#). If specified landscape material is not available, Contractor shall submit proof of non-availability together with a request for Substitute Item, per Section [00700](#) General Conditions.
- E. Label each tree and shrub with securely attached, waterproof tag bearing legible designation of botanical and common name.

- F. **PLANT MATERIAL CERTIFICATION**; Submit product certificates signed by supplier certifying that plant materials comply with specified requirements and at a minimum include the following:
1. Nursery name, address and phone;
 2. List of Plants to be supplied including botanical name, common name, and size;
 3. Three (3) digital photographs of each plant species containing height reference and identification;
 4. Certificates of inspections as required by governmental authorities;
 5. Certification that plant materials comply with specified requirements.
 6. Plant warranty documentation.

2.02 TREES

- A. All trees provided must be balled and burlapped. Contractor shall submit supplier certifications for all trees, shrubs and related material.
- B. **Shade Trees**: Shade trees shall be single-stem trees with straight trunk, well-balanced Tree Crown, and intact leader, of height and caliper indicated in the Drawings, complying with **ANSI Z60.1** for type of trees required. Shade Tree Crowns shall be equal to one-third (1/3) to one-half (1/2) of tree height.
- C. **Small Upright or Spreading Trees**: Small upright or spreading trees shall be branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to **ANSI Z60.1**. See Drawings for stem form type.
- D. **Multistem Trees**: Multistem trees shall be branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to **ANSI Z60.1**. Multistem trees shall have clump stem form.
- E. **Coniferous Evergreen Trees**: Coniferous evergreen trees, including bald cypress, shall comply with **ANSI Z60.1**. Trees shall be normal-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required. Contractor shall provide balled and burlapped coniferous evergreen trees.

2.03 SHRUBS

- A. Shrubs shall be container grown with the following form and size: deciduous and evergreen shrubs with not less than the minimum number of canes/spread required by and measured according to **ANSI Z60.1** for type, shape, and height of shrub.

2.04 GROUNDCOVERS

- A. Provide groundcovers established and well rooted in removable

containers, flats, or integral biodegradable pots as indicated in the Drawings. Refer to schedule in the planting Drawings for type and condition.

2.05 GRASSES AND PERENNIALS

- A. Provide grasses and perennials established and well rooted in removable containers, flats, integral biodegradable pots, or deep cell plugs as indicated in the Drawings. Refer to schedule in the planting Drawings for type and condition.

2.06 PLANTING SOIL

- A. Planting soil shall be growing media or topsoil material as specified in the Drawings within landscaping areas and in accordance with Section 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments shall be used.

2.07 FERTILIZER

- A. Fertilizer shall be granular fertilizer consisting of nitrogen, phosphorus, potassium, and other nutrients in proportions and amounts recommended in soil reports, as required per Section 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments, from a qualified soil-testing agency.
- B. Fertilizer shall be slow release or quick release as per the soil report.

2.08 MULCH

- A. **MULCH SAMPLE**; Submit small one-fourth (1/4) pound sample of mulch material(s) to be used for all landscaping areas.
- B. Organic Mulch
 - 1. Green Stormwater Infrastructure Planting Beds: Organic mulch shall be double ground aged hardwood, free from deleterious materials, suitable as a top dressing for proposed plant material, and large enough to prevent displacement. Mulch shall be brown to dark brown in color. Size of particles may vary from minimum of three (3) inches to maximum of four (4) inches in length.
 - 2. Adjacent Planting Beds: Organic mulch shall be double ground aged hardwood, free from deleterious materials and suitable as a top dressing for proposed plant material used adjacent to green stormwater infrastructure facilities. Mulch shall be brown to dark brown in color. Size of particles may vary from minimum of one-quarter (1/4) inch to maximum of two (2) inches in length.
- C. Walnut bark or chips are not acceptable.
- D. Decorative Gravel
 - 1. Decorative gravel shall be double-washed, free from sand, silt, clay, excess fines, and other deleterious material.

2. Gravel shall be regionally sourced (within 200-mile radius or Site) decorative gravel, , of the type and size specified in the Drawings or approved equal.

2.09 STAKES AND GUYS

- A. Upright and Guy Stakes: Shall be studded steel T-postLodgepole Pine stakes (untreated), six (6) feet length minimum.
- B. Guy and Tie Wire: Shall be per [ASTM A641/A641M](#), Class 1, galvanized-steel wire, two (2) strand, twisted, 0.106-inch diameter.
- C. Strap Chafing Guard: Shall be reinforced Nylon or Canvas at least 1.5 inches with grommets to protect tree trunks from damage.
- D. Hose Chafing Guard: Reinforced rubber or plastic hose at least 1/2 inch in diameter, black, cut to lengths required to protect tree trunks from damage.

2.10 LANDSCAPING EDGING

A. Steel Landscape Edging

1. Steel edging shall be standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
2. Steel edging shall meet the following requirements:
 - a. Edging Size: Three-sixteenths (3/16) inch wide by six (6) inches deep.
 - b. Stakes: Ten (10) gauge Tapered steel, a minimum of 15 inches long.
 - c. Accessories: Standard tapered ends, corners, and splicers.
 - d. Finish: Powder Coat Finish.
 - e. Color: Black

B. V-Cut Edging

1. V-Cut edging shall be a natural cut trench backfilled with specified mulch.

C. [LANDSCAPE EDGING SAMPLE](#); Submit landscape edging sample including the following:

1. Supplier name, address and phone;
2. Product name;
3. One 12-inch section of steel edging with one stake.

2.11 MISCELLANEOUS PRODUCTS

- A. Anti-desiccant: Natural water-insoluble emulsion, permeable moisture retarder, film forming, acting as a protective coating for the leaf or needle of the plant, substantially reducing water loss during high period of stress. Can be used under hot summer conditions and in cold weather conditions for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- B. Trunk-Wrap Tape: Two layers of crinkled paper cemented together with bituminous material, four (4) inches wide minimum, with stretch factor of 33 percent.
- C. Plastic Tree Protector: Each tree shall be protected after planting with an 18-inch nominal height, four (4) inch minimum diameter plastic protector. Material shall be vented polyethylene or equivalent and shall be gray in color.
- D. Herbicide: Provide a non-selective, systemic herbicide suitable for use with the plant material specified on the Plans. Provide ROUNDUP Weed and Grass Killer, manufactured by the Monsanto Company, Lawn and Garden Products, or approved equivalent.
- E. Pre-Emergent Herbicide: Provide pre-emergent herbicide Pre M 60 DG (granular), or approved equivalent.
- F. Mycorrhizal Fungi: Dry, granula inoculant containing at least 6,810 spores per pound. (0.45 kilograms) of vesicular-arbuscular mycorrhizal fungi and 60 million spores per pound (0.45 kilograms) of ectomycorrhizal fungi, and a maximum particle size of 2 millimeters. Apply per manufacturer's recommendation.
- G. All other materials, not specifically described but required for a complete and proper installation, shall be as selected by the Contractor subject to the approval of the [Design Professional](#).
- H. [MISCELLANEOUS PRODUCTS DATA](#): Submit product information for miscellaneous products related to plants including but not limited to anti-desiccant, trunk-wrap tape, fertilizers, pesticides, and herbicides.

2.12 WATER

- A. Water used in this Work shall be furnished by the Contractor and will be suitable for irrigation and free from ingredients harmful to plant life.
- B. All watering equipment shall be furnished by the Contractor.
- C. Water from adjacent fire hydrants, public or private water lines shall be metered. Written approval from the property owner shall be obtained prior to the use of suitable water from ponds, creeks or private owners.
- D. Watering bags shall be used to water trees. Provide slow release, UV stabilized, polyethylene watering bag with black polypro straps and nylon zippers.

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking

1. Contractor shall lay out individual plant locations and areas for plantings.
2. **PLANTING LAYOUT:** Notify the **Design Professional** once plant locations are staked, and vegetation areas are outlined prior to installation of Plants. Contractor shall adjust locations when requested, and obtain acceptance of layout before planting.

B. Project Conditions

1. Contractor shall coordinate planting per Section 02937 Green Stormwater Infrastructure Site Activity Plan. Planting seasons shall be as follows:
 - a. Trees and shrubs (woody plants):
 - 1) Spring: February 15th to May 15th
 - 2) Fall: October 15th to November 30th
 - b. Grasses and perennials (herbaceous plants):
 - 1) Spring: April 15th to May 15th
 - 2) Fall: September 15th to October 30th
2. Proceed with and complete landscape work as rapidly as portions of the site become available, working within seasonal limitations for each kind of landscape work required.
3. Planting dates outside of the specified planting seasons must be approved by the **Design Professional**. Contractor shall notify the **Design Professional** in the event of planting discrepancies and if seasonal conditions become abnormal. Planting operations shall not be performed during time of extreme drought, when ground is frozen, or during times of other unfavorable weather. Proceed with planting only when existing and forecasted weather conditions permit. Contractor shall assume full and complete responsibility for all such plantings and operations.
4. Contractor shall examine areas to receive Plants for compliance with requirements and conditions affecting installation and performance. When unsatisfactory conditions for plant growth are encountered, including, but not limited to rubble fill, adverse drainage conditions, or obstructions, notify the **Design Professional** before planting. Proceed with installation only after unsatisfactory conditions have been corrected to the satisfaction of the **Design Professional**.

5. At time of planting, the top six (6) inches of all areas to be planted shall be free of stones greater than one-half (1/2) inch, weeds and foreign matter.

C. Control and Protection

1. Prior to planting activities, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.
2. Contractor shall protect structures, utilities, sidewalks, pavements, and other facilities, lawns and existing vegetation from damage caused by planting operations.

3.02 INSTALLATION

A. Fine Grading: Grade planting areas to a smooth, uniform surface plane with a loose, uniformly fine texture.

1. Perform grading to finished grade elevations identified in the Drawings. Roll and rake, remove ridges, and fill depressions to meet finished grade.
2. Limit fine grading to areas that can be planted in the immediate future.
3. Wet surface thoroughly and allow to dry before planting. Do not create muddy soil.
4. Restore areas if soil loss has occurred or planting area has otherwise been disturbed after finished grading, before planting.

B. Planting Pit Excavation

1. Trees and Shrubs:
 - a. Excavate circular pits of the dimensions as shown on the tree and shrub details in the Drawings. Scarify sides of plant pit smoothed during excavation.
 - b. Trees: Excavate pit one (1) inch shallower than root ball depth.
 - c. Shrubs: Excavate pit two (2) inches shallower than root ball depth.
2. Grasses and Perennials: Dig holes large enough to allow spreading of roots as shown on the grasses and perennials detail.
3. Contractor shall notify the Design Professional if the following conditions are encountered:
 - a. Obstructions: Unexpected rock or obstructions detrimental to trees or shrub placement or growth are

encountered in excavations. Where hardpan layer is encountered, drill six (6) inch diameter holes into free-draining strata or to a depth of ten (10) feet from subgrade, whichever is less, and backfill holes with three-quarter (3/4) inch storage aggregate media.

- b. Drainage: Subsurface soil conditions reveal unexpected water seepage or retention in tree or shrub pits.

C. Planting

1. Installation shall be per the Drawings.
2. Only as many Plants as can be planted and watered on that same day shall be distributed in a planting area. Do not prune trees and shrubs at time of installation except to remove damaged growth.
3. Treat entire plant pit or bed with pre-emergent herbicide in accordance with manufacturer's recommendations.
4. Tree and Shrub Planting
 - a. Balled and Burlap Stock: Do not use ball and burlap stock if root ball is cracked or broken before or during planting operations. Locate Root Flare and remove any extra soil prior to placing tree or shrub into pit to locate final elevation.
 - 1) Set root ball plumb and in center of pit or trench with the Root Flare flush above adjacent Finished Grades.
 - 2) Remove burlap twine and cage from top two-thirds (2/3) of root balls and partially from sides after gentle placement in planting holes, but do not remove from under root balls. Remove pallets, if any, before setting.
 - 3) Place planting soil around root ball in layers, tamping to settle mix and eliminate voids and air pockets.
 - 4) When pit is approximately one-half (1/2) backfilled, water thoroughly before placing remainder of backfill.
 - 5) Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil.
 - b. Container-Grown Stock: Container shall not be removed from Plants prior to Plants being set out in the designated planting area. Plants shall be removed in such a manner that the root ball is not broken. Refer to detail for correct installation.
 - 1) If circling or diving roots are found, shave all sides of the root ball including the bottom to

prevent root girdling.

- 2) Set Plants plumb and hold rigidly in position until planting soil has been tamped firmly around root ball.
- 3) After the plant has been placed, additional backfill consistent with planting soil shall be added to the hole to cover approximately one-half (1/2) of the height of the root ball. At this stage, water shall be added to the top of the partly filled hole to thoroughly saturate the root ball and adjacent planting soil. Finish filling the hole with planting soil and tamp firmly.
- 4) All Plants which settle deeper than specified on the planting details shall be raised to the correct level.

5. Grasses and Perennial Planting

- a. Containers or flats shall not be removed from Plants prior to Plants being set out in the designated planting area as specified in the Drawings.
- b. Plant shall be removed in such a manner that the root ball is not broken.
- c. Remove Plants from containers with enough soil around roots to form a plug. Do not damage roots.
- d. Place plant in hole, and work planting soil around roots to eliminate air pockets. Leave a slight saucer indentation around Plants to hold water.
- e. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- f. Protect Plants from hot sun and wind; remove protection if Plants show evidence of recovery from transplanting shock.

D. Guying and Staking

1. Installation shall be per the Drawings.
2. Stake trees with a two (2) inch caliper and less.
3. Use a minimum of two (2) stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend at least 54 inches above grade.
4. Set stakes vertically and space to avoid penetrating root balls or root masses.
5. Support trees with straps at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

6. Set stakes in line with, and on opposite sides of the trunk placed in North/South direction so that the line between stakes is perpendicular to the direction of the prevailing wind.
7. Contractor shall return one (1) week after trees have been staked to adjust the guy wire and stakes so the tree trunk is plumb and vertical.

E. Mulch

1. Mulch shall be placed to the lines, grades, and depths specified in the Drawings.
2. Mulch extents shall be equal to planting pit disturbance area. Place mulch away from trunk and trunk flare. Berm outer edges of mulch ring to create a saucer form.

F. Landscaping Edging

1. Steel Edging Installation
 - a. Install steel edging where indicated according to manufacturer's installation recommendations.
 - b. Anchor with steel stakes spaced approximately 48 inches apart, driven below top elevation of edging.
 - c. Steel edging shall not be visible above sod or organic wood mulch upon completion of plantings and sod installation.
 - d. Touch-up Painting and Restoring Finishes
 - 1) Touch-up Painting: Immediately after installation, clean field seams, connections, and abraded areas of shop paint, and apply same material to exposed areas.
 - 2) Restoring Finishes: Restore finishes damaged during installation and during work so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit, or provide new units.
2. V-Cut Edging: Dig or machine cut natural 30 degree bevel cut, eight (8) inch minimum in width and six (6) inch minimum in depth to the depths and dimensions detailed in the Drawings.

G. Installation of Miscellaneous Products

1. As directed by the [Design Professional](#), apply anti-desiccant to trees and shrubs using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage to protect during digging, handling, and transportation. If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving and again two (2)

weeks after planting.

2. If planted in fall, wrap trees of two (2) inch caliper or larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling. Remove trunk-wrap tape in March and dispose of trunk-wrap tape per Part 3.04. Do not use trunk-wrap tape for trees planted in spring.

H. Watering

1. Container Plants: Water container plant materials at the following rate and frequency:
 - a. First Week: One (1) inch per day, every other day.
 - b. Second Week: One (1) inch per day, every third day.
 - c. Third Week: One (1) inch per day, every fourth day.
2. Trees: Water trees at the following rate and frequency:
 - a. Two (2) inch caliper trees: Fill bag one (1) time per week
 - b. Greater than two (2) inch caliper to three (3) inch caliper trees: Fill bag two (2) times per week.
 - c. Greater than three (3) inch caliper to five (5) inch caliper: Fill bag three (3) times per week.
 - d. Design Professional to specify additional or alternative watering requirements
3. After the third week and prior to Certificate of [Achievement of Full Operation](#), water as needed to ensure healthy and vigorous plants.
4. Contractor shall adjust watering rate and frequency as necessary to adapt to rainfall and to prevent puddles, ponding, or runoff. Do not water to the point of runoff.

3.03 TOLERANCES

- A. Trees and shrubs shall be measured according to [ANSI Z60.1](#) with branches and trunks or canes in their normal position. Do not prune to obtain required sizes.
 1. Tree size shall be greater than or equal to specified caliper. Take caliper measurements six (6) inches above ground for trees up to 4.5-inch caliper size, and 12 inches above ground for larger sizes.
 2. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
- B. Acceptable trees and shrubs shall be in a vigorous, thriving condition as determined by the Owner prior to the end of the

Establishment Period. Plants shall be free of dead or dying branches or branch tips, and shall bear foliage of a normal density, size and color.

- C. Acceptable perennial and ornamental grass stands will consist of 90 percent coverage over the entire area and contain health mature or developing plants representative of the original species planted prior to the end of the Establishment Period.
- D. Plant materials are to be inspected to certify that all Plants have been installed according to the Drawings and are acceptable. [Design Professional](#) will inspect Plants upon written request from the Contractor.
- E. Any plant that is dead, or is not in satisfactory health as determined by the [Design Professional](#) will be replaced by the Contractor at no additional cost to the Owner.
- F. [AS-BUILT DRAWINGS](#); During the course of installation, carefully record in red line on a print of the planting drawings all changes made to the planting layout during installations; approved by the [Design Professional](#).

3.04 DISPOSAL OF MATERIAL

- A. Materials no longer in use shall be removed and disposed of by Contractor per Section [02937](#) Green Stormwater Infrastructure Site Activity Plan.
- B. Clean wheels of vehicles prior to leaving Site to avoid tracking soil onto roads, sidewalks, or other areas.

3.05 PROTECTION

- A. Contractor is responsible for protection of Plants from damage due to landscape operations, operations by other contractors and trades, and others.
- B. The Contractor shall implement control and protection measures per Section [02938](#) Green Stormwater Infrastructure Control and Protection, including temporary seeding, to protect the green stormwater infrastructure facility until vegetation is fully established and the entire upstream tributary area is stabilized.
- C. All protection measures shall be submitted to the [Design Professional](#) for acceptance.
- D. Erect visible barricades and warning signs as required to protect newly planted areas from traffic. Maintain visible barricades throughout Establishment Period or until substantial and healthy stand of grass is established.

3.06 MAINTENANCE

- A. The Contractor shall maintain the green stormwater infrastructure facility and adjacent areas disturbed during construction through the Establishment Period as defined in Section [02957](#) Green Stormwater Infrastructure Establishment, and per the schedule identified in Section [02937](#) Green Stormwater Infrastructure Site

Activity Plan.

- B. Remove tree stakes after one growing season if root system is stable. If root system is not stable enough for tree to remain upright, reattach and adjust connection to accommodate for new growth and leave stakes for one more growing season.

3.07 POST-CONSTRUCTION TESTING

- A. The [Design Professional](#) reserves the right to take and analyze samples of materials for conformity to specifications at any time. Rejected materials shall be immediately removed from the Site at the Contractor's expense. The cost of testing of materials not meeting specifications shall be paid by the Contractor.

3.08 WARRANTY

- A. The Contractor shall warrant the green stormwater infrastructure Plants through the duration of the Establishment Period.
- B. If at any time during the Establishment Period the plantings become damaged due to improper erosion control, administration of maintenance activities, or frequency of maintenance activities, the Contractor shall replace the Plants and fully restore the green stormwater infrastructure facility and any damaged components as determined by the [Design Professional](#), at no additional cost to the Owner.

-- End of Section --

SECTION 02953

GREEN STORMWATER INFRASTRUCTURE NON-NATIVE SEEDING AND SODDING
12/22

PART 1 GENERAL

1.01 PURPOSE

- A. The purpose of Section 02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding is to provide requirements for furnishing and applying limited soil amendments, seeding, sodding, reconditioning existing lawn areas, and replanting unsatisfactory or damaged lawns affected by execution of the Work.
- B. Definitions
1. Certified Seed: Progeny of breeder, foundation or registered seed, handled under procedures acceptable to the Department of Agriculture and Forestry to maintain satisfactory genetic purity and identity. Certification color is Blue Tag or Gold Tag.
 2. Cover Crop: Temporary vegetation to help suppress weeds and manage soil erosion when project conditions are outside of the non-native seeding and sodding planting seasons.
 3. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath topsoil.

1.02 MEASUREMENT AND PAYMENT

- A. The Contractor shall provide all labor, material, and equipment required for seeding and sodding, depicted in the Drawings and specified herein. Seed and sod shall be paid for by Unit Price measured as follows:

Non-Native Seeding and Sodding Measurement and Payment Units

Item	Unit
Temporary Seed	[Pounds/Acre][Pounds/Square Foot]
Turfgrass Seed	[Pounds/Acre][Pounds/Square Foot]
Turfgrass Sod	[Square Feet][Square Yards]

1.03 RELATED SECTIONS

- A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937 Green Stormwater Infrastructure Site Activity Plan

02938 Green Stormwater Infrastructure Control and Protection

- 02946 Green Stormwater Infrastructure Aggregate Media
- 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments
- 02951 Green Stormwater Infrastructure Plants
- 02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

- A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by [Design Professional](#).

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS
ASSOCIATION (APWA)

APWA 2150 (2017) Division II Construction and
Material Specification, Erosion and
Sediment Control

TURFGRASS PRODUCERS INTERNATIONAL (TPI)

TPI Guideline Specifications to
Turfgrass Sodding

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)

USDA FSA United States Department of
Agriculture, Federal Seed Act

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

TEMPORARY SEEDING NOTIFICATION

SD-03 Product Data

SOIL AMENDMENTS

SD-07 Certificates

TURFGRASS SEED CERTIFICATION

TURFGRASS SOD SEED CERTIFICATION

TEMPORARY SEED CERTIFICATION

1.06 QUALITY ASSURANCE

- A. Installer Qualifications

1. Work shall be performed by a qualified installer per Section [02937](#) Green Stormwater Infrastructure Site Activity Plan, whose work has resulted in the successful installation of

seeding and sodding, similar in material, design, and extent.

1.07 QUALITY CONTROL

- A. Prior to procurement of material and delivery to the Site, the Contractor shall submit quality control certificates, certifying the materials conform to specifications. The quality of all materials, the process of manufacture, and the finished products shall be subject to inspection and acceptance by the [Design Professional](#). Such inspection may be made at the place of manufacture or the Site after delivery.
- B. All materials shall be subject to rejection at any time due to failure to meet any requirements specified herein. Material rejected after delivery to the Site shall be marked for identification and shall be removed from the Site immediately. All materials which have been damaged after delivery or installation will be rejected, removed and replaced at the Contractor's expense.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

- A. Upon delivery to the Site, the Contractor shall submit material delivery receipts to the Owner for record. Delivery receipts must include sufficient information to verify the material delivered is consistent with the approved submittals. If delivery receipts do not provide sufficient detail, the Contractor is responsible for verifying with the supplier that the correct material was delivered and providing the Owner with appropriate documentation.
- B. Turfgrass Seed: Deliver turfgrass seed in original sealed, labeled, and undamaged containers.
- C. Turf Sod: Harvest, deliver, store, and handle turf sod according to requirements of the [TPI](#).

PART 2 PRODUCTS

2.01 TURFGRASS SEED

- A. Seed shall be fresh, clean, dry, new-crop seed, complying with the [USDA FSA](#) regulations.
- B. [TURFGRASS SEED CERTIFICATION](#); Submit certificates and supplier seed label for turfgrass seed including the following:
 - 1. The botanical and common name, origin and percentage by weight of each species and variety;
 - 2. Percentage germination, purity, and weed seed;
 - 3. Identity of noxious weeds;
 - 4. Date of seed test.
- C. Seed shall meet the following requirements for germination, purity, and weed seed:
 - 1. Germination: 85 percent (min)

2. Purity: 98 percent (min)
3. Weed Seed: 0 percent (max)
- D. Seed shall have Blue Tag certification.
- E. Moldy seed or seed that has been damaged in storage shall not be used.
- F. Seeded areas shall be a blend of 90 percent Turf-Type Tall Fescue and ten (10) percent Kentucky Bluegrass fulfilling the following requirements:
 1. Blend shall be at least three (3) improved Turf-Type Tall Fescue species combined with at least one (1) Kentucky Bluegrass species.
 2. Blend shall not include aggressive Kentucky Bluegrass cultivars.
 3. Blend shall not include Forage-Type Tall Fescues.
 4. Turf-Type Tall Fescues shall have a 70 percent average endophyte level minimum.

2.02 TURFGRASS SOD

- A. Sod shall be certified turfgrass sod complying with **TPI** specifications for machine-cut thickness, size, strength, moisture content, and mowed height, free of weeds.
- B. **TURFGRASS SOD SEED CERTIFICATION**; Provide certificates and supplier seed label for turfgrass sod seed including:
 1. The botanical and common name, origin and percentage by weight of each species and variety;
 2. Percentage germination, purity, and weed seed;
 3. Identity of noxious weeds;
 4. Date of seed test.
- C. Sod shall meet the following requirements for germination, purity, and weed seed:
 1. Germination: 85 percent (min)
 2. Purity: 98 percent (min)
 3. Weed Seed: 0 percent (max)
- D. Seed used for sod shall have Gold Tag certification. If Gold Tag certification seed is not available, then seed shall be the highest quality Blue Tag certification seed available, at the discretion of the **Design Professional**.
- E. Sod shall have uniform density, color, and texture of the

turfgrass species, strongly rooted, and capable of vigorous growth and development when planted.

- F. Sodded areas shall be a blend of 90 percent Turf-Type Tall Fescue and ten (10) percent Kentucky Bluegrass:
 - 1. Blend shall be at least three (3) improved Turf Type Tall Fescues combined with at least two (2) Kentucky Bluegrass species.
 - 2. Turf-Type Tall Fescues shall have a 70 percent average endophyte level minimum.

2.03 TEMPORARY SEED

- A. Temporary seeding shall be installed when site and/or seasonal conditions do not allow for seeding or sodding of the type specified.
- B. **TEMPORARY SEEDING NOTIFICATION**; Notify **Design Professional** when temporary seeding is warranted.
- C. Temporary seed shall be per **APWA 2150**, Part 2153.5, A.
- D. **TEMPORARY SEED CERTIFICATION**; Submit certificates and supplier seed label for temporary seed including:
 - 1. The botanical and common name, origin and percentage by weight of each species and variety;
 - 2. Percentage germination, purity, and weed seed;
 - 3. Identity of noxious weeds;
 - 4. Date of seed test.

2.04 TOPSOIL

- A. Topsoil shall be per Section **02947** Green Stormwater Infrastructure Growing Media and Soil Amendments.
- B. **SOIL AMENDMENTS**; Submit product data of the following soil amendments, including but not limited to product name, product instructions, and supplier name, address, and phone:
 - 1. Lime;
 - 2. Sulfur;
 - 3. Herbicides.

2.05 HERBICIDE

- A. Herbicides shall be per Section **02951** Green Stormwater Infrastructure Plants.

2.06 SEED COAT

- A. Seed Coat shall be cross-linked, modified acrylic polymer (CAS#

71042-87-0) with graphite (CAS#7782-42-5).

2.07 FERTILIZER

- A. Fertilizer shall be slow-release, granular or pelleted fertilizer, consisting of 50 percent water-insoluble nitrogen.
- B. Fertilizer shall be commercial fertilizer of neutral character with some elements derived from organic sources, containing:
 - 1. Phosphoric Acid: Not less than four (4) percent
 - 2. Potassium: Not less than two (2) percent
 - 3. Nitrogen: Not less than three (3) pounds of actual Nitrogen per 1,000 square feet of turf area in a form that will be available during initial growth period
- C. Do not use fertilizer between May 1st and September 15th.

2.08 MULCH

- A. Straw mulch shall be air-dry, clean, mildew and seed free salt hay or threshed straw of wheat, rye, oats or barely.

2.09 WATER

- A. Water used in this Work shall be furnished by the Contractor and will be suitable for irrigation and free from ingredients harmful to plant life.
- B. All watering equipment shall be furnished by the Contractor.
- C. Water from adjacent fire hydrants, public or private water lines shall be metered. Written approval from the property owner shall be obtained prior to the use of suitable water from ponds, creeks or private owners.

PART 3 EXECUTION

3.01 PREPARATION

- A. Project Conditions
 - 1. Contractor shall coordinate seeding per the Site Activity Plan. Planting seasons shall be as follows:
 - a. Seed
 - 1) Spring: March 15th to May 15th.
 - 2) Fall: September 15th to October 15th .
 - b. Sod: Sod as temperatures allow and when irrigation for establishment is available. Do not sod when ground is frozen or ambient air temperatures are greater than 90 degrees Fahrenheit or less than 50 degrees Fahrenheit.
 - 2. Seeding or sodding dates outside of the specified planting

seasons shall be approved by the [Design Professional](#). Contractor shall notify the [Design Professional](#) in the event of seeding discrepancies and if seasonal conditions become abnormal. Proceed with seeding only when existing and forecasted weather conditions permit.

3. Contractor shall examine areas to be seeded or sodded for compliance with requirements and conditions affecting installation and performance. When unsatisfactory conditions for seed or sod growth are encountered, including, but not limited to rubble fill, adverse drainage conditions, or obstructions, notify the [Design Professional](#) before seeding or sodding. Proceed with installation only after unsatisfactory conditions have been corrected to the satisfaction of the [Design Professional](#).

B. Control and Protection

1. Prior to installation, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified per Sections [02937](#) Green Stormwater Infrastructure Site Activity Plan and [02938](#) Green Stormwater Infrastructure Control and Protection.
2. Contractor shall protect structures, utilities, sidewalks, pavements, and other facilities, lawns and existing vegetation from damage caused by seeding and sodding operations.

3.02 INSTALLATION

A. Soil Preparation

1. Newly Graded Subgrades: Limit subgrade preparation to areas that will be planted in the immediate future.
 - a. For seed application only, apply starter fertilizer directly to subgrade before scarifying.
 - b. Mechanically scarify subgrade to a minimum depth of two (2) inches, four (4) inches preferred.
 - c. Remove and dispose of stones larger than one (1) inch in any dimension, sticks, roots, litter, debris, and extraneous matter per Part 3.04.
 - d. Apply soil amendments per Section [02947](#), and thoroughly blend topsoil before spreading.
 - e. Spread topsoil to a minimum depth of six (6) inches but not less than required to meet finished grades after light rolling and natural settlement. Do not spread if topsoil or subgrade is frozen, muddy, or excessively wet.
2. Unchanged Subgrades: If areas are to be seeded or sodded in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare soil as follows:

- a. Remove and dispose of existing vegetation per Part 3.04.
 - b. Mechanically scarify in-situ soil to a minimum depth of six (6) inches.
 - c. Remove and dispose of stones larger than one (1) inch in any dimension, sticks, roots, litter, debris, and extraneous matter per Part 3.04.
 - d. Apply soil amendments per Section 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments and fertilizers and mix thoroughly into top six (6) inches of soil. Mix soil to a homogeneous mixture of fine texture.
- B. Fine Grading: Grade seeding and sodding areas to a smooth, uniform surface plane with a loose, uniformly fine texture.
1. Perform grading to finished grade elevations identified in the Drawings. Roll and rake, remove ridges, and fill depressions to meet finished grade.
 2. Limit fine grading to areas that can be planted in the immediate future.
 3. Wet surface thoroughly and allow to dry before planting. Do not create muddy soil.
 4. Restore areas if eroded or otherwise disturbed after finished grading, before seeding or sodding.
- C. Temporary Seeding: Temporary seeding shall be installed per APWA 2150, Part 2153.5, B. to produce a cover crop until the permanent seed per Part 2.01 or sod per Part 2.02 can be installed per Part 3.01.
- D. Seeding
1. Sow seed at five (5) to six (6) pounds per 1,000 square feet.
 - a. Drill Seeding: Sow seed with a Brillion type seeding machine where applicable.
 - 1) Evenly distribute seed by sowing equal quantities in two (2) directions at right angles to each other, or three (3) directions in high maintenance areas, as directed by Design Professional.
 - b. Broadcast Seeding: Use broadcast or drop seed methods where restricted by steep slopes or other areas not accessible to a seeding machine.
 - 1) Do not broadcast or drop seed when wind velocity exceeds five (5) miles per hour.
 - 2) Rake seed lightly into top one-eighth (1/8) inch of topsoil, roll lightly, and water with fine

spray.

- c. Hydroseeding: Apply hydroseeding in a uniform and consistent manner.
 - 1) Mix seed, fertilizer and pulverized mulch with water, agitating constantly. Do not add seed to water greater than four (4) hours prior to application.
 - 2) On slopes of 2:1 (horizontal:vertical) or flatter, apply seed separately from fertilizer. Rake soil over seed to an average depth of one-half (1/2) inch.
 - 3) On slopes steeper than 2:1 (horizontal:vertical) apply seed and fertilizer in a single operation.

2. Seed Protection

- a. Protect seeded slopes 4:1 (horizontal:vertical) or greater with erosion-control blankets installed and stapled per manufacturer's recommendations.
- b. Protect seeded slopes less than 4:1 (horizontal:vertical) by spreading straw mulch as specified in Part 2.08, after completion of seeding operations. Spread uniformly to form continuous cover over seeded areas. Spread by hand, blower, or as approved by [Design Professional](#).
- c. Protect seeded areas against hot, dry weather or drying winds by applying compost within 24 hours after completion of seeding operations. Scatter compost uniformly to a depth of one-quarter (1/4) inch thick and roll to a smooth surface. Soak compost after spreading.

E. Sodding

- 1. Lay sod within 24 hours of harvesting. Do not lay sod if sod is dormant or if subgrade is frozen or muddy.
 - a. Remove plastic netting from sod rolls during placement.
 - b. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap.
 - c. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation.
 - d. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface.
 - e. Work sifted topsoil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

2. Lay sod across angle of slopes exceeding 3:1 (horizontal:vertical). Anchor sod on slopes exceeding 4:1 (horizontal:vertical) with steel staples spaced per manufacturer recommendations but not less than two (2) anchors per sod strip to prevent slippage.
 3. Saturate sod with fine water spray within one (1) hour of planting. For first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1.5 inches below sod.
- F. Mulching: Mulching shall be done within 24 hours following the seeding operation except in the case of wood cellulose type mulch.
1. Straw mulch shall be spread uniformly in a continuous blanket at a depth of not less than 1.5 inches and not more than two (2) inches loose measurement (approximately 1.5 to 2 tons per acre).
 2. Mulch shall be spread by hand or by a blower type mulch spreader.
 3. Blower type mulch spreaders shall be adjusted and operated in such a manner as to prevent excessive breakage of the mulch material. If this cannot be accomplished, the mulch shall be spread by hand.
 4. Care shall be exercised to ensure that all wire from baled hay is collected as it is removed from the bale.
 5. Mulching shall be started at the windward side of relatively flat areas, or at the upper part of a steep slope, and continued uniformly until the area is covered.
 6. The mulch shall not be bunched.
 7. No mulch shall be spread unless it can be anchored on the same day. The straw mulch shall be anchored in the soil to a depth of 2 to 3 inches by a notched disk set straight or a mulch crimping machine. The machine shall be weighted and operated in such a manner to secure the mulch firmly in the ground to form a soil binding mulch and prevent loss or bunching of the hay by wind. Two (2) or more passes may be required to anchor the mulch to the satisfaction of the Design Professional.

3.03 TOLERANCES

- A. Finished Grade: The Contractor shall place materials based on the line and grade specified in the Drawings within 0.1 feet vertical tolerance.
- B. Satisfactory Seed and Sod Areas
1. Area shall be uniform and free of weeds, bare spots exceeding five (5) by five (5) inches, and surface irregularities.

2. Reestablish areas that do not comply with requirements and continue maintenance until areas are satisfactory as determined by the [Design Professional](#).

3.04 DISPOSAL OF MATERIAL

- A. Materials no longer in use shall be removed and disposed of by Contractor per Section [02937](#) Green Stormwater Infrastructure Site Activity Plan.
- B. Clean wheels of vehicles prior to leaving Site to avoid tracking soil onto roads, sidewalks, or other areas.

3.05 PROTECTION

- A. Contractor is responsible for protection of seed or sod from damage due to landscape operations, operations by other contractors and trades, and others.
- B. The Contractor shall implement control and protection measures per Section [02938](#) Green Stormwater Infrastructure Control and Protection, including temporary seeding, to protect the green stormwater infrastructure facility until vegetation is fully established and the entire upstream drainage area is stabilized.
- C. All protection measures shall be submitted to the [Design Professional](#) for acceptance.
- D. Erect visible barricades and warning signs to protect newly seeded or sodded areas from traffic. Maintain barricades throughout Establishment Period, as defined in Section [02957](#) Green Stormwater Infrastructure Establishment, and until substantial and healthy stand of specified plants is established.

3.06 MAINTENANCE

- A. The Contractor shall maintain the green stormwater infrastructure facility and adjacent areas disturbed during construction through the Establishment Period and per the schedule identified in Section [02937](#) Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

- A. Not applicable.

3.08 WARRANTY

- A. The Contractor shall warrant the green stormwater infrastructure seeding and sodding through the duration of the Establishment Period.
- B. If at any time during the Establishment Period the facility becomes damaged due to improper erosion control, maintenance activities, or frequency of maintenance activities, the Contractor shall restore the green stormwater infrastructure facility and any damaged components as determined by the [Design Professional](#), at no additional cost to the Owner.

-- End of Section --

SECTION 02955

GREEN STORMWATER INFRASTRUCTURE OUTLETS
12/22

PART 1 GENERAL

1.01 PURPOSE

- A. Outlets allow excess stormwater to exit the green stormwater infrastructure facility when the capacity of the facility is exceeded. The outlet structure can control water levels both at the surface and in the subsurface of the green stormwater infrastructure facility. Stormwater above the finished grade of the green stormwater infrastructure is controlled with an overflow riser that is overtopped once the ponding elevation in the facility is exceeded.

1.02 MEASUREMENT AND PAYMENT

- A. Contractor shall provide all labor, material and equipment required to install the outlet as shown in the Drawings and as specified herein. Outlet shall be paid for by Unit Price and measured as follows:

Outlets Measurement and Payment Units

Item	Unit
Fittings	Each
Metal Grate	Each
Manufactured Outlet Structure	Each
Concrete Base	Cubic Yard
Aggregate Base	Cubic Yard

1.03 RELATED SECTIONS

- A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

- 02937 Green Stormwater Infrastructure Site Activity Plan
02938 Green Stormwater Infrastructure Control and Protection
02939 Green Stormwater Infrastructure Earthwork
02946 Green Stormwater Infrastructure Aggregate Media

02954 Green Stormwater Infrastructure Piping

02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

- A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by [Design Professional](#).

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 301	Specifications for Structural Concrete
ACI 305R	Guide to Hot Weather Concreting
ACI 306R	Guide to Cold Weather Concreting
ACI 318	Building Code Requirements for Structural Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

ASTM C94/C94M	Standard Specification for Ready-Mixed Concrete
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A615/A615M	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

APWA 2208	(2017) Division II Construction and Material Specifications, Paving - Portland Cement Concrete Pavement
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KANSAS CITY METRO MATERIALS BOARD SPECIFICATIONS (KCMMB)

KCMMB	Kansas City Metro Materials Board Specifications
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MID-WEST CONCRETE INDUSTRY BOARD CONCRETE SPECIFICATIONS - CONCRETE PAVEMENT (MCIB)

MCIB	Mid-West Concrete Industry Board
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Concrete Specifications - Concrete
Pavement

1.05 SUBMITTALS

SD-03 Product Data

MANUFACTURER INFORMATION

SHOP DRAWINGS

SD-07 Certificates

CONCRETE BASE MIX DESIGN

CONCRETE COLLAR MIX DESIGN

FINISHED GRADE SURVEY VERIFICATION

1.06 QUALITY ASSURANCE

- A. Concrete Manufacturer: A firm experienced in manufacturing ready-mixed concrete products and that complies with **ASTM C94/C94M** requirements for production facilities and equipment. Manufacturer certified according to the National Ready Mixed Concrete Association (NRMCA) "Certificate of Ready Mixed Concrete Production Facilities."
- B. Installer Qualifications: Design Professional to insert additional manufacturer/installer qualifications as applicable.
- C. Testing Agency Qualifications
 - 1. An independent agency, acceptable to the authorities having jurisdiction, qualified according to **ASTM C1077** for testing indicated.
 - 2. Personnel performing tests shall be ACI Concrete Strength Testing Technician and ACI Concrete Laboratory Testing Technician - Level 1. Testing Agency laboratory supervisor shall be an ACI Concrete Laboratory Testing Technician - Level 2.
- D. Concrete Field Testing: Personnel conducting concrete field tests shall be qualified as ACI Concrete Field Testing Technician - Grade I.

1.07 QUALITY CONTROL

- A. Inspection and testing shall be performed by the Contractor/manufacturer in conformance with applicable standards. All material delivered to the Site shall have quality control certificates certifying the materials conform to specifications.
- B. Field testing of concrete shall be performed by the Contractor once for every 50-cubic yard of concrete placed and shall conform to the requirements of **APWA 2208**.
- C. **SHOP DRAWINGS**: Submit shop drawings with a minimum of the

following information, if applicable:

1. Supplier name, address and phone;
 2. Structure dimensions (exterior and interior);
 3. Pipe connections and sizes;
 4. Flow lines/flow directions;
 5. Grate and/or screening details including effective open area for outlet capacity. Approved or equal products must provide grate effective open area that is within an acceptable range to the specified product, as determined by the [Design Professional](#).
- D. The quality of all materials, the process of manufacture, and the finished products shall be subject to inspection and acceptance by the [Design Professional](#). Such inspection may be made at the place of manufacture or on the Site after delivery.
- E. All materials shall be subject to rejection at any time due to failure to meet any requirements specified herein. Material rejected after delivery to the Site shall be marked for identification and shall be removed from the Site immediately.
- F. All materials which have been damaged after delivery will be rejected and replaced at the Contractor's expense. If materials are rejected after installation, they shall be repaired as accepted by the [Design Professional](#), or removed and replaced at the Contractor's expense.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

- A. Upon delivery to the Site, the Contractor shall submit material delivery receipts to the Owner for record. Delivery receipts must include sufficient information to verify the material delivered is consistent with the approved submittals. If delivery receipts do not provide sufficient detail, the Contractor is responsible for verifying with the supplier that the correct material was delivered and providing the Owner with appropriate documentation.
- B. Materials shall be stored away from active grading or earthwork to avoid contamination with soil, sediment or debris.
- C. Manufactured products shall be delivered, stored and handled per manufacturer recommendations.

PART 2 PRODUCTS

2.01 MANUFACTURED OUTLET STRUCTURE

- A. Manufactured Outlet Structure shall be of the product type and manufacturer specified in the Drawings [Design Professional](#) to specify manufacturer name and product information or approved equal.
- B. [MANUFACTURER INFORMATION](#); Submit manufacturer information, product data and instructions for each product, including but not

limited to structure type, size, material, effective open area, fabrication, delivery and handling, placement, installation, protection, and product warranty documentation.

- C. Concrete Base: Concrete mix shall be 4,000 psi with 2-4 inches of slump. Design Professional to specify desired concrete mix requirements or approved equal. Reinforcing bars shall be ASTM A615/A615M Grade 60 or approved equal. Concrete cover requirements shall conform to ACI 318.
 - 1. CONCRETE BASE MIX DESIGN; Submit certification that concrete mix design for concrete base meets the requirements of the specified mix.
- D. Aggregate Base: Concrete shall have an underlying aggregate base per Section 02946 Green Stormwater Infrastructure Aggregate Media.

PART 3 EXECUTION

3.01 PREPARATION

- A. Surveying and Staking: All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of the Contractor. The Contractor shall set construction stakes, establishing all structure locations and elevations. The Contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.
- B. Project Conditions
 - 1. Conditions for concrete placement shall comply with ACI 301. Hot weather placement shall comply with ACI 305R, and cold weather placement shall comply with ACI 306R.
 - 2. Design Professional to specify additional project conditions, as applicable
- C. Control and Protection
 - 1. Prior to installation of green stormwater infrastructure outlets, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.
 - 2. Prior to connecting the outlet to downstream drainage systems, temporary erosion control measures shall be in place.
 - 3. Stormwater bypass and/or dewatering measures shall be in place to keep the Site clean and dry for the duration of installation.

3.02 INSTALLATION

A. Excavation

1. Excavation shall extend to a depth such that the specified overflow elevation, once fully installed, is located at the elevation shown in the Drawings. If an overflow elevation is not specified, the Contractor is to consult the [Design Professional](#) to verify control elevations for the structure prior to installation.
2. Subgrade shall be prepared to provide uniform and continuous support of the outlet to the lines and grades shown in the Drawings.

B. Manufactured Outlet Structure

1. Concrete Base and Anchoring
 - a. Unless otherwise specified by the manufacturerDesign Professional, all manufactured outlet structures require anchoring to prevent floating during periods of inundation.
 - b. Aggregate base shall be placed to the depth and extents shown in the Drawings. Place aggregate using methods that will not disturb or damage the outlet structures the surrounding piping, or the green stormwater infrastructure facility.
 - c. Compaction shall be achieved using small, hand-held or walk behind compactors to prevent damage to the structure or over-compaction of the surrounding areas intended for infiltration.
 - d. Concrete base size and thickness shall be as specified by manufacturer.
 - e. Anchoring: Outlet structure shall be encased in concrete or otherwise securely attached to the concrete base to resist buoyancy and flotation. Concrete encasement or other attachments shall not inhibit the function of the structure. If manufactured outlet structure includes aluminum accessories, apply bituminous coating to all aluminum surfaces in contact with concrete. Manufactured outlet structures with stainless steel accessories do not require bituminous coating for concrete encasement.
2. Manufactured Outlet Structure Placement
 - a. Place outlet structure on concrete base and level vertically. Verify critical elevations, including but not limited to top of structure, inverts in/out and overflowweirorificevalve elevations.
 - b. Connection of underdrain and/or outlet pipes to outlet structure shall provide watertight connections per manufacturer's instructions.

- c. Anchor or encase outlet structure to concrete base.

C. Backfill

1. Prior to backfilling, cover structure openings to protect from material deposition inside the structure during placement. Provide protection of outlet per Section 02938 Green Stormwater Infrastructure Control and Protection.
2. Backfill around structure and compact uniformly in six (6) inch lifts by hand using small, hand-held or walk behind compactors to prevent damage to the structure or over-compaction of surrounding areas intended for infiltration.
3. Install soil and/or aggregate media around structure to finished grade per Section 02946 Green Stormwater Infrastructure Aggregate Media and 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments, as shown in the Drawings. All green stormwater infrastructure media shall be in place including mulch per Section 02951 Green Stormwater Infrastructure Plants prior to removal of protective covering and installation of grated cover.

3.03 TOLERANCES

- A. Outlet structure installed elevation shall not deviate from design elevation by more than 0.1 feet. Verify all elevations specified in the Drawings including but not limited to invert elevations, top of structure elevation and overflowweirorifice valve elevations.
- B. Horizontal placements shall be within 0.1 feet of the alignment depicted in Drawings.
- C. **FINISHED GRADE SURVEY VERIFICATION**; Survey finished elevation of green stormwater infrastructure outlet and submit to the **Design Professional** for review. Survey elevation shall be taken at specific point locations identified in the Drawings, including but not limited to invert elevations, top of structure elevation and overflowweirorificevalve elevations.

3.04 DISPOSAL OF MATERIAL

- A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

- A. The Contractor shall implement temporary protection and control measures per Section 02938 Green Stormwater Infrastructure Control and Protection to protect the outlet until the entire upstream tributary area is fully stabilized.
- B. All protection measures shall be submitted to the **Design Professional** for acceptance.

3.06 MAINTENANCE

- A. The Contractor shall maintain outlet through the Establishment Period, as defined in Section 02957 Green Stormwater Infrastructure Establishment, and per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

- A. Not applicable.

3.08 WARRANTY

- A. The Contractor shall furnish the Owner with a written warranty from the manufacturer/supplier (Warrantor) that shall warrant the material against manufacturing defects and material degradation.
- B. Should a defect occur, which is covered under warranty, the Warrantor shall bear all costs for the repair, relocation and replacement of the outlet. The Contractor shall be responsible for coordination with the Warrantor for replacement of any defective products or material.

-- End of Section --

SECTION 02957

GREEN STORMWATER INFRASTRUCTURE ESTABLISHMENT
12/22

PART 1 GENERAL

1.01 PURPOSE

- A. Contractor shall provide all equipment, material and labor required for servicing, maintaining, and establishing green stormwater infrastructure facilities and project landscaping, as identified in Green Stormwater Infrastructure Maintenance Plan, submitted per Section 02937 Green Stormwater Infrastructure Site Activity Plan.
- B. The Green Stormwater Infrastructure Establishment Period consists of both the GSI Construction Period and the Correction Period as defined in Part 1.01, C. Substantial Completion is defined at the time of Owner's issuance of Certificate of Achievement of Full Operation per Section 00700 General Conditions.
- C. Definitions
 - 1. Establishment Period: Period in which the Contractor shall be responsible for the performance of the green stormwater infrastructure facility and associated green stormwater infrastructure components as defined in Section 00800 Supplementary Conditions to achieve and sustain Service Levels of Performance defined in Part 3.06. Establishment Period shall commence at the start of GSI Construction Period and shall extend through the duration of the Correction Period.
 - 2. GSI Construction Period: Portion of the Establishment Period for green stormwater infrastructure components placed in continuous service before Achievement of Full Operation, as specified in Section 00700 General Conditions, Article 13.07, Part B. Period shall commence when green stormwater infrastructure facility construction commences, as defined as when the first green stormwater infrastructure component is installed, and shall extend through issuance of Certificate of Achievement of Full Operation, as defined in Section 00700 General Conditions.
 - 3. Correction Period: Period shall commence at issuance of Certificate of Achievement of Full Operation and shall extend for a period as defined in Section 00800 Supplementary Conditions.
 - 4. Establishment: Establishment is used to describe the length of time prior to green stormwater infrastructure being fully capable of managing stormwater runoff. During this period of time, Service and Maintenance activities are necessary to promote landscape health for plant maturity and full integration of green stormwater infrastructure components.
 - 5. Service: Service is described as replenishing materials that

are deteriorated, lost to erosion, removed or damaged through exposure to elements, or resulting from use, to achieve and sustain Service Levels of Performance defined in Part 3.06.

6. Maintenance: Maintenance is described as Work that is appropriate and necessary to achieve and sustain Service levels of performance defined in Part 3.06.

1.02 MEASUREMENT AND PAYMENT

- A. Payment will constitute full compensation for all labor, equipment, tools, supplies, and incidentals necessary to complete the Work.
- B. Contractor shall submit an Application for Payment quarterly. During Correction period, each Application for Payment shall be for one-twelfth (1/12) of the remaining contracted amount for this Work.
- C. Each Application for Payment shall include Inspection Log and Material Log per the Green Stormwater Infrastructure Maintenance Plan, as defined in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

1.03 RELATED SECTIONS

- A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

00700 General Conditions

00800 Supplementary Conditions

01290.13 Punch List

02937 Green Stormwater Infrastructure Site Activity Plan

02938 Green Stormwater Infrastructure Control and Protection

02946 Green Stormwater Infrastructure Aggregate Media

02947 Green Stormwater Infrastructure Growing Media and Soil Amendments

02951 Green Stormwater Infrastructure Plants

02952 Green Stormwater Infrastructure Native Grass and Wildflower Seeding

02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding

02956 Green Stormwater Infrastructure In-Situ Infiltration Testing

1.04 REFERENCES STANDARDS

- A. Not applicable.

1.05 SUBMITTALS

SD-05 Design Data

INSPECTION LOG AND MATERIAL LOG

SD-06 Test Reports

POST-CONSTRUCTION INFILTRATION TEST RESULTS

1.06 QUALITY ASSURANCE

- A. Service, Maintenance, and Establishment activities to be performed by the Contractor shall be identified in the Green Stormwater Infrastructure Maintenance Plan.

1.07 QUALITY CONTROL

- A. Contractor shall use an Inspection Log per Section 02937 Green Stormwater Infrastructure Site Activity Plan to record and report all inspection activities as part of the Green Stormwater Infrastructure Maintenance Plan.
- B. Contractor shall use a Material Log per Section 02937 Green Stormwater Infrastructure Site Activity Plan to maintain a record of all material used as part of the Green Stormwater Infrastructure Maintenance Plan.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

- A. Contractor shall have proper identification while onsite at all times. Identification may include but is not limited to an authorization letter from Owner, business cards, or labeled vehicles or uniforms.

PART 2 PRODUCTS

2.01 MATERIALS AND METHODS

- A. This specification includes recording and documentation of Service, Maintenance, and Establishment activities as defined by the Green Stormwater Infrastructure Maintenance Plan. Recording and documentation requires Contractor utilization of an INSPECTION LOG AND MATERIAL LOG.
- B. Materials and methods identified in the Green Stormwater Infrastructure Maintenance Plan are subject to approval by Design Professional.

2.02 ALTERNATE MATERIALS OR METHODS

- A. Contractor may use alternate materials and methods subject to approval by the Design Professional.

PART 3 EXECUTION

3.01 PREPARATION

- A. Not applicable.

3.02 INSTALLATION

- A. Not applicable.

3.03 TOLERANCES

- A. The Contractor is responsible for maintaining finished grade of green stormwater infrastructure facility within the following tolerances:

1. Horizontal Tolerance: 0.1 feet
2. Vertical Tolerance: 0.1 feet

- B. If green stormwater infrastructure finished grade varies from required tolerances, Contractor shall add additional surface material as specified in the Drawings and per Sections 02946 Green Stormwater Infrastructure Aggregate Media and 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments.

3.04 DISPOSAL OF MATERIAL

- A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

- A. The Contractor shall implement temporary control and protection measures per Section 02938 Green Stormwater Infrastructure Control and Protection to protect the green stormwater infrastructure facility until the entire upstream tributary area is fully stabilized.

3.06 MAINTENANCE

- A. The Contractor is responsible for Maintenance of green stormwater infrastructure components through the duration of the Establishment Period.
- B. Maintenance activities and frequencies shall be sufficient to meet the following standards for service levels of performance:

Establishment Period Service Levels of Performance

Appearance	Weeds, Pests, Disease	Mulch, Erosion	Drainage
Vegetation healthy with tidy appearance	Weeds are not acceptable Every effort should be made to control and eliminate all weeds	Mulch evenly distributed, two (2) inches to four (4) inches deep	Zero ponding depth observed 48 hours following a rain event
Vegetation watered during dry periods over two (2) weeks in length	Pests or diseases that threaten vegetation should be removed with gentlest method possible. If problem is limited to less than 5% of plants, remove infected plants and replace with different species	No evidence of erosion	Clear, open flow paths for water (inlet, outlet, overflow)
Vegetation confined to planted areas		Little to no sediment or silt on mulch surface	
Clean, distinct planting bed edges			
Litter/trash removed			
Fallen/blown foliage removed (leaves, nuts, sticks, lawn clippings, fallen branches)	Mosquito larvae removed		
Little to no sediment or silt on surface			
No cracking, settling, or damage to of green stormwater infrastructure components			

- C. Maintenance activities and frequencies provided in the Contract Documents or listed in the Green Stormwater Infrastructure Manual do not take precedence over the levels of performance described in Part 3.06, A.

3.07 POST-CONSTRUCTION TESTING

- A. The Contractor shall conduct post-construction infiltration testing per Section 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing at up to three (3) testing locations prior to Final Inspection of work as described in Part 3.08, C. Contractor shall conduct testing within ten (10) days of Final Inspection and submit POST-CONSTRUCTION INFILTRATION TEST RESULTS.

- B. Post-construction infiltration rates shall meet or exceed pre-construction infiltration rates and shall be no less than 0.25 inches per hour.
- C. Media that fails to meet post-construction infiltration requirements shall be remediated as recommended by the [Design Professional](#). Amended media shall then be retested per Section [02956](#) Green Stormwater Infrastructure In-Situ Infiltration Testing. This procedure shall be repeated by the Contractor until the media meets post-construction infiltration requirements at the discretion of the [Design Professional](#).

3.08 WARRANTY

- A. Service, Maintenance, and Establishment activities shall be for the full duration of the Establishment Period.
- B. For vegetative green stormwater infrastructure components, the Contractor shall be responsible for the health of all plants. Contractor shall replace all dead or dying plants within the green stormwater infrastructure facility. Any plant that is dead, or is not in satisfactory health as determined by the [Design Professional](#) will be replaced by the Contractor at no additional cost to the Owner. All dead plants shall be replaced a maximum of once per year during the Establishment Period, not to exceed three (3) replacements per plant. Replacement plants shall be installed during the appropriate planting season as defined in Sections [02951](#) Green Stormwater Infrastructure Plants, [02952](#) Green Stormwater Infrastructure Native Grass and Wildflower Seeding, or [02953](#) Green Stormwater Infrastructure Non-Native Seeding and Sodding.
- C. The Contractor shall complete a Final Inspection of the Work with the Owner to determine Service level performance within 60 days of termination of the Establishment Period. The Owner shall notify the Contractor in writing of any deficiencies in meeting the Service level performance in the final Punch List per Section [01290.13](#) Punch List. The Contractor shall correct any identified deficiencies and document remedial action taken in the final Punch List. Affidavit for Final Payment shall not be accepted until all deficiencies have been corrected by the Contractor.

-- End of Section --

SECTION 03000 - MISCELLANEOUS CONCRETE

PART 1 - GENERAL

1.1 SCOPE

- A. The Contractor shall perform all concrete work as required to complete the work specified in the contract documents.
- B. This section covers miscellaneous concrete work associated with the construction of water, wastewater and stormwater infrastructure. This section does not apply to concrete work associated with surface restoration. See Section 02575 – Surface Restoration for concrete requirements associated with curb, gutter, sidewalk and street work.

1.2 RELATED SECTIONS

- A. Section 03370 – Sanitary Sewer Manhole Construction.
- B. Section 03608 – Concrete Vaults.

1.3 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - ASTM A615 Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
 - ASTM C31 Test Methods of Making and Curing Concrete Test Specimens in the Field.
 - ASTM C33 Concrete Aggregates.
 - ASTM C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - ASTM C94 Ready-Mixed Concrete.
 - ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - ASTM C150 Portland Cement.
- C. American Concrete Institute (ACI):
 - ACI 304 Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
 - ACI 305 Committee Report on Hot-Weather Concreting.
 - ACI 306 Committee Report on Cold-Weather Concreting.
 - ACI 309 Recommended Practice for Consolidation of Concrete.
 - ACI 318 Building Code Requirements for Reinforced Concrete.
 - ACI 347 Recommended Practice for Concrete Formwork.

1.4 SUBMITTALS

- A. Contractor shall submit product data for review on the following items required by this Division:
 - 1. Laboratory name.
 - 2. Aggregate testing and gradation.
 - 3. Design mix.
- B. Product data shall be submitted in accordance with Section 01300 – Submittals.

PART 2 - PRODUCTS

2.1 CEMENT

- A. Cement shall conform to ASTM C150, Type I, unless high early strength is required in which instance Type III shall be used. Cement may be bagged or bulk.

2.2 FINE AGGREGATE

- A. Fine aggregate, clean natural sand, shall conform to ASTM C33 and have the following gradation:

<u>Sieve</u>	<u>% Passing</u>	<u>% Retained</u>
3/8"	100	0
#4	95-100	0-5
#8	80-100	0-20
#16	50-85	15-50
#30	25-60	40-75
#50	10-30	70-90
#100	2-10	90-98

2.3 COARSE AGGREGATE

- A. Clean crushed rock, washed gravel, or other inert granular material, except that clay and shale particles shall not exceed one percent. Coarse aggregate shall conform to ASTM C33 and have the following gradation:

<u>Sq. Sieve</u>	<u>% Passing</u>	<u>% Retained</u>
3/4"	90-100	0-10
3/8"	20-55	45-80
#4	0-10	90-100
#8	0-5	95-100

2.4 WATER

- A. Potable water from a municipal or other public water supply district shall be used for mixing and curing.

2.5 REINFORCING STEEL

- A. Reinforcing Steel:

1. Reinforcing steel bars shall conform to the requirements of the following Standards and Grades:
 - (a) ASTM A615: Grade 40 or 60.
 - (b) ASTM A616: Grade 50 or 60.

- B. Bending details shall conform to ACI 318.

2.6 FORMS AND FORMWORK ACCESSORIES

- A. Forms:

1. Suitable and substantial forms shall be provided. All forms shall be constructed and maintained plumb and true to line, securely braced, tied, clamped and shored in order to prevent leakage of concrete and prevent deflection or displacement of forms during

placement of concrete. All exposed corners and edges shall have 1" fillets. All joints shall be mortar tight; open joints shall be sealed as required.

2. Where applicable, undisturbed earth may be used in lieu of forms.
 3. The deflection of the forms due to the weight and rate of placing concrete, placing equipment, and workmen shall be accurately figured and taken into account in the design of the forms so that finished concrete members will have surfaces, lines, planes, and elevations required within tolerances in accordance with ACI 117.
 4. All forms shall be removed prior to backfill unless the following conditions are met:
 - (a) As directed by the City.
 - (b) When constructed of unbraced plywood having a thickness of ½-inch or less, removal shall be optional unless otherwise directed by the City.
 5. Forms shall be constructed so that they can be removed without damage to the concrete.
- B. Formwork accessories:
1. Forms shall be securely braced and tied with approved form ties that do not leave any parts within ¾ inch of the surface of the concrete. Wire ties and wood spreaders will not be permitted.

2.7 CONCRETE MIX

A. Concrete:

1. Concrete shall conform to KCMO PW 2208 except as follows:
 - (a) Limestone may be used as coarse aggregate.
 - (b) Design strength of concrete shall be 4,500 psi or greater at 28 days.
 - (c) Maximum slump shall be 4 inches. Determination of slump shall conform to ASTM C143.
 - (d) Coarse Aggregate: 1-inch maximum.
 - (e) Air entrainment admixture is required to provide 4 to 6 percent entrained air when placed, in conformance with ASTM C185.
 - (f) Water reducing admixture is required.
2. Ready mix concrete shall be supplied by a plant approved by the KCMO Public Works Department according to the Ready Mix Concrete Quality Management Plan. Submit ready mix concrete plant information in accordance with paragraph SUBMITTALS.
3. Submit concrete mix design in accordance with KCMO PW 2208.C and in accordance with the paragraph SUBMITTALS.

B. Concrete shall be delivered to the site in conformance with ASTM C94.

PART 3 - EXECUTION

3.1 REINFORCING STEEL AND CONCRETE

A. Placing of Reinforcing Steel:

1. Before being installed in the final position, all metal reinforcements shall be free of mud, clay, ice, grease, oil, loose rust and scale, and other coatings that would reduce or destroy the bond.
2. Metal reinforcements shall be accurately formed and positioned to the required dimensions. All bars are to be accurately placed and securely tied at all intersections. All reinforcing steel shall be placed so it is covered with a minimum of 3" of concrete.
3. Steel reinforcements shall be accurately positioned as required and shall be secured against displacement by using annealed wire ties or suitable clips at all intersections.
4. The steel reinforcements shall be supported by metal supports, spacers, or hangers.
5. The legs on the metal chair supports shall be plastic coated.

B. Forms:

1. Verify lines, levels and centers before proceeding with formwork.
2. A coat of non-staining oil, lacquer, or other approved material shall be applied to protect form surface and to facilitate stripping. Coating shall be applied in strict accordance with the directions of the manufacturer.
3. Forms shall be removed in such manner as to assure the complete safety of the structure. In no case shall supporting forms or shoring be removed until the concrete has acquired sufficient strength.

C. Placing of Concrete:

1. Only those methods and arrangements of equipment shall be used which will reduce to a minimum any segregation of coarse aggregate from the concrete.
2. Every consideration shall be given to the proper placement of all concrete and the proper care of all concrete after placement.
3. Concrete shall be deposited into the forms or on the grade as nearly as practicable in its final position and in such manner that the concrete will completely fill the forms.
4. Vibration shall not be used to move concrete in a horizontal direction after initial placement.
5. Concrete that has partially hardened or has been contaminated by foreign material shall not be deposited in the Work and shall be removed from the Site at no additional cost to the City.
6. When inclined chutes beyond the mixer are permitted by the City, a baffle shall be provided at the bottom end so that concrete will drop vertically without segregation.
7. No water shall be added to the concrete for any reason at the job site that will result in exceeding the specified water-cement ratio. Any water withheld when batching the concrete shall be noted on the material delivery ticket.
8. Care shall be taken to assure proper concrete coverage of reinforcing steel as designed.
9. Placement operations shall be performed in such a manner as to prevent loose earth falling into the excavation during placement of concrete.
10. Concrete that might contact forms or reinforcing steel during placement shall be placed by the use of trunks or pipes whenever the drop exceeds six (6) feet for unexposed work, or three (3) feet for exposed work.
11. When trunks or pipe are used, they shall be located at horizontal spacing of not to exceed ten (10) feet.
12. Concrete for thrust restraints shall be placed in horizontal layers not exceeding two (2) feet in depth.
13. Placing of concrete in thrust restraints shall be done in such manner as to prevent "cold joints," both horizontally and vertically.

D. Vibrating:

1. In conformance with ACI 309, mechanical internal vibrators shall be used whenever possible in all formed concrete work.
2. Vibrators shall be inserted at uniform spacing of twelve (12) inches to twenty (20) inches to assure thorough consolidation of all concrete.
3. Vibrators shall be inserted and withdrawn vertically to a depth, which will assure penetration into the previous lift with vibration periods of from five (5) to fifteen (15) seconds.
4. Form vibration and/or hand spading will be required at points inaccessible for thorough internal vibration.
5. During placement of concrete, stand-by vibrators shall be immediately available in the event of mechanical failure in the vibrators being used.

- E. No concrete shall be deposited below water. The excavation may be damp but shall contain no water.
- F. Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials. Retempering of concrete is not permissible.
- G. For formed surfaces, the Contractor shall break off ties, grout voids which are deeper than ½" and chip out honeycombed areas to solid concrete and grout flush with formed surface.
- H. Curing shall be maintained continuously for seven days after placing concrete or until forms are removed and the surface finished. Concrete surface temperature is to be maintained between 50°F and 100°F for at least seven days.
- I. Concrete shall not be placed on iced or frozen subgrade or when the air temperature is below 20°F. Concreting shall not be continued when the air temperature is below 45°F unless the following conditions are attained:
 - 1. Mixing water shall be heated (to a maximum of 150°F).
 - 2. Aggregates shall be heated until free of all ice and frost.
 - 3. The concrete temperature after mixing shall be between 50°F and 70°F if the air temperature is 20°F to 45°F.
 - 4. After the concrete is placed, it shall be covered, protected, and heated so as to maintain a minimum of 70°F air temperature for the 24 hours and 50°F air temperature for the next six days. Open-flame type heaters are not permitted. Heating equipment not vented outside of the covering will not be permitted.
 - 5. Moist conditions shall be maintained during the heating period.
 - 6. All covering, heating equipment, etc., shall be on hand and approved by the Engineer before any concrete is placed.
- J. Calcium chloride, as an admixture, shall not be used.
- K. Exposed concrete is not to be placed in air temperatures above 100°F. Cover, protect and cool work as to maintain the temperature of the concrete below 100°F. The concrete temperature, after mixing, shall not be greater than 85°F. Spray and/or shade aggregate piles and cool mixing water as required.

3.2 CONCRETE TEST CYLINDERS

- A. All concrete test cylinders shall be provided by a certified testing laboratory. The testing of test cylinders, including transportation, shall be paid for by the Contractor.
- B. The laboratory shall make at least three test cylinders for each day's pour in excess of 10 cubic yards of each class of concrete, and three test cylinders for each additional 50 cubic yards or major fraction thereof, as directed by the Engineer.
- C. The laboratory shall ship the test cylinders to the laboratory on the second day, where the laboratory shall proceed to cure until tested. One cylinder shall be tested on the seventh day, and the remaining cylinders shall be tested on the 28th day. The test cylinders shall be identified at the time cast, and as to which pour is represented. Unsatisfactory tests of cylinders shall make the concrete represented subject to rejection, with consequent removal and replacement required.
- D. Concrete test cylinders shall be cast and tested in accordance with ASTM C31 and C39. The testing laboratory shall furnish four copies of test reports for test cylinders and distributed as follows:
 - 1. 2 copies – City.
 - 2. 2 copies – Contractor.

3.3 CLEANUP

- A. Cleanup operations shall be conducted in accordance with Section 01566 – Cleanup Operations

END OF SECTION

SECTION 05011 – STORMWATER CASTINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. This specification covers ductile iron castings for stormwater structures. Unless otherwise specified, all castings for stormwater structures shall have a clear opening of 30 inches and hinged covers.

1.02 DESCRIPTION

- A. This specification is for stormwater ductile iron castings. Prior to the Contractor supplying castings, all manufacturers shall be approved as suppliers for the City of Kansas City, Missouri (City) and shall be able to demonstrate that there is an acceptable quality control program at the producing foundry.

1.03 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.04 RELATED SECTIONS

- A. Section 01015 – Specific Project Requirements.
- B. Section 01300 – Submittals.
- C. Section 03370 – Sanitary Sewer Manhole Construction.

1.05 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. The version of the codes and standards in effect at the time of the Notice to Bidders shall be used, except as noted on the Drawings or in the Specific Project Requirements section of these specifications.
- B. American Association of State Highway and Transportation Offices (AASHTO):
AASHTO M306 (Latest Revision) – Drainage, Sewer, Utility, and Related Castings.
Standard Specifications for Highway Bridges.
- C. American Society for Testing and Materials (ASTM) International:
ASTM A536 Standard Specification for Ductile Iron Castings.
ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
ASTM C478 Standard Specification for Precast Reinforced Concrete Manholes Sections.
- D. U.S. Environmental Protection Agency: Material Safety and Data Sheet.
- E. Federal Register: 29 CFR 1910.1200 Hazard Communications.
- F. Federal Standards:
FED-STD-123 Marking for Domestic Shipment (Civilian Agencies).
- G. United States Customs Service:
Custom Regulation Chapter 1, Part 134, Article 19, U.S.C. 1304.

1.06 CONTACTOR SUBMITTALS

- A. Submit the following in accordance with Section 01300 – Submittals:
 - 1. Certified shop drawings for all castings, product data, manufacturer's catalog cut sheets, specifications and installation details.
 - 2. Casting identification and location:
 - (a) Iron Casting submittals shall include a certification of conformance in accordance with AASHTO M306 (Part 9, Certification) and HS-25 loading.
 - (b) A foundry certification shall be furnished stating that samples representing each lot have been tested, inspected and are in accordance with this specification.
 - 3. A manufacturer's affidavit certifying that the furnished castings comply with the provisions of these specifications, regardless of whether or not the purchaser has an inspector at the plant.
 - 4. All submittals shall be approved by the City before castings are ordered by the Contractor.

1.07 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the work.
- B. The Manufacturer shall guarantee items to be free of defects.
- C. Manufacturer shall have a quality control process in place and shall provide a copy of their "Quality Control Manual."
- D. The manufacturer shall keep records of all tests, MSDS sheets, foundry, lot records, product liability insurance and any customs documentation control data for a period of 3 years. The supplier agrees to furnish copies of records within two weeks after the receipt of request for such records.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Check materials upon arrival. Identify and segregate as to types, functions, and sizes. Store materials off of the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.
- B. Unless otherwise specified on the purchase order, cleaning, preservation, and packaging of castings shall be in accordance with the manufacturer's commercial practice. Packing and marking shall also be adequate to ensure acceptance and safe delivery by the carrier for the mode of transportation employed.
- C. If the number of the defective items exceeds two and one half percent of the lot, the purchaser will reject the remaining quantity in the lot and the supplier will redeliver the remaining quantity of the lot.
- D. All castings shall be marked in accordance with the requirements of Federal Standard No. 123 and with Chapter 1, Part 134 of the United States Customs Service Regulations, including 19 U.S.C. 1304 paragraph, as applicable. Failure to conform to the above requirements will be just cause for rejection of castings.

PART 2 - PRODUCTS**2.01 DUCTILE IRON CASTINGS**

- A. Castings shall be manufactured and tested in accordance with ASTM A536 and AASHTO M306-10 HS-25 loading.

2.02 WORKMANSHIP AND FINISH

- A. Castings shall be of uniform quality, free from all defects, holes, shrinkage, cracks and any other surface defect. Ductile iron castings shall be ground smooth and well cleaned by shot blasting. Runners, risers, fins, and other cast-on pieces shall be removed.
- B. As-cast dimensions may vary by one half the maximum shrinkage possessed by the metal or $\pm 1/16$ in/ft.
- C. As-cast weight may vary by ± 5 percent from the drawing/specification weight.
- D. For traffic service castings, bearing surfaces between manhole rings and covers or grates and frames shall be cast or machined with such precision to prevent rocking.
- E. Circular manhole frames and covers shall be furnished with machined horizontal bearing surfaces unless otherwise specified in the standard details.
- F. In other matters of workmanship and finish, the castings shall conform to any points agreed upon by the City and the manufacturer/supplier.

2.03 MANHOLE FRAMES AND COVERS

- A. Frames and covers shall be as specified and shall be of the type suitable for the application. The frames and covers shall be circular and the covers with vent holes.
- B. Markings – See Figure 1 at the end of this section for approved markings.
- C. The minimum clear opening shall be 30 inches for all castings for stormwater structures.
- D. All covers shall have provisions for ease of opening, such as concealed pick holes.
- E. All frames and covers shall be “Traffic Rated” in accordance with AASHTO M306 HS-25 Loading.
- F. Unless specified in Section 01015 – Specific Project Requirements or noted on the contract drawings, cam locks are not required.
- G. Special Requirements for Paved Areas:
 - 1. Definition: Areas subject to vehicular traffic. Includes, but is not limited to, all paved areas.
 - 2. All manhole frames and covers shall be adjustable and self-leveling. Frames and covers shall be adjustable to meet any slope and grade of the roadway (from 0 to 17 percent) and shall be able to be raised or lowered in $\frac{1}{4}$ inch increments, up to $2\frac{1}{4}$ inches. Ring height shall be adjustable after installation without disturbing the surrounding pavement.
 - 3. Acceptable manufactures include the following (or approved equal):
 - (a) Hinged ErgoXL Self-Level Manhole Frame and Cover with Gasket Cover as manufactured by East Jordan.
 - (b) PAMREX VIATOP (reference #CDVT6OQG) as manufactured by CertainTeed.
- H. Special Requirement for Curb Inlets, Green Spaces and Un-Paved Areas:
 - 1. Areas that are not normally subject to vehicular traffic. Includes, but is not limited to, greenways, easements and curb inlets.
 - 2. Ductile iron covers shall be hinged with drain holes and incorporate 90 degree blocking system to prevent accidental closure.
 - 3. Flange shall incorporate bedding slots or bolt holes except castings for curb inlets.
 - 4. Acceptable manufacturers include the following (or pre-approved equal):
 - (a) Pamrex models as manufactured by CertainTeed.
 - (b) ErgoXL as manufactured by East Jordan.
 - (c) ErgoXL TF as manufactured by East Jordan.

2.04 FRAME AND CHIMNEY SEALING SYSTEM

- A. Per Section 03370 – Sanitary Sewer Manhole Construction.

PART 3 - EXECUTION

3.01 MANHOLE FRAMES AND COVERS

- A. The Contractor shall coordinate the installation of the castings with the work of the other trades in order to avoid delays. Install inserts or anchors as required by individual items.
- B. Install items as specified and in accordance with the manufacturer's instructions.
- C. Install items plumb, level, in alignment and anchor securely. All manhole frames with hinged lids shall be anchored at four points.

3.02 CLEANING

- A. Clean all items after installation to remove rust, dirt, oil, grease and other deleterious substances.
- B. Clean all welds, bolted connections and abraded areas and apply the shop coating. Touch up damaged areas with the shop coating.

3.03 WARRANTY

- A. All castings shall have a lifetime warranty against manufacture defects for all components.

Figure 1 on page 5.

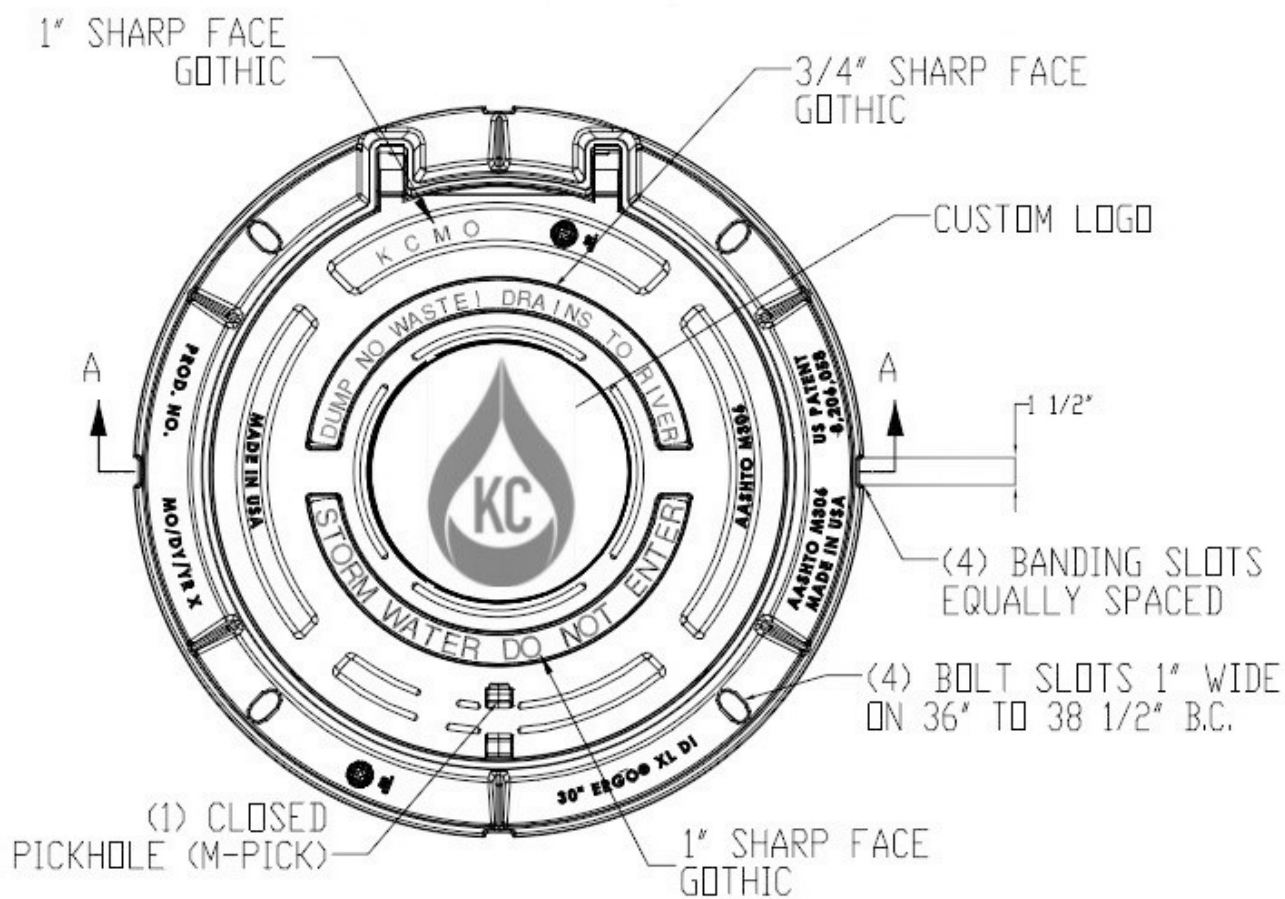


Figure 1: Standard Stormwater Markings

END OF SECTION

SECTION 05012 – WATER CASTINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. This specification covers ductile iron castings for water structures and valve box lids and covers. Unless otherwise specified, all castings for water structures shall have a clear opening of 30 inches and hinged covers.

1.02 DESCRIPTION

- A. This specification is for water ductile iron castings. Prior to the Contractor supplying castings, all manufacturers shall be approved as suppliers for the City of Kansas City, Missouri (City) and shall be able to demonstrate that there is an acceptable quality control program at the producing foundry.

1.03 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.04 RELATED SECTIONS

- A. Section 01000 – General Project Requirements.
- B. Section 01015 – Specific Project Requirements.
- C. Section 01300 – Submittals.
- C. Section 02641 – Water Valves.
- D. Section 03608 – Concrete Vaults.

1.05 CODES AND STANDARDS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. The version of the codes and standards in effect at the time of the Notice to Bidders shall be used, except as noted on the Drawings or in the Specific Project Requirements section of these specifications.
- B. American Association of State Highway and Transportation Offices (AASHTO):
AASHTO M306 (Latest Revision) – Drainage, Sewer, Utility, and Related Castings.
Standard Specifications for Highway Bridges.
- C. American Society for Testing and Materials (ASTM) International:
ASTM A536 Standard Specification for Ductile Iron Castings.
ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
ASTM C478 Standard Specification for Precast Reinforced Concrete Manholes Sections.
- D. U.S. Environmental Protection Agency: Material Safety and Data Sheet.
- E. Federal Register: 29 CFR 1910.1200 Hazard Communications.
- F. Federal Standards:
FED-STD-123 Marking for Domestic Shipment (Civilian Agencies).
- G. United States Customs Service:
Custom Regulation Chapter 1, Part 134, Article 19, U.S.C. 1304.

1.06 CONTACTOR SUBMITTALS

- A. Submit the following in accordance with Section 01300 – Submittals:
 - 1. Certified shop drawings for all castings, product data, manufacturer's catalog cut sheets, specifications and installation details.
 - 2. Casting identification and location:
 - (a) Iron Casting submittals shall include a certification of conformance in accordance with AASHTO M306 (Part 9, Certification) and HS-25 loading.
 - (b) A foundry certification shall be furnished stating that samples representing each lot have been tested, inspected and are in accordance with this specification.
 - 3. A manufacturer's affidavit certifying that the furnished castings comply with the provisions of these specifications, regardless of whether or not the purchaser has an inspector at the plant.
 - 4. All submittals shall be approved by the City before castings are ordered by the Contractor.

1.07 QUALITY ASSURANCE

- A. The Contractor is responsible for the quality assurance and quality control of the work.
- B. The Manufacturer shall guarantee items to be free of defects.
- C. Manufacturer shall have a quality control process in place and shall provide a copy of their "Quality Control Manual."
- D. The manufacturer shall keep records of all tests, MSDS sheets, foundry, lot records, product liability insurance and any customs documentation control data for a period of 3 years. The supplier agrees to furnish copies of records within two weeks after the receipt of request for such records.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Product delivery, storage and handling shall be done in accordance with this section and section 01000 – General Project Requirements, paragraph PRODUCT DELIVERY, STORAGE AND HANDLING.
- B. Check materials upon arrival. Identify and segregate as to types, functions, and sizes. Store materials off of the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.
- C. Unless otherwise specified on the purchase order, cleaning, preservation, and packaging of castings shall be in accordance with the manufacturer's commercial practice. Packing and marking shall also be adequate to ensure acceptance and safe delivery by the carrier for the mode of transportation employed.
- D. If the number of the defective items exceeds two and one half percent of the lot, the purchaser will reject the remaining quantity in the lot and the supplier will redeliver the remaining quantity of the lot.
- E. All castings shall be marked in accordance with the requirements of Federal Standard No. 123 and with Chapter 1, Part 134 of the United States Customs Service Regulations, including 19 U.S.C. 1304 paragraph, as applicable. Failure to conform to the above requirements will be just cause for rejection of castings.

PART 2 - PRODUCTS

2.01 DUCTILE IRON CASTINGS

- A. Castings shall be manufactured and tested in accordance with ASTM A536 and AASHTO M306-10 HS-25 loading.

2.02 WORKMANSHIP AND FINISH

- A. Castings shall be of uniform quality, free from all defects, holes, shrinkage, cracks and any other surface defect. Ductile iron castings shall be ground smooth and well cleaned by shot blasting. Runners, risers, fins, and other cast-on pieces shall be removed.
- B. As-cast dimensions may vary by one half the maximum shrinkage possessed by the metal or $\pm 1/16$ in/ft.
- C. As-cast weight may vary by ± 5 percent from the drawing/specification weight.
- D. For traffic service castings, bearing surfaces between rings and covers or grates and frames shall be cast or machined with such precision to prevent rocking.
- E. Circular frames and covers shall be furnished with machined horizontal bearing surfaces unless otherwise specified in the standard details.
- F. In other matters of workmanship and finish, the castings shall conform to any points agreed upon by the City and the manufacturer/supplier.

2.03 WATER VAULT FRAMES AND COVERS

- A. Frames and covers shall be as specified and shall be of the type suitable for the application. The frames and covers shall be circular and the covers with vent holes.
- B. Markings – See Figure 1 at the end of this section for approved markings.
- C. The minimum clear opening shall be 30 inches for all castings for water structures.
- D. All covers shall have provisions for ease of opening, such as concealed pick holes.
- E. Unless specified in Section 01015 – Specific Project Requirements or noted on the contract drawings, a locking mechanism is not required.
- F. Approved manufacturers:
 - 1. Clay & Bailey.
 - 2. Sigma Municipal Castings.
 - 3. EJ.
- G. Models:
 - 1. The approved manufacturers shall submit their model in accordance with this Section and Section 01300 – Submittals for review and approval.

2.04 AIR RELEASE VAULT FRAMES AND COVERS

- A. Frames and covers shall be as specified and shall be of the type suitable for the application. The frames and covers shall be circular and the covers with vent holes.
- B. Markings – See Figure 2 at the end of this section for approved markings.
- C. The minimum clear opening shall be 30 inches for all castings for water structures.
- D. All covers shall have provisions for ease of opening, such as concealed pick holes.
- E. All frames and covers shall be “Traffic Rated” in accordance with AASHTO M306 HS-25 Loading.
- F. Unless specified in Section 01015 – Specific Project Requirements or noted on the contract drawings, a locking mechanism is not required.
- G. Acceptable Manufacturers/Model include the following (or approved equal):
 - 1. Air Release Vault Frame and Cover as manufactured by East Jordan.

2.05 VALVE BOX LIDS AND COVERS

- A. Valve box lids and covers shall be as specified and shall be of the type suitable for the application. The valve box lid and cover shall be circular and the covers indented at the twelve (12) o'clock, three (3) o'clock, six (6) o'clock and nine (9) o'clock positions for ease of removal.
- B. Markings – See Figure 3 at the end of this section for approved markings.
- C. Approved manufacturers:
 - 1. Clay & Bailey.
 - 2. Sigma Municipal Castings.
 - 3. Star Pipe Products.
 - 4. EJ.
 - 5. MacLean Highline.
 - 6. Pentek Access Boxes.
- D. Models:
 - 1. The approved manufacturers shall submit their model in accordance with this Section and Section 01300 – Submittals for review and approval.

2.06 TEST STATION LIDS AND COVERS

- A. Test station lids and covers shall be as specified and shall be of the type suitable for the application. The valve box lid and cover shall be circular and the covers indented at the twelve (12) o'clock, three (3) o'clock, six (6) o'clock and nine (9) o'clock positions for ease of removal.
- B. Markings – See Figure 4 at the end of this section for approved markings.
- C. Approved manufacturers:
 - 1. Clay & Bailey.
 - 2. Sigma Municipal Castings.
 - 3. Star Pipe Products.
 - 4. EJ.
 - 5. MacLean Highline.
 - 6. Pentek Access Boxes.
- D. Models:

The approved manufacturers shall submit their model in accordance with this Section and Section 01300 – Submittals for review and approval.

PART 3 - EXECUTION

3.01 VAULT FRAMES AND COVERS

- A. The Contractor shall coordinate the installation of the castings with the work of the other trades in order to avoid delays. Install inserts or anchors as required by individual items.
- B. Install items as specified and in accordance with the manufacturer's instructions.
- C. Install items plumb, level, in alignment and anchor securely. All frames shall be anchored at four points.

3.02 CLEANING

- A. Clean all items after installation to remove rust, dirt, oil, grease and other deleterious substances.
- B. Clean all welds, bolted connections and abraded areas and apply the shop coating. Touch up damaged areas with the shop coating.

3.03 WARRANTY

- A. All castings shall have a lifetime warranty against manufacturing defects for all components.

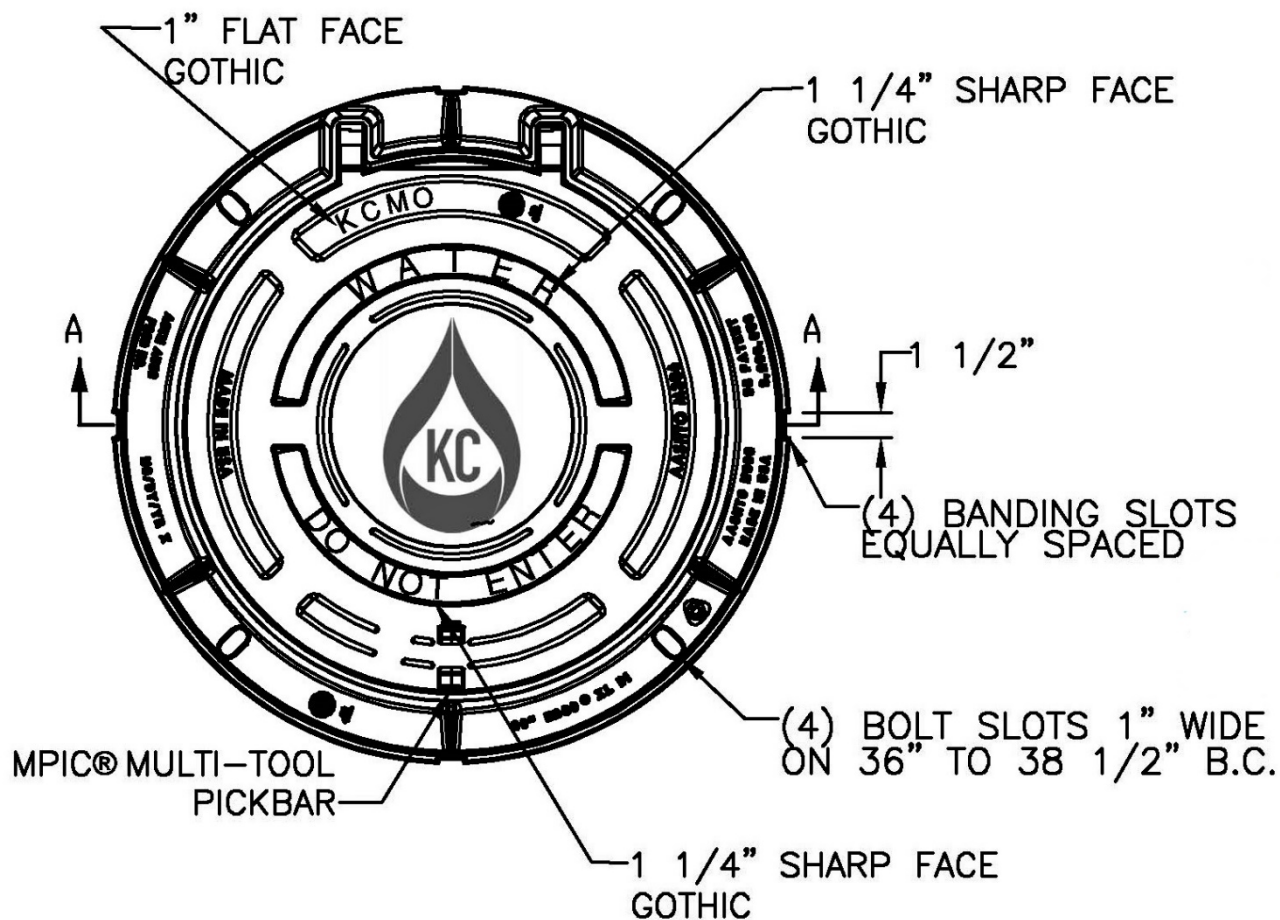


Figure 1: Standard Water Vault Markings

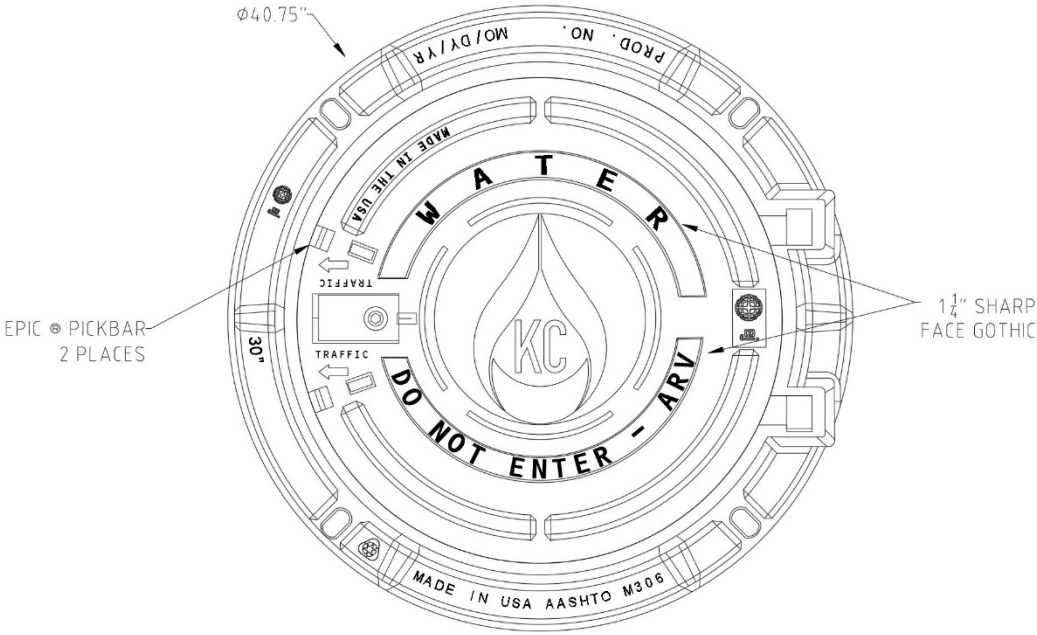


Figure 2: Standard Air Release Vault Markings

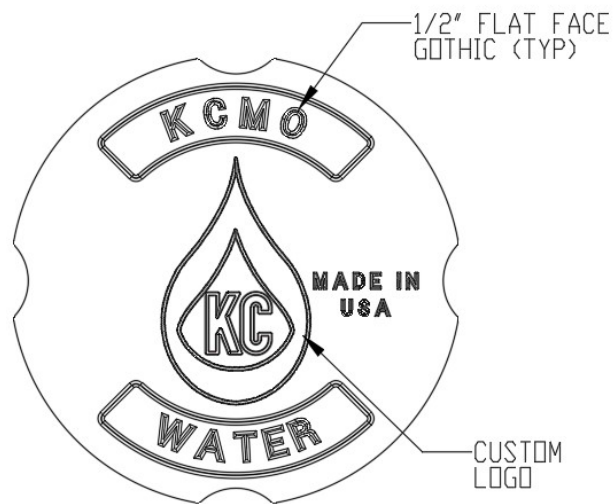


Figure 3: Standard Valve Cover Markings

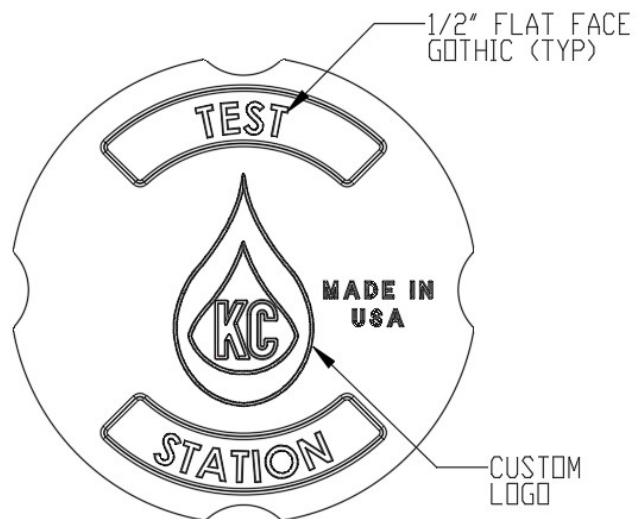


Figure 4: Standard Test Station Cover Markings

END OF SECTION

**SECTION 328423
UNDERGROUND SPRINKLERS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Pipe and fittings, valves, sprinkler heads, emitters, and accessories.
- B. Control system.
- C. Coordinate work with an existing irrigation system; perform operational testing prior to any site disturbance activities. Ensure existing zones that span the limit of disturbance are maintained in an operating condition during construction.
 - 1. Ensure existing zones that span the limit of disturbance are maintained in an operating condition during construction.

1.02 DEFINITIONS

- A. Lateral Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
- B. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
- C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.03 PERFORMANCE REQUIREMENTS

- A. Design, furnish and install a complete automatic irrigation system for the turf and plant bed areas as shown on the plans. Work to include layout, trenching, piping, backfill, valves, valve boxes, risers, emitters and controls.
- B. Delegated Design: design 100 percent head-to-head coverage irrigation system, including comprehensive analysis by a qualified irrigation designer, using performance requirements and design criteria indicated.
 - 1. Overspray onto buildings, sidewalks and parking or driveways is not permitted.
- C. Minimum Working Pressures; pipe shall be selected to accommodate twice the anticipated water pressure or pipe indicated below, whichever is greater.
 - 1. Main Piping: 200 psi
 - 2. Lateral Piping: 100 psi

1.04 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch 2013 (Reaffirmed 2018).
- B. ASTM D1784 - Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds 2020.
- C. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2021a.
- D. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series) 2020.
- E. ASTM D2464 - Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80 2015.
- F. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40 2021.
- G. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems 2020.
- H. ASTM D2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe 2021.
- I. ASTM D2672 - Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement 2020.

- J. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets 2020.
- K. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals 2019.
- L. ASTM F402 - Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings 2018.
- M. ASTM F656 - Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings 2021.
- N. ASTM F1970 - Standard Specification for Special Engineered Fittings, Appurtenances or Valves for use in Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Systems 2019.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with site backfilling, landscape grading and delivery of plant life.
- B. Preinstallation Meeting: Convene one week prior to commencing work of this Section.

1.06 FIELD DIMENSION AND LAYOUT

- A. The Contractor is responsible for furnishing, setting, and marking all line, grade, and location stakes including offsets and general construction staking.
- B. Electronic design files WILL be available to the Contractor upon request, subject to the following conditions:
 - 1. A signed Electronic File Transfer Agreement shall be required from each Contractor requesting the electronic design files prior to distribution.
 - 2. Electronic design files will be distributed as DWG files. The Contractor will be responsible for obtaining the appropriate software to open, analyze, and/or convert these file formats for their own use, and understand the risks and limitations associated with that software

1.07 SUBMITTALS

- A. Product Data: The Contractor shall submit catalog information of all equipment for approval.
- B. Delegated Design Submittal: Comply with the following performance requirements and design criteria, including analysis data.
 - 1. Water service point-of-connection and pressure.
 - 2. Zone control valves.
 - 3. Piping layout and sizes.
 - 4. Sprinkler/emitter locations, head types and area of coverage.
 - 5. Schedule of irrigation equipment indicating type, model, size and quantity.
 - 6. Typical irrigation installation details.
- C. Qualification Data for Installer: Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
 - 1. Contractor shall provide current Certificates of Training from an Authorized HDPE Fusion Equipment Manufacturer that will demonstrate that the operator is knowledgeable regarding the proper procedures and application HDPE pipe fusion.
 - 2. The Contractor shall be responsible to verify that the fusion equipment is in good operating condition and that the operator has been trained within the past twelve months. Fusion beads shall not be removed.
- D. Operation and Maintenance Data:
 - 1. Provide instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.
 - 2. Provide schedule indicating length of time each valve is required to be open to provide a determined amount of water.

- E. Statement of Warranty: Describing an understanding of the required warranty. Provide name and phone number for responsible contact. Include product warranties for each component warranted by manufacturer.
- F. Record Documents: The Contractor is responsible for documenting changes to the design.
 - 1. Record work that is installed differently than shown on the construction shop drawings. Record pipe and wiring network alterations and location changes to equipment. Keep documents current. Do not permanently cover work until as-built information is recorded.
 - 2. Turn over the "Record Drawings" to the Architect. Completion of the Record Drawings will be a prerequisite for irrigation system substantial completion and final payment.

1.08 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: An installer that has successfully installed projects of similar scope and size, with minimum three years of experience.
 - 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

1.09 WARRANTY

- A. The purpose of this guarantee/warranty is to ensure that the Owner receives irrigation materials of prime quality, installed and maintained in a thorough and careful manner.
- B. For a period of one year from date of Project Substantial Completion, the Contractor will guarantee/warranty irrigation materials, equipment, and workmanship against defects. Fill and repair depressions. Restore landscape or structural features damaged by the settlement of irrigation trenches or excavations. Repair damage to the premises caused by a defective item. Make repair within seven days of notification from the Owner's Representative.
 - 1. Contract documents govern replacements identically as with new work. Make replacements at no additional cost to the contract price.
 - 2. Guarantee/warranty applies to originally installed materials and equipment and replacements made during the guarantee/warranty period.
- C. Provide winterization and spring start up services at no additional charge during the warranty period.

PART 2 PRODUCTS

2.01 IRRIGATION SYSTEM

- A. Electric solenoid controlled underground irrigation system, with pressure blow-out drain.
- B. Manufacturers:
 - 1. Rain Bird Sales, Inc; [____]: www.rainbird.com/#sle OR approved equal as approved 5 days before final bids.
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.02 PIPE MATERIALS

- A. PVC Pipe: ASTM D2241; 200 psi (1.38 MPa) pressure rated; solvent joints for pipe 2" and smaller.
- B. PVC Pipe: ASTM D1785; Schedule 40; solvent welded sockets.
- C. PVC Fittings:
 - 1. PVC Socket Fittings: ASTM D2466, Schedule 40.
 - 2. PVC Threaded Fittings: ASTM D2464, Schedule 80.
 - a. All threaded connections shall be sealed using Teflon tape or paste.
- D. Pipe Risers at Valves: Schedule 80 PVC nipples.
- E. Solvent Cement: ASTM D2564 for PVC pipe and fittings. Include primer according to ASTM F656.

- F. Sleeves: Sleeves for pipes passing beneath paving shall conform to ASTM D2241, Schedule 40. Minimum diameter of 2 inch or 2 sizes larger than pipe scheduled to pass through them.
- G. PE Pipe with Controlled ID: ASTM D2239 PE4710 compound; SIDR 15.
 - 1. Insert Fittings for PE Pipe: ASTM D2609, nylon or propylene plastic with barbed ends. Include bands or other fasteners.

2.03 OUTLETS

- A. Sprinkler performance must meet or exceed the product specified in the irrigation schedule, except gallons per minute flow may not be exceeded by more than 5%
 - 1. Rotor Sprinkler Head: Gear drive mechanism; fully adjustable for flow and pressure; size as indicated; with letter or symbol designating degree of arc and arrow indicating center of spray pattern.
 - a. Description:
 - 1) Body Material: ABS
 - 2) Nozzle: ABS
 - 3) Retraction Spring: Stainless steel.
 - b. Capacities and Characteristics:
 - 1) Flow varies as required to provided uniform distribution within each irrigation zone.
 - 2) Pop-up Height: 4-inches to 5-inches, aboveground to nozzle.
 - 3) Arc: Variable, adjustable dependent upon location. Adjustable heads are not acceptable for use in 360 degree applications.
 - 4) Inlet: bottom inlet, NPS 3/4".
 - 2. Pop-Up Spray Type Sprinkler Head:
 - a. Description:
 - 1) Body Material: ABS
 - 2) Nozzle: ABS, color coded.
 - 3) Retraction Spring: Stainless steel.
 - 4) Pattern: Fixed, with flow adjustment.
 - b. Capacities and Characteristics:
 - 1) Flow: Varies as required to provide uniform distribution within each irrigation zone.
 - 2) Pop-up Height: 4-inches, aboveground to nozzle.
 - 3) Pressure-Regulated to 30 PSI.
 - 4) Arc: Full, half, quarter, or variable pattern nozzle as required to minimize overspray.
 - 5) Radius: Varies, up to 15 feet.
 - 6) Inlet: NPS 1/2.
 - 3. Landscape Dripline:
 - a. Description:
 - 1) Flexible, linear low-density polyethylene, ultraviolet (UV) resistance.
 - 2) Pressure compensating emitters factory molded into tubing at set intervals to deliver water at 10-60 PSI
 - 3) Fittings: UV-resistant, glass reinforced polypropylene
 - b. Capacities and Characteristics:
 - 1) Emitter spacing: 12-inch.
 - 2) Emitter flow: 0.6 GPH.
 - 3) Line spacing: as indicated
 - 4) Flush cap at the end of each run for winterization.
 - 5) One operation indicator per zone shall provide a visual indication of system operation.
 - 6) Air relief valve at the high point of each zone.
 - c. Pressure Regulating Filter:

- 1) Capable of operating between 20 - 120 PSI
- 2) The downstream pressure shall be 25 or 40 PSI regardless of variations in upstream pressure.
- 3) 150 mesh stainless steel filter, removable cap for service and cleaning.
4. Quick Coupler: Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.
 - a. Locking-Top Option: Vandal-resistant locking feature. Include one (1) matching key(s).
 - b. Delegated design Placement and Quantity: include a minimum of two (2) quick couplers in the irrigation plan. Coordinate location with Owner.
5. Swing Joints: Pre-Fabricated PVC sprinkler riser for connections between water service and sprinkler head(s) with ACME thread and O-ring sealed rotating sections as per ASTM F2768, for leak free height adjustment and impact absorption.
 - a. Reference Standard: ASTM D1784, ASTM F1970.
 - b. PVC Type I, Cell Classification 1254-B.
 - c. CWP Rating: 315 psig, ASTM D3139.
 - d. O-Ring Material: Buna.
 - e. Rotating Section Threads: ACME with O-ring seal.
 - f. Size swing joints to match inlet, NPS 1/2 to NPS 1 inch.

2.04 VALVES

- A. Automatic Control Valves: Molded-plastic body, normally closed, diaphragm type with manual-flow adjustment, adjustable pressure regulation, and operated by 24-V ac solenoid
- B. Valve Box and Cover: with open bottom and openings for piping; designed for installing flush with grade.
 1. Size: As required for valves and service but no smaller than the following:
 - a. 15"x21"x12" deep for control valves.
 - b. 10" diameter for quick coupling or isolation valves.
 - c. 6" diameter for drip irrigation flush valves.
 2. Shape: Rectangular for control valves, circular for specialties as indicated on details.
 3. Material: PE or ABS.
 4. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/8 inch minimum to 3/4 inches maximum, to 6" depth below base of box. Install prior to box installation.

2.05 CONTROLS

- A. Irrigation systems shall be equipped with controllers that contain the following features:
 1. Multiple programming capabilities, capable of storing a minimum of three different programs to allow for separate schedules.
 2. Multiple start times (cycling, cyle/soak, stackable start times), capable of a minimum of three different start times to allow for multiple irrigation cycles on the same zone for areas prone to runoff.
 3. Variable run times, capable of varying run times from 1 minute to 60 minutes.
 4. Variable scheduling, capable of interval scheduling (minimum of 14 days) to allow for watering on even day, odd day, calendar day and interval scheduling.
 5. Percent adjust (water budget) feature shall include a percent up/down adjust feature that permits the user to increase or decrease the run-times for each zone by a prescribed percentage, by means of one adjustment without modifying the settings for that individual zone.
 6. Capable to accept external soil moisture and/or rain sensors.
 7. Non-volatile memory or self-charging battery circuit.
 8. Complete shutoff capability for total cessation of outdoor irrigation.
- B. Rain sensors, equip irrigation system with rain-sensor.

- C. Two-Wire Controllers:
 - 1. Wire Conductors: 14 AWG with solid copper conductors; insulated for direct burial and compatible with control system specified.
 - 2. Decoders shall be compatible with control system and provided in single-station configurations.
 - 3. All connections shall be made with 3M DBY watertight wire connectors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify location of existing utilities.
- B. Verify that water stub out is available, in proper location, and ready for use.

3.02 PREPARATION

- A. Piping layout indicated is diagrammatic only. Route piping to avoid plants, ground cover, and structures.
- B. Layout and stake locations of system components.
- C. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system.

3.03 TRENCHING

- A. Trench Size:
 - 1. Minimum Cover Over Installed Mainline Piping: 24-inches.
 - 2. Minimum Cover Over Installed Lateral Piping: 12-inches.
 - 3. Minimum Cover Over Installed Sleeve Piping: 24-inches.
 - 4. Maximum Cover Over Installed Piping: 24-inches.
- B. Trench to accommodate grade changes.
- C. Maintain trenches free of debris, material, or obstructions that may damage pipe.

3.04 PIPING INSTALLATION

- A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.
- B. Install piping free of sags and bends.
- C. Install groups of pipes parallel to each other, spaced to permit valve servicing.
- D. Install fittings for changes in direction and branch connections.
- E. Install expansion loops in control-valve boxes for plastic piping.
- F. Lay piping on solid subbase, uniformly sloped without humps or depressions.
- G. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperatures above 40 deg F before testing.
- H. Install piping in sleeves under parking lots, roadways, and sidewalks in sleeves made of Schedule PVC pipe and socket fittings, and solvent-cemented joints.

3.05 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. PE Piping Fastener Joints: Join with insert fittings and bands or fasteners according to piping manufacturer's written instructions.
- E. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
 2. PVC Pressure Piping: Join schedule number, ASTM D1785, PVC pipe and PVC socket fittings according to ASTM D2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D2855.
 3. PVC Nonpressure Piping: Join according to ASTM D2855.

3.06 SPRINKLER INSTALLATION

- A. Install sprinklers after hydrostatic test is completed.
- B. Install sprinklers at manufacturer's recommended heights.
- C. Install sprinklers utilizing factory pre-fabricated swing joints or swivel joints.
- D. Locate part-circle sprinklers to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries unless otherwise indicated.

3.07 DRIP IRRIGATION INSTALLATION

- A. Install drip tubes with direct-attached emitters on ground, conceal with landscape mulch.
- B. Install air relief valves at highest point within each drip zone.

3.08 CONTROL WIRE

- A. Wire Splices: No splices between controller and valve without prior approval and documentation on as-built drawings.
- B. Install control cable in same trench as irrigation piping and at least 2-inches below, or beside, piping. Bundle wires together and tape at 10 foot intervals. Provide an 18-inch expansion loop at all sleeve ends, direction changes and at every valve box. Allow expansion coils at zone valves long enough so valve bonnet may be removed for maintenance.
- C. Control system shall be properly grounded per manufacturer's published recommendations and at a minimum shall include surge protection at every 500 feet, or every 8 decoders, whichever is smaller.

3.09 FIELD QUALITY CONTROL

- A. Tests and Inspections:
- B. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 1. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Performance Testing: After system is 100% installed, perform a coverage test to determine whether water coverage and operation of the system is adequate for planting, without areas of excessive flooding, dry spots, areas of insufficient overlap, or excessive overspray. If the irrigation system is determined by the Owner to be inadequate due to poor workmanship or materials, it shall be replaced or repaired at Contractor's expense and both pressure and coverage tests repeated until accepted.

3.10 BACKFILLING

- A. Excavated soil may be used as backfill. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, trash, and other extraneous matter. In rocky soil provide sand

backfill material around and under the piping and risers by hand to a height of 6" above all piping. Backfill shall be compacted to 95% minimum density by mechanical tamping. Trench must be free of water during backfilling operation.

- B. All backfill around valves and risers shall be mechanically compacted to 95% minimum density.
- C. Backfill trench and compact to specified subgrade elevation. Protect piping from displacement.

3.11 SYSTEM STARTUP

- A. Prepare and start system in accordance with manufacturer's instructions.
- B. Contractor will review controller programming and update or change program throughout establishment period. Programming must conform to local watering restrictions. Contractor is liable for fines associated with watering during restricted times.
- C. Adjust control system to achieve time cycles required.
- D. Adjust head types for full water coverage as directed.

3.12 CLOSEOUT ACTIVITIES

- A. Instruct Owner 's personnel in operation and maintenance of system, including adjusting of controller timing. Use operation and maintenance data as basis for demonstration.

3.13 MAINTENANCE

- A. Provide one complete spring start-up and a fall shutdown by installer, at no extra cost to Owner.

END OF SECTION

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Provide additional submittals as required by specification 01300 Submittals.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. One of the following or equal:
 - 1. 600 volt class wire and cable:
 - a. General Cable.
 - b. Okonite Co.
 - c. Southwire Co.
 - d. Service Wire.
 - 2. Instrumentation class wire and cable:
 - a. Alpha Wire Co.
 - b. Belden CDT.
 - c. General Cable.
 - d. Okonite Co.
 - e. Rockbestos Surprenant Cable Corp.

2.2 CONDUCTORS AND CABLES

- A. Conductors: Copper and comply with NEMA WC 70/ICEA S-95-658.

- B. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.

2.3 MANUFACTURED UNITS

- A. Instrumentation class cable:

1. Type TC.
2. Suitable for use in wet locations.
3. Voltage rating: 600 volts.
4. Temperature rating:
 - a. 90 degree Celsius rating in dry locations.
 - b. 75 degree Celsius rating in wet locations.
5. Conductors:
 - a. Insulation:
 - 1) Flame-retardant PVC, 15 mils nominal thickness, with nylon jacket 4 mils nominal thickness.
 - b. #14 AWG stranded and tinned.
 - c. Color code: ICEA Method 1:
 - 1) Pair: Black and white.
 - 2) Triad: Black, white and red.
 - 3) Multiple pairs or triads:
 - a) Color-coded and numbered.
6. Drain wire:
 - a. #18 AWG.
 - b. Stranded, tinned.
7. Jacket:
 - a. Flame retardant, moisture and sunlight resistant PVC.
 - b. Ripcord laid longitudinally under jacket to facilitate removal.
8. Shielding:
 - a. Individual pair/triad:
 - 1) Minimum 1.35-mil double-faced aluminum foil-polyester tape overlapped to provide 100 percent coverage.
 - b. Multiple pair or triad shielding:
 - 1) Group shield: Minimum 1.35-mil double-faced aluminum foil-polyester tape overlapped to provide 100 percent coverage.
 - 2) Completely isolate group shields from each other.
 - 3) Cable shield: 2.35 mils double-faced aluminum and synthetic polymer backed tape overlapped to provide 100 percent coverage.
 - c. All shielding to be in contact with the drain wire.

2.4 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.5 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 3 EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger. Minimum size shall be No. 12 AWG.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded. Minimum size shall be No. 12 AWG.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-2-THWN-2, single conductors in raceway.
- C. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors where possible.
- B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 - Raceways and Boxes for Electrical Systems prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Instrumentation class cable:
 - 1. Install instrumentation class cables in separate raceway systems from power cables:
 - a. Install instrument cable in metallic conduit within non-dedicated manholes or pull boxes.
 - b. Install cable without splices between instruments or between field devices and instrument enclosures or panels.
 - 2. Do not make intermediate terminations, except in designated terminal boxes as indicated on the Drawings.
 - 3. Shield grounding requirements as specified in Section 26 05 26 - Grounding and Bonding for Electrical Systems. Ground shield on one end only. Cut and tape shield on the other end.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 - Identification for Electrical Systems.
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 – Sleeves and Sleeve Seals for Electrical Raceways and Cabling.

3.7 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements.
 - a. Motor circuits.
 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- B. Test and Inspection Reports: Prepare a written report to record the following:
1. Procedures used.
 2. Results that comply with requirements.
 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Grounding systems and equipment.

1.2 ACTION SUBMITTALS

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

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad; 3/4 inch in diameter by 10 feet for service entrance and SCADA antenna shall be 3/4 inch in diameter by 8 feet.

PART 3 EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install stranded conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 4/0 AWG minimum. Bury at least 36 inches below grade.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Conductor Terminations and Connections:
 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Welded connectors except as otherwise indicated.
 3. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 1. Feeders and branch circuits.
 2. Lighting circuits.
 3. Receptacle circuits.
 4. Single-phase motor and appliance branch circuits.
 5. Three-phase motor and appliance branch circuits.
 6. Flexible raceway runs.
 7. Armored and metal-clad cable runs.

- B. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
 - 1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 - 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding bus.
 - 3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

- E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.

3.4 LABELING

- A. Comply with requirements in Section 26 05 53 – Identification for Electrical Systems for instruction signs. Ground conductor insulation shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
 - 1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the Facility Manager."

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.
- C. Provide additional submittals as required by specification 01300 Submittals.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, and coordinated with each other, using input from installers of the items involved:
- B. Welding certificates.

PART 2 PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.
 - 1. Material: Stainless Steel, Grade 304.
 - 2. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 - 3. Channel Dimensions: Selected for applicable load criteria.
- B. Conduit and Cable Support Devices: Stainless-steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Manufacturers shall be Allied Tube & Conduit, B-Line, Erico Int., Uni-Strut or approved equal.

- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M stainless steel plates, shapes, and bars.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-stainless steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers shall be Hilty, ITW, MKT or approved equal.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers shall be B-Line, Empire, Hilty or approved equal.
 - 3. Concrete Inserts: Stainless steel, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 stainless steel units are suitable for attached structural element.
 - 5. Through Bolts: Stainless steel structural type, hex head, and high strength. Comply with ASTM A 325.
 - 6. Toggle Bolts: Stainless-steel springhead type.
 - 7. Hanger Rods: Threaded stainless steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Stainless steel.

PART 3 EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

- B. Comply with requirements for raceways and boxes specified in Section 26 05 33 Raceways and Boxes for Electrical Systems.
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with stainless steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with single-bolt stainless steel conduit clamps using spring friction action for retention in support channel.
- E. Spring- stainless steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum conduits, tubing, and fittings.
 - 2. Nonmetal conduits, tubing, and fittings.
 - 3. Aluminum wireways and auxiliary gutters.
 - 4. Surface raceways.
 - 5. Boxes, enclosures, and cabinets.
 - 6. Handholes and boxes for exterior underground cabling.

1.2 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.
- C. Provide additional submittals as required by specification 01300 Submittals.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 - 1. Structural members in paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ARC: Aluminum Rigid Conduit - Comply with ANSI C80.5 and UL 6A.
- C. FMC: Comply with UL 1; aluminum.
- D. LFMC: Flexible aluminum conduit with PVC jacket and complying with UL 360.

- E. PVC Coated Rigid Steel Conduit: Comply with UL6 and ANSI C80.1.
- F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Provide conduit seals and Comply with UL 886 and NFPA 70.
 - 2. Expansion Fittings: PVC or aluminum to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- G. Joint Compound for ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- C. LFNC: Comply with UL 1660.
- D. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- E. Fittings for LFNC: Comply with UL 514B.
- F. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet and corrosive locations.
- B. Metal Outlet and Device Boxes: Comply with NEMA FB 1, stainless steel, Type FD, with gasketed cover.
- C. Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, stainless steel with gasketed cover.
- D. Provide stainless steel box extensions where required.
- E. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- F. Gangable boxes are prohibited.

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
1. Standard: Comply with SCTE 77. Load rating: Tier as indicated on plans.
 2. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
 3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 5. Cover Legend: Molded lettering, "ELECTRIC".
 6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

PART 3 EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: ARC.
 2. Concealed Conduit, Aboveground: ARC.
 3. Underground Conduit: RNC, Type EPC-40-PVC.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Boxes, Enclosures, Mounting Hardware, Aboveground: NEMA 250, Type 4X, stainless steel.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated.
1. Exposed, Not Subject to Physical Damage: ARC.
 2. Exposed, Not Subject to Severe Physical Damage: ARC.
 3. Exposed and Subject to Severe Physical Damage: ARC.
 4. Concealed in Ceilings and Interior Walls and Partitions: ARC.

- 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): Aluminum FMC, except use LFMC in damp or wet locations.
- 6. Damp or Wet Locations: ARC.
- 7. In Concrete: PVC Coated Rigid Steel.
- 8. Boxes and Enclosures and Mounting Hardware: Aluminum wet location rated.
- C. Minimum Raceway Size: 3/4-inch trade size unless indicated otherwise on plans.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid Aluminum Conduit: Use threaded rigid conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 - 2. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- D. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- E. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- F. Support conduit within 12 inches of enclosures to which attached.
- G. Stub-ups to Above Ceilings:
 - 1. Use ARC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- H. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Utilize Meyers Hubs, apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

- I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors.
- J. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- L. At conduit penetration to cabinets use listed conduit seal.
- M. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- N. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.
- O. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Where otherwise required by NFPA 70.
- P. Expansion-Joint Fittings:
 - 1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet.
 - 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F of temperature change for PVC conduits.

4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- Q. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- R. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- S. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.
- T. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- U. Locate boxes so that cover or plate will not span different building finishes.
- V. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- W. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- X. Set metal floor boxes level and flush with finished floor surface.
- Y. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- 3.3 INSTALLATION OF UNDERGROUND CONDUIT
- A. Underground Conduit:
1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom to allow for clear unobstructed pipe installation. Remove rocks and other debris which could damage conduit.
 2. Install backfill without debris or rocks.
 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.

4. Install manufactured duct elbows for stub-up at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured PVC coated rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Underground Warning Tape: Comply with requirements in Section 26 05 53 – Identification for Electrical Systems.

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
- D. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 – Sleeves and Sleeve Seals for Electrical Raceways and Cabling.

3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 05 33

SECTION 26 05 44 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Provide additional submittals as required by specification 01300 Submittals.

PART 2 PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, Stainless Steel, plain ends.

- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Stainless-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Stainless sheet steel.
2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. Metraflex Company (The).
 - d. Pipeline Seal and Insulator, Inc.
 - e. Proco Products, Inc.
 - 2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Stainless steel.
 - 4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Presealed Systems.

2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
 2. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

PART 3 EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 1. Use circular stainless steel sleeves unless penetration arrangement requires rectangular sleeved opening.
 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible stainless steel or aluminum boot-type flashing units applied in coordination with roofing work.

- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using stainless steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install stainless steel pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 26 05 44

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.2 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Provide additional submittals as required by specification 01300 Submittals.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage.
- C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Self Laminated machine printed labels are required. Handwritten labels shall not be allowed.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.
- D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.
- E. Self Laminated Machine Printed Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

- B. Self-Adhesive, Self Laminating Polyester Labels: Write-on, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.
- C. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around conductor it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.
- D. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- E. Printed-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Labels for Tags: Self-adhesive label, machine-printed with permanent, waterproof, black ink recommended by printer manufacturer, sized for attachment to tag.

2.4 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
 - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

2.5 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
 - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. 1/4-inch grommets in corners for mounting.

3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 42 INCHES."

2.6 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
1. Engraved legend with black letters on white face.
 2. Punched or drilled with mechanical fasteners.
 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.7 EQUIPMENT IDENTIFICATION LABELS

- A. Punched or Drilled Mechanically Fastened Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- E. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.
- H. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Install labels at 30-foot maximum intervals.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. Stand-By Power.
 - 2. Power.
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.

- a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - d. Colors for 240/120-V Circuits:
 - 1) Hot: Black.
 - 2) Neutral: White.
 - e. Colors for 240V, 3-Phase Circuits: Per NEC requirements.
 - f. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
 - E. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.
 - F. Control-Circuit Conductor Termination Identification: For identification at terminations provide self-adhesive vinyl labels with the conductor designation.
 - G. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
 - H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
 - I. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 - 1. Limit use of underground-line warning tape to direct-buried cables.
 - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

- J. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated.
- K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections
- L. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- M. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.
- N. Equipment Identification Pre-Printed Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Indoor Equipment: Adhesive film label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 - e. Hand written labels shall not be allowed.

END OF SECTION 26 05 53

SECTION 26 05 73.16 - COORDINATION STUDIES

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes computer-based, fault-current and overcurrent protective device coordination studies. Protective devices shall be set based on results of the protective device coordination study.

1.2 ACTION SUBMITTALS

- A. Product Data: For computer software program to be used for studies.
- B. Other Action Submittals: The following submittals shall be made after the approval process for system protective devices has been completed. Submittals shall be in digital form.
 - 1. Coordination-study input data, including completed computer program input data sheets.
 - 2. Study and Equipment Evaluation Reports.
 - 3. Coordination-Study Report.
- C. Provide additional submittals as required by specification 01300 Submittals.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For coordination-study specialist.
- B. Product Certificates: For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399.

1.4 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.
- B. Coordination-Study Specialist Qualifications: An entity experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
 - 1. Professional Design Professional, licensed in the state where Project is located, shall be responsible for the study. All elements of the study shall be performed under the direct supervision and control of Design Professional.
- C. Comply with IEEE 242 for short-circuit currents and coordination time intervals.
- D. Comply with IEEE 399 for general study procedures.

PART 2 PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPER

- A. Available Computer Software Developer: Subject to compliance with requirements, companies offering computer software programs that may be used in the Work are limited to the following:
 - 1. SKM Systems Analysis, Inc.

2.2 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

- A. Comply with IEEE 399.
- B. Analytical features of fault-current-study computer software program shall include "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.
- C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

PART 3 EXECUTION

3.1 POWER SYSTEM DATA

- A. Gather and tabulate the following input data to support coordination study:
 - 1. Product Data for overcurrent protective devices specified in other Division 26 Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 - 2. Impedance of utility service entrance.
 - 3. Electrical Distribution System Diagram: In hard-copy and electronic-copy formats, showing the following:
 - a. Circuit-breaker and fuse-current ratings and types.
 - b. Relays and associated power and current transformer ratings and ratios.
 - c. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
 - d. Cables: Indicate conduit material, sizes of conductors, conductor material, insulation, and length.
 - e. Busway ampacity and impedance.
 - f. Motor horsepower and code letter designation according to NEMA MG 1.
 - 4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:

- a. Special load considerations, including starting inrush currents and frequent starting and stopping.
- b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
- c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
- d. Ratings, types, and settings of utility company's overcurrent protective devices.
- e. Special overcurrent protective device settings or types stipulated by utility company.
- f. Time-current-characteristic curves of devices indicated to be coordinated.
- g. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
- h. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
- i. Panelboards, switchboards, ampacity, and interrupting rating in amperes rms symmetrical.

3.2 FAULT-CURRENT STUDY

- A. Calculate the maximum available short-circuit current in amperes rms symmetrical at circuit-breaker positions of the electrical power distribution system. The calculation shall be for a current immediately after initiation and for a bolted short circuit at each of the following:
 1. Service Entrance Equipment.
 2. Branch circuit panelboard.
 3. Generators.
- B. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.
- C. Calculate momentary and interrupting duties on the basis of maximum available fault current.
- D. Calculations to verify interrupting ratings of overcurrent protective devices shall comply with IEEE 241 and IEEE 242.
 1. Transformers:
 - a. ANSI C57.12.22.
 - b. IEEE C57.12.00.
 - c. IEEE C57.96.
 2. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.20.1.
 3. Low-Voltage Fuses: IEEE C37.46.
- E. Study Report:
 1. Show calculated X/R ratios and equipment interrupting rating (1/2-cycle) fault currents on electrical distribution system diagram.

F. Equipment Evaluation Report:

1. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
2. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
3. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

3.3 COORDINATION STUDY

A. Perform coordination study using approved computer software program. Prepare a written report using results of fault-current study. Comply with IEEE 399.

1. Calculate the maximum and minimum 1/2-cycle short-circuit currents.
2. Calculate the maximum and minimum interrupting duty (5 cycles to 2 seconds) short-circuit currents.
3. Calculate the maximum and minimum ground-fault currents.

B. Comply with IEEE 241 and IEEE 242 recommendations for fault currents and time intervals.

C. Transformer Primary Overcurrent Protective Devices:

1. Device shall not operate in response to the following:
 - a. Inrush current when first energized.
 - b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
 - c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.
2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.

D. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.

E. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:

1. Tabular Format of Settings Selected for Overcurrent Protective Devices:
 - a. Device tag.
 - b. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.

- c. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.
 - d. Fuse-current rating and type.
 - e. Ground-fault relay-pickup and time-delay settings.
 - 2. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
 - a. Device tag.
 - b. Voltage and current ratio for curves.
 - c. Single-phase damage points for each transformer.
 - d. No damage, melting, and clearing curves for fuses.
 - e. Cable damage curves.
 - f. Transformer inrush points.
 - g. Maximum fault-current cutoff point.
- F. Completed data sheets for setting of overcurrent protective devices.

END OF SECTION 26 05 73.16

SECTION 26 05 73.19 - ARC FLASH HAZARD ANALYSIS

PART 1 GENERAL

1.1 SUMMARY

- A. The scope of this document is to provide requirements for providing a low voltage (600 volts and below) Arc Flash Hazard Analysis and documentation.

1.2 REQUIREMENTS

- A. A low voltage Arc Flash Hazard Analysis shall be provided for this project. The analysis shall be based on the specific equipment installed, and shall be updated to include project "as built" documentation. Where the arc flash hazard/risk category is equal to or greater than level 3, the overcurrent protective device coordination study should be reviewed to reduce the hazard/risk level. The analysis shall be based on the specific devices installed and include (but not be limited to) the following:
 - 1. Service Entrance Equipment.
 - a. All overcurrent protective devices installed in service entrance equipment and panelboards.
 - 2. Feeder Circuits.
 - a. All Branch circuit overcurrent protective devices installed.
 - 3. Branch Circuits.
 - a. All Branch circuit overcurrent protective devices installed.
 - b. All motor circuit overcurrent protective devices for motors.
- B. The project shall include printed waterproof labels for equipment that lists the specific arc flash hazard/risk category at each location.
- C. Format
 - 1. A preliminary Arc Flash Hazard Analysis shall be submitted to the Engineer no later than three (3) weeks after the overcurrent protective device shop drawings have been approved.
 - 2. The Arc Flash Hazard Analysis shall be reviewed and updated to reflect any changes and corrections to conductor length within one week of the final electrical walk through for punchlist. The low voltage arc flash hazard analysis shall include the stamp or seal and signature of the preparing engineer, and shall be reviewed and approved by the Engineer of Record.
 - 3. Engineer approved Arc Flash Hazard warning labels shall be furnished and installed prior to project completion.

4. The low voltage arc flash hazard analysis shall be provided using the SKM Systems Analysis, Inc.
5. Prior to project completion, the low voltage arc flash hazard analysis shall be provided in both hard copy and on computer disk. The hard copy shall clearly show each device set point. The computer disk shall include the complete coordination file including all device curves.

END OF SECTION 26 05 73.19

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 ACTION SUBMITTALS

- A. Provide submittals per Division 1.
- B. Product Data: For each type of product indicated.
- C. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Include evidence of NRTL listing for series rating of installed devices.
 - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Include wiring diagrams for power, signal, and control wiring.
 - 8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Panelboard schedules for installation in panelboards.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS**2.1 GENERAL REQUIREMENTS FOR PANELBOARDS**

- A. Enclosures: Surface-mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 4X stainless steel.
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 - 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
 - 4. Directory Card: Inside panelboard door, mounted in transparent card holder.
- B. Incoming Mains Location: As required.
- C. Phase, Neutral, and Ground Buses: Tin-plated, high-strength, electrical-grade copper, with compression connectors for outgoing conductors.
- D. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Suitable for use with copper conductors.
 - 2. Main and Neutral Lugs: Compression type.
 - 3. Ground Lugs and Bus Configured Terminators: Compression type.
 - 4. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

- 5. Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
- E. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 PERFORMANCE REQUIREMENTS

- A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1.

2.3 DISTRIBUTION PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Approved equal.
- B. Panelboards: NEMA PB 1, power and feeder distribution type.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- D. Mains: As indicated on plans.
- E. Branch Overcurrent Protective Devices: Bolt-on circuit breakers.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Schneider Electric – Sq.D.
 - 4. Approved equal.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: As indicated on plans.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

- E. Contactors in Main Bus: NEMA ICS 2, Class A, mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
 - 1. External Control-Power Source: 120-V branch circuit.
- F. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- G. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Schneider Electric – Sq.D.
 - 4. Approved equal.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
 - 3. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - d. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
 - e. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
 - f. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Receive, inspect, handle, store and install panelboards and accessories according to NECA 407.
- B. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- D. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
- E. Install filler plates in unused spaces.
- F. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- G. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 26 05 53 – Identification for Electrical Systems.
- B. Create a directory to indicate installed circuit loads and incorporating Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 05 53 – Identification for Electrical Systems.
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 26 05 53 – Identification for Electrical Systems.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Weather-resistant receptacles.
3. Snap switches.
4. Wall-switch and exterior occupancy sensors.
5. Communications outlets.
6. Switched Receptacles (refer to plans for requirements).

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.
- C. Provide additional submittals as required by specification 01300 Submittals.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).

2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand (Pass & Seymour).

- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Provide 3 year material and labor warranty.
- C. Comply with NFPA 70.
- D. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 5351 (single), CR5362 (duplex).
 - b. Hubbell; HBL5351 (single), HBL5352 (duplex).
 - c. Leviton; 5891 (single), 5352 (duplex).
 - d. Pass & Seymour; 5361 (single), 5362 (duplex).
 - e. Provide Classified Hazardous rated devices as required.

2.4 GFCI RECEPTACLES

- A. General Description:
 1. Straight blade, non-feed-through type.
 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
 4. Provide Classified Hazardous rated devices as required.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; VGF20.
 - b. Hubbell; GFR5352L.
 - c. Pass & Seymour; 2095.
 - d. Leviton; 7590.

2.5 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Provide Classified Hazardous rated devices as required.
- C. Switches, 120/277 V, 20 A:
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Single Pole:
 - 1) Cooper; AH1221.
 - 2) Hubbell; HBL1221.
 - 3) Leviton; 1221-2.
 - 4) Pass & Seymour; CSB20AC1.
 - b. Two Pole:
 - 1) Cooper; AH1222.
 - 2) Hubbell; HBL1222.
 - 3) Leviton; 1222-2.
 - 4) Pass & Seymour; CSB20AC2.

2.6 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 1. Plate-Securing Screws: Metal with head color to match plate finish.
 2. Material for Dry Locations: 0.035-inch- thick, satin-finished, Type 302 stainless steel.
 3. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.7 FINISHES

- A. Device Color:
 1. Wiring Devices Connected to Normal Power System: Ivory unless otherwise indicated or required by NFPA 70 or device listing.
 2. Wiring Devices Connected to Stand-By Power System: Red.

- 3. TVSS Devices: Blue.
- B. Wall Plate Color: Natural stainless steel.

PART 3 EXECUTION

3.1 INSTALLATION

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

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

E. Receptacle Orientation:

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

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

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

3.2 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar

problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

- C. Wiring device will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 26 27 26

SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Non-fusible switches.
 - 2. Molded-case circuit breakers (MCCBs).
 - 3. Enclosures for switches and breakers.

1.2 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. ABB/General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, voltage as indicated on plans, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Type HD, Heavy Duty, Double Throw, voltage as indicated on plans, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- D. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Lugs: Suitable for number, size, and conductor material.

2.2 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. ABB/General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Square D; a brand of Schneider Electric.
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Features and Accessories:
 - 1. Standard frame sizes, trip ratings, and number of poles.
 - 2. Lugs: Suitable for number, size, trip ratings, and conductor material.
 - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.

4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
6. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
7. Alarm Switch: One NO contact that operates only when circuit breaker has tripped.

2.3 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location as indicated below.
 1. Outdoor Locations: NEMA Type 4X stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Comply with requirements in Section 26 05 53 – Identification for Electrical Systems.
 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 2. Test continuity of each circuit.
- C. Tests and Inspections:
 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 26 28 16

SECTION 265613 - LIGHTING POLES AND STANDARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Poles and accessories for support of luminaires.

1.2 DEFINITIONS

- A. EPA: Equivalent projected area.
- B. Luminaire: Complete luminaire.
- C. Pole: Luminaire-supporting structure, including tower used for large-area illumination.
- D. Standard: See "Pole."

1.3 ACTION SUBMITTALS

- A. Product Data: For each pole, accessory, and luminaire-supporting and -lowering device.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and mounting and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Detail fabrication and assembly of poles and pole accessories.
 - 4. Foundation construction details, including material descriptions, dimensions, anchor bolts, support devices, and calculations, signed and sealed by a professional engineer licensed in the state of installation.
 - 5. Anchor bolt templates keyed to specific poles and certified by manufacturer.
 - 6. Method and procedure of pole installation. Include manufacturer's written installations.

1.4 INFORMATIONAL SUBMITTALS

- A. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements according to AASHTO LTS-6-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations signed and sealed by a professional engineer.
- B. Material test reports.
- C. Field quality-control reports.
- D. Sample warranty.

- E. Soil test reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data for pole-lowering devices and pole-mounted accessories.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of pole(s) that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within a specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs from special warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design pole foundation and pole power system.
- B. Seismic Performance: Foundation and pole shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
 2. Component Importance Factor:1.5.
- C. Structural Characteristics: Comply with AASHTO LTS-6-M.
- D. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied according to AASHTO LTS-6-M.
- E. Live Load: Single load of 500 lbf (2200 N) distributed according to AASHTO LTS-6-M.
- F. Ice Load: Load of 3 lbf/sq. ft. (145 Pa), applied according to AASHTO LTS-6-M for applicable areas on the Ice Load Map.
- G. Wind Load: Pressure of wind on pole and luminaire, calculated and applied according to AASHTO LTS-6-M.
 1. Basic wind speed for calculating wind load for poles 50 feet (15 m) high or less is 90 mph (40 m/s)
 - a. Wind Importance Factor: 1.0
 - b. Minimum Design Life: 25 years
 - c. Velocity Conversion Factor:1.0

- H. Strength Analysis: For each pole, multiply the actual EPA of luminaires and brackets by a factor of 1.1 to obtain the EPA to be used in pole selection strength analysis.
- I. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

2.2 ALUMINUM POLES

- A. Poles: Seamless, extruded structural tube complying with ASTM B221, Alloy 6061-T6, with access handhole in in pole wall.
 - 1. Shape: Square, straight.
 - 2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- B. Brackets for Luminaires: Detachable, cantilever, without underbrace.
 - 1. Adaptor fitting welded to pole, allowing the bracket to be bolted to the pole-mounted adapter, then bolted together with stainless-steel bolts.
 - 2. Cross Section: Tapered oval, with straight tubular end section to accommodate luminaire. Match pole material and finish.
- C. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
- D. Grounding and Bonding Lugs: Bolted 1/2-inch (13-mm) threaded lug, complying with requirements in Section 260526 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
- E. Fasteners: Stainless steel, size and type as determined by manufacturer. Corrosion-resistant items compatible with support components.
 - 1. Materials: Compatible with poles and standards as well as to substrates to which poles and standards are fastened and shall not cause galvanic action at contact points.
 - 2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
- F. Handhole: Oval shaped, with minimum clear opening of 2-1/2 by 5 inches (65 by 130 mm), with cover secured by stainless-steel captive screws.
- G. Prime-Coat Finish: Manufacturer's standard prime-coat finish ready for field painting.
- H. Powder-Coat Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
 - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair powder coat bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
 - 2. Powder coat shall comply with AAMA 2604.

- a. Electrostatic applied powder coating; single application with a minimum 2.5- to 3.5-mils (64- to 89-um) dry film thickness; cured according to manufacturer's instructions. Coat interior and exterior of pole for equal corrosion protection.
- b. Color: To be determined by owner.

2.3 POLE ACCESSORIES

- A. Base Covers: Manufacturers' standard metal units, finished same as pole, and arranged to cover pole's mounting bolts and nuts.

2.4 MOUNTING HARDWARE

- A. Anchor Bolts: Manufactured to ASTM F1554, Grade 55, with a minimum yield strength of 55,000 psi (380 000 kPa).
- B. Nuts: ASTM A563, Grade A, Heavy-Hex.
- C. Washers: ASTM F436, Type 1.

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 POLE FOUNDATION

- A. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Structural steel complying with ASTM A36/A36M and hot-dip galvanized according to ASTM A123/A123M; and with top-plate and mounting bolts to match pole-base flange and strength required to support pole, luminaire, and accessories. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."
- B. Anchor Bolts: Install plumb using manufacturer-supplied steel template, uniformly spaced.

3.2 POLE INSTALLATION

- A. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 033000 "Cast-in-Place Concrete."
- B. Foundation-Mounted Poles: Mount pole with leveling nuts and tighten top nuts to torque level according to pole manufacturer's written instructions.

- C. Poles and Pole Foundations Set in Concrete-Paved Areas: Install poles with a minimum 6-inch- (150-mm-) wide, unpaved gap between the pole or pole foundation and the edge of the adjacent concrete slab. Fill unpaved ring with pea gravel. Insert material to a level 1 inch (25 mm) below top of concrete slab.
- D. Raise and set pole using web fabric slings (not chain or cable) at locations indicated by manufacturer.

3.3 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum using insulating fittings or treatment.
- B. Steel Conduits: Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50-percent overlap.

3.4 GROUNDING

- A. Ground Metal Poles and Support Structures: Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."
 - 1. Install grounding electrode for each pole unless otherwise indicated.
 - 2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

END OF SECTION 265613

SECTION 265619 - LED EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
2. Luminaire supports.

B. Related Requirements:

1. Section 265613 "Lighting Poles and Standards" for poles and standards used to support exterior lighting equipment.

1.2 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of luminaire.
- B. Shop Drawings: For nonstandard or custom luminaires.
1. Include plans, elevations, sections, and mounting and attachment details.
 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 3. Include diagrams for power, signal, and control wiring.
- C. Delegated-Design Submittal: For luminaire supports.
1. Include design calculations for luminaire supports and seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale and coordinated.

- B. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
- C. Product Certificates: For each type of the following:
 - 1. Luminaire.
- D. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.
 - 1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.

1.6 FIELD CONDITIONS

- A. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.7 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.
 - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

2.2 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

- D. UL Compliance: Comply with UL 1598 and listed for wet location.
- E. Lamp base complying with ANSI C81.61
- F. CRI of 80. CCT of 4000 K
- G. L70 lamp life of 50,000 hours.
- H. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- I. Nominal Operating Voltage: 120 V ac.
- J. Lamp Rating: Lamp marked for outdoor use.
- K. Source Limitations:
 - 1. Obtain luminaires from single source from a single manufacturer.
 - 2. For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.3 MATERIALS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- C. Diffusers and Globes:
 - 1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - 2. Glass: Annealed crystal glass unless otherwise indicated.
 - 3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
- D. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- E. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- F. Housings:
 - 1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
 - 2. Provide filter/breather for enclosed luminaires.

2.4 FINISHES

- A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- C. Factory-Applied Finish for Aluminum luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - 2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
 - 3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 - 4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.
 - a. Color: Per fixture schedule.
- D. Factory-Applied Finish for Steel luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
 - 2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - a. Color: Per fixture schedule.

2.5 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION**3.1 GENERAL INSTALLATION REQUIREMENTS**

- A. Comply with NECA 1.

- B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Install lamps in each luminaire.
- D. Fasten luminaire to structural support.
- E. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and relamping.
 - 3. Support luminaires without causing deflection of finished surface.
 - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- F. Wiring Method: Install cables in raceways. Conceal raceways and cables.
- G. Install luminaires level, plumb, and square with finished grade unless otherwise indicated. Install luminaires at height and aiming angle as indicated on Drawings.
- H. Coordinate layout and installation of luminaires with other construction.
- I. Adjust luminaires that require field adjustment or aiming.
- J. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.2 INSTALLATION OF INDIVIDUAL GROUND-MOUNTED LUMINAIRES

- A. Aim as indicated on Drawings.
- B. Install on concrete base per pole foundation details on drawings. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.3 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.4 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- B. Perform the following tests and inspections:
 - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 - 2. Verify operation of photoelectric controls.
- C. Illumination Tests:
 - 1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):
 - a. IES LM-5.
 - b. IES LM-50.
 - c. IES LM-52.
 - d. IES LM-64.
 - e. IES LM-72.
 - 2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- D. Luminaire will be considered defective if it does not pass tests and inspections.
- E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires.

END OF SECTION 265619

SECTION 330513 – WATERFALL/RECIRCULATION PUMPS, STRAINER BASKETS, PIPING AND VAULT**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 RELATED SPECIFICATIONS

- A. Standards and specifications of the Kansas City, Missouri Water Services Department.
- B. Standard and specifications of the Kansas City Metro Chapter of the American Public Works Association.
- C. Related City of Kansas City, Missouri Specification Sections include the following:
 - 1. 02200 – Earthwork
 - 2. 02250 – Trenching, Pipe Embedment and Backfill
 - 3. 02630 – Stormwater Pipe and Structures
 - 4. 02700 – Structures
 - 5. 03000 – Miscellaneous Concrete

1.3 SUMMARY

- A. This Section includes the following items associated with Waterfall/Recirculation System:
 - 1. Pumps and pump systems.
 - 2. Basket strainers.
 - 3. Pump vaults.
 - 4. Piping for pump systems.

1.4 DEFINITIONS

- A. HDPE: High density polyethylene plastic.
- B. PVC: Polyvinyl chloride plastic.
- C. RCP: Reinforced concrete pipe.

1.5 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

1. Each sheet or page of each submittal whether shop drawings or product data, shall bear the review stamp of the Contractor indicating the submittal has been reviewed and is approved. Submittals not bearing the Contractor's stamp will be returned without review.
 2. Contract drawings may not be reproduced in whole or in part to be utilized as a submittal. Contract drawings reproduced in whole or in part and modified into submittals will not be accepted and will be returned without review.
 3. Shop drawings shall be complete for each component or item. Indicate all dimensions, location of embedded items, all reinforcing steel sizes, spacing, lengths, and locations. Submission of typical shop drawings for separate components or items but not indicating the specifics of each will not be accepted and will be returned without review.
- B. Product Data: For the following:
1. Frames, grates, and covers.
 2. Pumps and accessories.
 3. Strainer Baskets and accessories.
 4. Piping and pipe fittings.
- C. Shop Drawings: Include plans, elevations, details, and attachments for the following:
1. Precast concrete vaults and structures, including frames, covers, and grates.
 2. Reinforcing steel and related accessories.
- D. Design Mix Reports and Calculations: For each class of cast-in-place concrete. Submittal shall establish weights and volumes of all materials used for each class of concrete in accordance with ACI 318, and shall include the following:
1. Concrete mix proportions
 2. Documentation of test records and standard deviations for field experience method or,
 3. Laboratory test results for trial batch method.
 4. Materials certificates for cements, fly ash, and aggregates. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds the specified requirements.
 5. Product data sheets for admixtures. Provide certifications from admixture manufacturers that chloride content complies with specified requirements.
- E. Inspection and test reports specified in the "Field Quality Control" article.
- 1.6 QUALITY ASSURANCE
- A. Environmental Agency Compliance: Comply with regulation pertaining to pond recirculation systems.
- B. Utility Compliance: Comply with regulations pertaining to pond recirculation systems. Include standards of utilities where appropriate.
- C. Product Options: Plans indicate sizes, profiles, connections, and dimensional requirements of system components and are based on specific manufacturer types indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Product Substitutions".

1.7 DELIVERY, STORAGE, AND HANDLING

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

1.8 PROJECT CONDITIONS

- A. The existing utility information shown on the Plans is based on the best available information. The exact location and depth of these utilities are unknown. Contractor shall perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Verify that pond recirculation system may be installed to comply with design and referenced standards. Contact Architect immediately if modifications to the original design are required.
- C. Site Information: Subsurface condition investigations were not performed as a part of this project. Contractor is responsible for performing the work of this Section regardless of the underground conditions discovered.
- D. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shutoff services if lines are active.
- E. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services.
 - 1. Notify Kansas City, MO Water Services Department not less than seven days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Kansas City, MO Water Services Department written permission.
- F. Where utilities require adjustment or relocation to construct the Work, and those utilities are not shown on the Drawings, notify the Kansas City, MO Water Services Department before proceeding. Relocate or adjust utility as directed. All utility adjustment and/or relocation work shall be at the Contractor's expense.
- G. If utility is damaged by Contractor, notify utility Kansas City, MO Water Services Department and Engineer immediately. Repair or replacement of utilities damaged by Contractor, whether such utilities are shown on the drawings or not shown on the drawings, shall be at Contractor's expense.

1.9 SEQUENCING AND SCHEDULING

- A. Coordinate utility crossings to with franchise utilities.
- B. Coordinate locations and depths with existing utility systems.
- C. Coordinate with other utility work, including electrical systems.
- D. Coordinate with other site work.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain Steel Wire: ASTM A 82, as drawn.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.2 WATERFALL/RECIRCULATION PUMPS VAULT

- A. Precast Concrete Utility Vaults: ASTM C 478 precast, reinforced concrete, watertight, of size and depth indicated.
 - 1. Steps: Steel core, plastic coated, individual steps. Include width that allows worker to place both feet on one step and is designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 16-inch intervals.
 - 2. Gaskets: ASTM C 443, rubber.
- B. Vault sizing to be coordinated with pumps and strainer baskets to provided adequate room for maintenance and repair.

2.3 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
 - 1. Cement: ASTM C 150, Type II.
 - 2. Fine Aggregate: ASTM C 33, sand.
 - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 - 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water-cement ratio.
 - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
 - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 deformed steel.

2.4 WATERFALL/RECIRCULATION PUMPS

- A. Close-coupled, end suction centrifugal pump molded in glass-filled polypropylene.
 - 1. Compatible with site electrical power and requirements.

2. Three horsepower motor to provide a flowrate of 9,000 GPH at 45 feet of head per pump/motor.
3. Advance 4000, by Advance Pumps or approved.

2.5 STRAINER BASKETS

- A. General: Standard one-high unit with a clear body and basket made of stainless steel, 500 cubic inch with 2" ports. PurFlo Strainer by Sequence Pumps, or approved equal.

2.6 PROTECTIVE COATINGS

- A. Description: One or two-coat, coal-tar epoxy; 15-mil minimum thickness, unless otherwise indicated; factory or field applied to the following surfaces:
 1. Exterior surfaces of concrete waterfall/recirculation pumps and strainers vault.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 2 Section "02200-Earthwork" and "02250-Trenching, Pipe Embedment and Backfill."

3.2 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

- A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.
 1. Use the following pipe couplings:
 - a. Sleeve type to join piping, of same size, or with small difference in OD.
 - b. Increaser/reducer-pattern, sleeve type to join piping of different sizes.
 - c. Bushing type to join piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.3 VAULT INSTALLATION

- A. General: Install or construct vaults, complete with appurtenances and accessories indicated.
- B. Install precast concrete vault as indicated and install according to ASTM C 891.
 1. Provide rubber joint gaskets complying with ASTM C 443 at joints of sections
 2. Apply double row of bituminous mastic sealant at joints of sections.
- C. Set frames and covers to finished grade.

3.4 WATERFALL/RECIRCULATION PUMPS

- A. Install in accordance with manufacturer's recommendations and requirements.
- B. Mount to vault structure with stainless steel expansion anchors and locate to allow for maintenance and inspection.
- C. Install intake and discharge piping and extend piping underground to locations indicated in Drawings.
- D. Connect to site electrical systems per electrical drawings and specifications.

3.5 STRAINER BASKETS

- A. Install in accordance with manufacturer's recommendations and requirements.
- B. Mount to vault structure with stainless steel expansion anchors and locate to allow for maintenance and inspection.
- C. Provide mounting pedestal, if necessary, to align piping between strainer basket and pump to allow pump intake to remain primed when valves are open.

3.6 FIELD QUALITY CONTROL

- A. Clear interior intake and discharge piping as work progresses. Place plug in end of incomplete piping at end of day and when work stops.
- B. Perform leak and operational test of waterfall/recirculation pumps.
- C. Perform testing per pump manufacturer's requirements.

3.7 MEASUREMENT AND PAYMENT

- A. Waterfall/Recirculation Pumps: Measured per Each, complete in place and acceptable, shall be paid for at the contract unit price bid for "Waterfall/Recirculation Pump" as listed in the Bid Form – Unit Prices. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- B. Waterfall/Recirculation Strainer Baskets: Measure per Each, complete in place and acceptable, shall be paid for at the contract unit price bid for "Waterfall/Recirculation Strainer Baskets" as listed in the Bid Form – Unit Prices. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- C. Waterfall/Recirculation 6'x6' Precast Concrete Pump Vault: Measured per Each, complete in place and acceptable, shall be paid for at the contract unit price bid for "Waterfall/Recirculation 6'x6' Precast Concrete Pump Vault" as listed in the Bid Form – Unit Prices. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the

performance of all related work, including protection in cold weather, necessary to complete the item.

- D. Waterfall/Recirculation 6" PVC Intake Pipe: Measure per linear foot, complete in place and acceptable, shall be paid for at the contract unit price bid for "Waterfall/Recirculation 6" PVC Intake Pipe" as listed in the Bid Form – Unit Prices. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.
- E. Waterfall/Recirculation 3" Flexible PVC Discharge Pipe: Measure per linear foot, complete in place and acceptable, shall be paid for at the contract unit price bid for "Waterfall/Recirculation 3" Flexible PVC Discharge Pipe" as listed in the Bid Form – Unit Prices. Such payment and price shall constitute full compensation for all the labor, materials, equipment, and for the performance of all related work, including protection in cold weather, necessary to complete the item.

END OF SECTION 330513

SECTION 40 69 00 - CONTINUOUS MONITORING AND ADAPTIVE CONTROL (CMAC)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This Section covers the Continuous Monitoring and Adaptive Control (CMAC) implementation which includes furnishing of materials, equipment, labor, transportation, supervision, software and licensing required to deploy forecast-based actuated stormwater controls.

1.2 DEFINITIONS

- A. Continuous Monitoring and Adaptive Control (CMAC): Monitoring weather forecast and stormwater data in real-time at a site and using that monitoring data to automatically control the site discharge with the intent of minimizing negative impacts locally and downstream during present and future conditions.
- B. CMAC Provider: A product company employed by the Contractor that is experienced in design, configuration, and deployment of CMAC Equipment and Software on a cloud-based platform.
- C. CMAC Equipment: Equipment manufactured by third parties that interoperates with the CMAC Software.
- D. CMAC Software: CMAC applications that are configured to achieve site-specific objectives and provide user access to real-time site conditions and remote control of CMAC Equipment. CMAC Software shall be hosted on the CMAC Platform, and provided as a subscription.
- E. CMAC Platform: Computing environments where the CMAC Software is deployed.
- F. CMAC Support: CMAC Software and Platform support services provided by the CMAC Provider.
- G. CMAC Package: A technology system comprised of CMAC Equipment, Software, Platform, and Support.
- H. Site: A stormwater detention and/or retention basin, capable of capturing, storing, and releasing stormwater, where CMAC Package will be installed.
- I. Real-time: Applications that process updates as soon as they are available and without significant delay relative to their objectives.

1.3 ROLES AND RESPONSIBILITIES

- A. The CMAC Provider shall:
 - 1. Provide CMAC Equipment specially designed to work with the CMAC Software (Section 2.1 CMAC equipment).
 - 2. Coordinate with and support the Contractor to facilitate proper installation of the CMAC Equipment per Part 3.

3. Provide the Contractor with remote-based commissioning support and guidance of the CMAC Equipment to ensure proper connectivity to the CMAC Platform.
4. Configure and deploy the CMAC Software to meet site requirements and performance objectives (Section 2.3 CMAC Software).
5. Provide a CMAC Software configuration summary to the Contractor for review and approval by the Owner.
6. Provide an CMAC Software subscription license to the Contractor or specified Owner (Section 2.4 CMAC).

B. The Contractor shall:

1. Provide site access and formal permits required for construction/installation of the CMAC Equipment.
2. Prepare, obtain, and submit all required submittals for review and approval by the Owner.
3. Provide all labor, material, and equipment required to install the CMAC Package as shown in the Drawings and as specified herein.

1.4 SUBMITTALS

- A. Submit shop drawings and product information for CMAC Equipment and installation materials to the Owner for all products detailed in Part 2.
- B. Submit a CMAC Software configuration summary for review and approval by the Owner per requirements listed in Part 2. The CMAC Software shall meet the performance and regulatory requirements of the site.
- C. Submit a construction verification checklist and installation photos for review and approval by the CMAC Provider and Owner.
- D. Submit completed CMAC Equipment commissioning checklist with guidance and remote-support from the CMAC Provider to Owner.
- E. Submit demonstration of CMAC Provider Qualifications to Owner for review and approval.

1.5 QUALITY ASSURANCE

- A. Qualifications: The CMAC Provider shall demonstrate a minimum of five (5) successful system implementations with a minimum of five (5) years of successful operation.
- B. Storage and Handling: The Contractor shall exercise care in the storage and handling of the CMAC Equipment and all components throughout duration of the Work. The Contractor shall be responsible for repair and replacement of CMAC equipment at the sole cost of the Contractor. The CMAC Equipment and all components shall always be stored indoors and transported inside the original shipping container until the components are ready to be installed. The CMAC Equipment shall be handled with care and lifted according to OSHA and NIOSH lifting recommendations and/or Contractor's workplace safety professional recommendations.

- C. Shipping: The CMAC Equipment shall be shipped to the Contractor's address or project site, and it is the responsibility of the CONTRACTOR to offload and transport the materials to the site of installation.

PART 2 - PRODUCTS

2.1 CMAC EQUIPMENT

- A. The CMAC equipment will be an OptiRTC system including, but not limited to:
1. Control Panel – Control Panel shall include components for hosting on-site CMAC Software applications that provide continuous automated control of discharge from gravity-drained stormwater facilities. The Control Panel shall be powered by line power (120VAC, 60Hz, 1PH), communicate over cellular networks, and be outdoor rated. The Control Panel shall include the following functional requirements:
 - a. Cellular microcontroller-based web gateway
 - b. 4G GSM cellular connectivity
 - c. Vendor-managed over-the-air updates to firmware and device configuration
 - d. Failsafe operation under prolonged loss of connectivity, power, and sensor subsystems
 - e. Message encryption of all communications with cloud platforms using hardware-backed keys
 - f. Capable of reporting continuous monitoring data at ~1 min frequency
 - g. Support communications protocol of CMAC Software
 - h. Operate for a temperature range of -20 to 60 °C
 - i. Accept inputs from: 4-20mA analog level sensor, 4-20mA and Modbus interfaces for actuated valve/gate position and diagnostics, door access security sensor, or line power per electrical diagram and notes in the Drawings
 - j. Provide outputs for: continuously modulated 4-20mA butterfly valve or slide gate position
 - k. Inherently safe operation of valve or gate positioning (i.e., equipment based on site objectives)
 - l. At-panel physical manual override and control
 - m. The enclosure shall be a Nema 4X stainless steel sized to accommodate future equipment that the City will install. 36" x 48" x 10" minimum size. Enclosure shall be able to locked with a padlock.
 2. Water Level Sensor – Industrial grade pressure transducer capable of operating for a temperature range of -20 to 60 °C. The water level sensor shall be connected to and powered by the Control Panel, and shall communicate site water level using a

4-20mA analog signal. Aneroid bellows will be used to isolate the vent line from the atmosphere. Provide one sensor for each pond.

3. Actuated Flow Control Device – Actuated gate per the Drawings. The actuated flow control device shall be rated for outdoor operations in the local environment and capable of closed-loop control via 4-20mA signal inputs and Modbus RTU-provided feedback with local manual operation (e.g. hand wheel or T-wrench) available at the flow control device.
4. Fiber Optic cable – Provide a Fiber Connections Inc. 6 port Gator Patch with a XXX' single mode OS2 fiber cable whip and LC connections.
5. Provide a Fiber Optic Pull box
6. Provide a motor starter to control the recycle pump.

2.2 CMAC EQUIPMENT INSTALLATION MATERIALS

- A. The Contractor shall install all CMAC Equipment in accordance with the Drawings and as specified herein.
- B. The Contractor shall procure all installation materials required for a complete and operational CMAC Package, in accordance with the Drawings and as specified herein. Materials include but are not limited to miscellaneous mounting hardware, electrical conduit and conductors, and appurtenances.

2.3 CMAC SOFTWARE

- A. The CMAC Provider shall configure the CMAC Software with site-specific control logic. CMAC provider shall demonstrate how CMAC software will meet site objectives. Control logic shall be hosted both locally on the Control Panel and in a cloud computing environment. Control logic shall include:
 1. Forecast-based pre-event drawdown
 - a. Storm D (1.4 inches): Upper Pond 912', Lower Pond 902' feet NAVD88
 - b. Storm H (2.9 inches): Upper Pond 909', Lower Pond 900'
 2. Extended post-event retention duration up to 48 hours
 3. Modulated release during wet weather to achieve peak flow reduction
 4. Dry-weather maximum release rate of 5.6 cfs to minimize downstream combined sewer overflows
 5. Dry and wet-weather target water surface elevations (feet, NAVD88) as follows:
 - a. Dry-Weather: Normal Water Level Upper Pond 916', Lower Pond 909'
 - b. Maximum Wet-Weather for Storm D (1.4 inches): Upper Pond 916', Lower Pond 909'
 - c. Maximum Wet-Weather for Storm H (2.9 inches): Upper Pond 916', Lower Pond 909'

6. On loss of power, actuators to remain in last commanded state.
 7. On loss of communications, system shall function with last set of instructions (i.e. is modulating to maintain level, continue that operation, etc.)
 - 8.
- B. The CMAC Software shall be capable of predictive modeling and using real-time weather forecasting from National Oceanic and Atmospheric Administration (NOAA) weather forecast data (or approved equal), including the use of Quantitative Precipitation Forecast and Probability of Precipitation data to manage water volume and flow rates at the site.
 - C. The CMAC Software shall support a Manual Control feature to allow for remote override of the automated control via a secure web browser. This feature shall provide a time and identity-based lock-out functionality such that two (2) users accessing the Manual Control feature at the same time cannot simultaneously command the Actuate Flow Control Device to take different positions.
 - D. The CMAC Software shall be capable of providing user-specific dashboards to display real-time conditions for on-site operating parameters.
 - E. The CMAC Software shall allow users to view site data in dynamic visualizations in modern browsers without requiring any plugin technology.
 - F. The CMAC Software shall be able to display site data summarized by individual storm events.
 - G. The CMAC Software shall be capable of sending automated email alerts to users based on thresholds relating to current and future site conditions.

2.4 CMAC PLATFORM

- A. CMAC Provider shall provide the Owner with access and use of CMAC Platform to operate selected CMAC site(s). The CMAC Platform shall meet the following specifications.
 1. The CMAC Platform shall employ cloud computing for data persistence.
 2. The CMAC Platform shall implement strong encryption for all data transmissions from the site, between components in the cloud, and to users' web browsers.
 3. The CMAC Platform shall be capable of supporting Single Sign-On with the Microsoft Active Directory-compatible identity providers.
 4. The CMAC Platform shall be capable of implementing multi-factor user authentication for secure login.
 5. The CMAC Platform shall provide data management, storage, and ability for users to download historical data.
 6. The CMAC Platform shall have a public, anonymous-access status page that administrators can subscribe to alerts from and access messages about incident response.

7. The CMAC Platform shall have a public API that can be used to support external websites and analysis tools access to recent data.

2.5 CMAC SUPPORT

- A. CMAC Provider shall provide support to the Owner as part of the CMAC Software and Platform service, including On-call customer support during regular business hours and responses to support inquiries within one (1) business day.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Contractor shall clear and prepare site for installation, including clearing vegetation around outlet structure and other equipment installation locations per the Drawings. Establish access throughout the site, including de-watering as needed.
- B. Contractor shall trench for rigid conduit runs (following Table 300.5 of the NEC and local codes) between level sensor and Control, between outlet structure and Control Panel, and between the Control Panel, the fiber optic pull box, and between the pull box and the fiber optic pull box located at the intersection of Paseo and Cliff Drive per the Drawings.
- C. Contractor shall install Control Panel per the Drawings and as specified herein:
 1. Install the stainless steel support structure.
 2. Mount the Control Panel to the support structure.
 3. Mount the antenna external to the enclosure
- D. Contractor shall prepare the outlet structure for installation of the Actuated Flow Control Device assembly, as specified herein:
 1. Grind concrete wall within outlet structure to prepare for Actuated Flow Control Device and mounting flange installation, as needed.
 2. Trim inlet pipe to be flush with the inner wall of outlet structure, as needed.
 3. Prepare the ground surface so that the valve rests on one of the following: poured concrete pad (4000 psi), approved concrete blocks, or approved structure capable of bearing 600-lb load, per the Drawings.
- E. Install Actuated Flow Control Device (the actuator, gate, and gate stem extension shall be delivered on a palette, pre-assembled) in accordance with manufacturer instructions and Drawings and as specified herein:
 1. Actuator handwheel (crank) shall be facing away from the nearest wall for easy access.
 2. Attach the flange to the valve with connector bolts tightened to torque specified in manufacturer instructions.
 3. Mount the valve over the inlet pipe by attaching the other end of the flange to the wall. Secure with bolts and injectable adhesive anchor.

4. Mount the valve stem extension with the stem extension mounts.
- F. Install and mount the stilling well and level sensor per the Drawings.
- G. Install motor start to control the recycle pump. Pump shall run at all times when the Lower Pond level is above 902'.
- H. Contractor shall perform electrical work per Sections 260519 through 26 0533 and install additional components per the Drawings and as specified herein:
 1. Supply power to the Control Panel and actuator.
 2. Provide rigid conduit underground from the Control Panel to the actuator. Connect the rigid conduit to the actuator conduit entry ports using flexible conduit; leave an extra three feet of flexible conduit for ease of future maintenance. Provide IP68-rated waterproof connections and seals.
 3. Run electrical conductors from the Control Panel to the actuator, and connect to appropriate terminals, following the Electrical Connection Schedule. Redline the conductor labels on the Electrical Connection Schedule and One-Line Diagram.
 4. Run pre-wired electrical cable from level sensor to control panel in rigid conduit with IP68 rated connections/seals. Mount pressure reference device (component of level sensor) within the Control Panel as follows:
 - a. Do not splice level sensor cable.
 - b. Do not allow moisture to enter the vent tube.
 - c. Damage to the level sensor cable will necessitate the replacement of the entire sensor, as the cable may not be repaired or spliced.
 - d. Leave any additional length of cable coiled neatly in the Control Panel.
 5. Connect conductors from level sensor and actuator to designated terminals within the Control Panel as shown in Electrical Schedule and Wiring Diagram. Use waterproof cord grips for conduit terminations at the Control Panel.
 - a. Leave at least 1 ft. of additional cable coiled neatly in the CMAC Control Panel for future repairs.
 6. Install the fiber optic whip from the Control Panel through the fiber optic pull box to the pull box at the Paseo and Cliff Drive. Install a 12 ga tracer wire and a pull string with the whip. The Contractor is not to splice the fiber cable to the City's network at the fiber pull box at Paseo and Cliff Drive.
- I. Mount trash rack upstream of Actuated Flow Control Device, per the Drawings.

3.2 CONSTRUCTION VERIFICATION AND COMMISSIONING

- A. Contractor shall coordinate with the CMAC Provider to schedule site commissioning after installation is complete per Section 3.1 Installation.
- B. Contractor shall complete the CMAC Provider's construction verification checklist and provide installation photos to the CMAC Provider to ensure proper installation of the

CMAC Equipment. Contractor shall provide signed checklist and photos to the CMAC Provider at least 14 calendar days prior to commissioning.

- C. Contractor shall commission the site, which includes testing communications and performance of the equipment, and communications to/from the CMAC Software and Platform (electrician is not required to be present). Complete the CMAC Equipment commissioning checklist with guidance and remote-support from the CMAC Provider.

3.3 FINAL ACCEPTANCE

- A. Contractor shall provide a signed copy of the CMAC Software configuration summary (signature must be from the Owner) to the CMAC Provider

REPORT OF SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION

PASEO GATEWAY ROADWAY IMPROVEMENTS
KANSAS CITY, MISSOURI
TSI PROJECT NUMBER 20192013

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Lenexa, Kansas 66219



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June 26, 2019



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June 26, 2019

Mr. Jay Burress, P.E.
MCCLURE
11250 Corporate Avenue
Lenexa, Kansas 66219

Re: **Report of Subsurface Exploration and
Geotechnical Engineering Evaluation
Paseo Gateway Roadway Improvements
Kansas City, Missouri
TSi Project No. 20192013**

Dear Mr. Burress:

TSi Geotechnical, Inc. (TSi) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the referenced project and is pleased to submit this report of our findings to McClure. The purpose of our work was to evaluate subsurface conditions at specific exploration locations and to gather data on which to prepare geotechnical recommendations for the design and reconstruction of Paseo Boulevard in Kansas City, Missouri. This report describes the exploration procedures used, exhibits the data obtained, and presents our evaluations and recommendations relative to the geotechnical engineering aspects of the project.


We appreciate the opportunity to assist you with this project. If you have any questions, or if we may be of further service to you, please call us.

Respectfully submitted,
TSI GEOTECHNICAL, INC.


For: Brooke Sidebottom, EI
Staff Engineer


Brian Robben, PE, EG
Geotechnical Department Manager




For: Denise B. Hervey, PE
Principal

PROFESSIONAL SERVICE SINCE 1989

CONTENTS

1.0	SCOPE OF SERVICES	1
2.0	SITE AND PROJECT DESCRIPTIONS	2
3.0	FIELD EXPLORATION AND LABORATORY TESTING	3
3.1	Field Exploration.....	3
3.2	Laboratory Testing.....	4
4.0	SUBSURFACE CONDITIONS	5
4.1	Generalized Subsurface Profile	5
4.2	Groundwater	6
5.0	ENGINEERING ASSESSMENTS AND RECOMMENDATIONS	7
5.1	Pavement Design	7
5.2	Retaining Walls.....	7
5.3	Pond Slope Recommendations	7
6.0	SITE PREPARATION AND EXCAVATION CONSIDERATIONS	8
6.1	Subgrade Preparation.....	8
6.2	Subgrade Protection.....	8
6.3	Fill and Backfill Materials.....	8
6.4	Fill and Backfill Placement.....	9
6.5	Excavation Considerations	9
7.0	CONSTRUCTION OBSERVATION AND TESTING	10
8.0	REPORT LIMITATIONS	11
Appendix A - Site and Boring Location Plan, Figure 1		
Appendix B - Boring Logs		
- General Notes		
- Unified Soil Classification System		
Appendix C - Laboratory Test Results		

SUBSURFACE EXPLORATION AND
GEOTECHNICAL ENGINEERING EVALUATION
PASEO GATEWAY ROADWAY IMPROVEMENTS
KANSAS CITY, MISSOURI

1.0 SCOPE OF SERVICES

This report summarizes the results of a geotechnical study performed for the proposed roadway improvements along Paseo Boulevard in Kansas City, Missouri. The study was performed in general accordance with TSi's proposal to McClure, dated November 15, 2016. Based on TSi's understanding of the project, the following items have been identified for inclusion in this study report:

- Subsurface conditions at the boring locations;
- Laboratory test results;
- Influence of groundwater on the project;
- Preparation of pavement subgrade;
- Recommendations for fill materials, placement, and compaction;
- Recommendations for retaining wall design;
- Recommendations for maximum slope requirements;
- General excavation considerations; and
- Pavement recommendations.

2.0 SITE AND PROJECT DESCRIPTIONS

The following project understanding is based on discussions with McClure and a site reconnaissance by an engineer from TSi. The project will consist of improvements along Paseo Boulevard approximately from Admiral Boulevard to I-29. The project will include reconstruction and realignment of the roadways and associated appurtenances. The general location of the project site is shown below. The Site and Boring Location Plan, Figure 1 in Appendix A, provides a more detailed plan of the project area.



TSi is under the assumption that retaining walls are planned to be constructed on the east portion of the site and will be on the order of 5 feet in height. Two ponds are also planned to be constructed.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

3.1 FIELD EXPLORATION

TSi conducted an exploration program at the project site from April 23 to May 1, 2019 consisting of nine soil borings designated as Borings B-1 to B-9. Boring B-5 was conducted using a hand auger to a termination depth of 10 feet. Borings B-3 and B-4 were drilled to auger refusal and then continued into bedrock an additional 4.5 to 5 feet. All remaining borings were drilled to a termination depth of 15 feet. The logs from this exploration are included in Appendix B. The approximate locations of the borings are indicated on the Site and Boring Location Plan, Figure 1 in Appendix A.

The borings were drilled using a CME-550 ATV-mounted drill rig to advance flight auger drilling tools. Split-spoon samples were recovered from each boring. Split-spoon samples were recovered using a 2-inch outside-diameter, split-barrel sampler, driven by an automatic hammer, in accordance with ASTM D 1586. The split-spoon samples were placed in plastic bags for later testing in the laboratory. Three-inch Shelby tube samples were also obtained in accordance with ASTM D 1587. The Shelby tube samples were preserved by sealing the entire sample in the tube.

Borings B-3 and B-4 were advanced below auger refusal into the underlying limestone bedrock. The bedrock was sampled using N series diamond-bit rock coring methods. The rock core recovered was placed in a cardboard box and taken to the laboratory for examination and testing. Percent recovery and Rock Quality Designation (RQD) values were calculated for each rock core sample and are noted on the boring logs. The RQD is the percentage of the total length of rock cored that consists of sound pieces that are a minimum of 4.0 inches in length. The RQD is a general indication of the integrity of the in-situ rock mass. Based on RQD, rock quality can be described as excellent (90 to 100), good (75 to 90), fair (50 to 75), poor (25 to 50), or very poor (0 to 25).

The results of the field tests and measurements were recorded on field logs and appropriate data sheets by a geotechnical specialist. Those data sheets and logs contain information concerning the exploration methods, samples attempted and recovered, indications of the presence of various subsurface materials, and the observation of groundwater if encountered. The field logs and data sheets contain the field representative's interpretations of the conditions between samples, based on the performance of the exploration equipment and the cuttings brought to the surface. The final logs included in this report were based on the field logs, modified as appropriate based on the results of laboratory testing of soil samples.

3.2 LABORATORY TESTING

A laboratory testing program was conducted by TSi to determine selected engineering properties of the obtained soil samples. The following laboratory tests were performed on select samples recovered from the borings:

- Visual descriptions by color and texture of each sample (ASTM 2488);
- Natural moisture content of fine-grained samples (ASTM D 2216);
- Atterberg limits on selected cohesive samples (ASTM D 4318);
- Unit weight on selected cohesive samples (ASTM D 7263);
- Unconfined compression on selected cohesive samples (ASTM D 2166); and
- California Bearing Ratio (CBR) (ASTM D 698).

The results of the laboratory tests are summarized on the boring logs and included in Appendix C. The analysis and conclusions contained in this report are based on field and laboratory test results and on the interpretations of the subsurface conditions as reported on the logs. Only data pertinent to the objectives of this report have been included on the logs; therefore, these logs should not be used for other purposes.

4.0 SUBSURFACE CONDITIONS

Details of the subsurface conditions encountered at the boring locations are shown on the boring logs in Appendix B. The general subsurface conditions encountered and their pertinent engineering characteristics are described in the following paragraphs. Conditions represented by the borings should be considered applicable only at those locations on the dates shown; the reported conditions may be different at other locations or at other times.

4.1 GENERALIZED SUBSURFACE PROFILE

The surficial material at the project site generally consisted of clays with roots and organics. The surficial materials were underlain by native lean clays (CL, in accordance with the Unified Soil Classification System) with various amounts of limestone gravel in all borings, with the exceptions of Borings B-7 and B-9. The native lean clays extended to bedrock or to boring termination depth. Standard penetration tests (N-values) and moisture contents in the lean clays ranged from 3 blows per foot (bpf) to 50 blows for three inches of penetration and 12% to 30%, respectively. Atterberg limits tests were conducted on the lean clays which resulted in liquid limits and plasticity indices ranging from 32 to 39 and 13 to 19, respectively. Dry unit weight and undrained shear strength values on the native lean clay resulted at 104 pounds per cubic foot (pcf) and 1.04 tons per square foot, respectively. The apparent depths to bedrock for Borings B-1, B-3, and B-4 are included in Table 1 below.

The materials encountered at Borings B-7 and B-9 included lean clay fill materials to a termination depth of 15.0 feet. Fills included varying amounts of limestone gravel, asphalt, concrete, and brick fragments. Standard penetration tests (N-values) and moisture contents in the fill materials ranged from 3 to 14 blows per foot (bpf) and 15% to 27%, respectively. An Atterberg limits test was conducted on the fill material in Boring B-7 which resulted in a liquid limit of 37 and a plasticity index of 17. Dry unit weight and undrained shear strength values on the fill material ranged from 92 to 103 pcf and 0.21 to 0.86 tons per square foot, respectively.

The native clays were generally underlain by limestone bedrock. Drilling operations were advanced below auger refusal at Borings B-3 and B-4. Limestone bedrock was generally hard and highly weathered. Recovery of the limestone bedrock ranged from 81% to 100% while rock quality designations (RQDs) ranged from 0% to 11%.

TABLE 1
APPARENT DEPTH TO LIMESTONE BEDROCK

Boring Location	Top of Weathered Bedrock (ft)	Auger Refusal (ft)
B-1	8.5	NE*
B-3	3.5	10.0
B-4	6.9	8.3

*NE – Not Encountered

4.2 GROUNDWATER

Groundwater was not encountered in the borings during drilling. The presence or absence of groundwater at a particular location does not necessarily mean that groundwater will be present or absent at that location at other times. Seasonal variations and other unknown considerations could cause fluctuations in water levels and the presence of water in the soils.

5.0 ENGINEERING ASSESSMENTS AND RECOMMENDATIONS

5.1 PAVEMENT DESIGN

Based on the general character of the on-site subsurface conditions and assuming a properly prepared subgrade, a CBR value of 2.5 is considered appropriate for used in designing the flexible pavement sections for the site. Rigid pavement design can be based on a modulus-of-subgrade reaction (k) of 100 pounds per cubic inch (pci) for the subgrade. These values for rigid and flexible pavement design are based on the requirement that the pavement subgrade is prepared in accordance with the recommendations provided in this report.

TSi recommends all pavements be directly underlain by 6 inches of well-graded crushed limestone, such as MoDOT Type 5. If unknown fill materials are encountered at the subgrade level that will directly underlie pavements, it should be overexcavated and replaced to a depth of 12 inches below the bottom of the pavement section. The fill materials should be replaced with approved LVC materials as outlined in Section 6.3 of this report.

5.2 RETAINING WALLS

The proposed big block type retaining walls are still in design and are of an unknown height. When retaining wall design is complete, walls 6 feet or over in height require global stability analysis to be performed by a professional engineer. The allowable bearing pressure for the walls supported on native clay or native bedrock is 2,000 pounds per square foot (psf) or 4,000 psf, respectively.

5.3 POND SLOPE RECOMMENDATIONS

The two proposed ponds east of the new roadway are still in design. Based on discussions with McClure, TSi understands that the lower pond bottom is planned to be at an elevation of approximately 898 feet and the upper pond bottom is planned to be at 907 feet. Borings B-4, B-5, and B-6 were drilled within the proposed pond locations. Materials encountered in these borings generally included silty lean clays. Boring B-4 also encountered shallow limestone bedrock. Boring locations should be surveyed for accurate ground surface elevations. Based on the material types encountered, TSi recommends the pond slopes not exceed 1V:3.0H. Additional slope stability analysis may be run by TSi for further investigation and included as an addendum to this report if requested by McClure. Shallow bedrock will require overexcavation and replacing with a clay liner of a minimum thickness of 2 feet for the ponds to retain water.

6.0 SITE PREPARATION AND EXCAVATION CONSIDERATIONS

6.1 SUBGRADE PREPARATION

Construction areas should be stripped of any vegetation, root mass, organic soil, existing pavements, existing fill and any other deleterious materials prior to site excavation and grading. Care should be taken during stripping to prevent excessive disturbance of the underlying soil. After the removal of these materials, and where further excavation is not required, the exposed subgrade should be proofrolled. Proofrolling is accomplished by passing over the subgrade with proper equipment such as a loaded tandem-axle dump truck or scraper and observing the subgrade for pockets of excessively soft, wet, disturbed, or otherwise unsuitable soils. Any unacceptable materials thus found should be excavated and either recompacted or replaced with new structural fill.

Prior to placing fill in any area, the subgrade should be scarified to a depth of about 6 inches, the moisture content adjusted to near its optimum moisture content, and the subgrade recompacted in accordance with recommendations made in subsequent sections of this report. The recommended proofrolling and/or scarification and recompaction may be waived if, in the opinion of TSi, this procedure would be detrimental or unnecessary. Following the satisfactory preparation of the subgrade, controlled fill material may be placed.

6.2 SUBGRADE PROTECTION

Construction areas should be properly drained in order to reduce or prevent surface runoff from collecting on the exposed subgrade in excavations. Any ponded water on the exposed subgrade or trench bottom should be removed immediately. Temporary storm-water swales and collection areas may be required to control surface water flow into low areas of the site or into trench excavations.

6.3 FILL AND BACKFILL MATERIALS

Structural fill should consist of approved soils, such as low to moderate plasticity cohesive soil, or well-graded crushed limestone material, free of organic matter and debris. Low to moderate plasticity cohesive materials used as fill should consist of inorganic clay with a liquid limit less than 45 and a plasticity index of less than 25. Granular fill should have a maximum particle size of 1.5 inches. Fill materials from off-site sources should be approved prior to their use. Soil with decayable material such as wood, metal, or vegetation is not acceptable.

Some of the soil on the site may require the addition of moisture prior to compaction. This should be performed in a controlled manner using a tank truck with a spray bar, and the moistened soil should be thoroughly blended with a disk or pulverizer to produce a uniform moisture content. Repeated passages of the equipment may be required to achieve a uniform moisture content. If this facility is constructed during the winter season, fill materials should be carefully observed to see that no ice or frozen soils are placed as fill or remain in the base materials upon which fill is placed.

Some of the on-site soil may require moisture reduction prior to compaction. During warm weather, moisture reduction can generally be accomplished by disking, or otherwise aerating the soil. When air-drying is not possible, a moisture-reducing chemical additive, such as lime or Class C fly ash, could be used as a drying agent.

6.4 FILL AND BACKFILL PLACEMENT

Cohesive fill should be compacted to a dry density of at least 95% of the standard Proctor maximum dry density (ASTM D 698) of the soil. Granular material, such as crushed limestone, placed for pavement support, should be compacted to at least 100% of the standard Proctor maximum dry density. The moisture content of lean clay or granular fill at the time of compaction should generally be from $\pm 2\%$ of the optimum moisture content of the material as determined by the standard Proctor compaction test. Fill should be placed in loose lifts not in excess of 8 inches thick, and compacted to the aforementioned criterion. However, it may be necessary to place fill in thinner lifts to achieve the recommended compaction when using small hand-operated equipment.

6.5 EXCAVATION CONSIDERATIONS

Existing clay soils can likely be excavated using conventional earth moving equipment methods. Shallow limestone bedrock was encountered throughout the project site and will be encountered during excavation procedures. The weathered upper portions of the limestone may be possible to excavate using conventional excavators, but the use of hydraulic breakers, rock bucket teeth, or, the equivalent will likely be required as limestone becomes less weathered with depth. The most suitable means to excavate the bedrock materials should be determined by the contractor in the field.

Trenching, excavating, and bracing should be performed in accordance with Occupational Safety and Health Administration (OSHA) regulations and other applicable regulatory agencies. In accordance with the OSHA excavation standards, the existing clay soils at the site are considered Type C, which requires a side slope for excavations of not steeper than 1.5 horizontal to 1.0 vertical (1.5H:1.0V). However, worker safety and classification of the excavation soil is solely the responsibility of the contractor. Also according to OSHA requirements, any excavation extending to a depth of more than 20 feet must be designed by a registered professional engineer. An excavation retention system, such as soldier pile and lagging or sheet piling, may be used as an alternate to sloping back the sides of trench excavations.

7.0 CONSTRUCTION OBSERVATION AND TESTING

It is recommended that TSi be retained during construction to perform testing and observation services for the following items:

- Removal of existing pavement structure, existing unsuitable fill, and any other deleterious material;
- Proofrolling, recompaction, and preparation of the soil subgrade that will support new fill or structural elements;
- Placement and compaction of fill and backfill; and
- Observation and testing of pavement materials and subgrades.

These Quality Assurance services should help to verify the design assumptions and maintain construction procedures in accordance with the project plans, specifications, and good engineering practice.

8.0 REPORT LIMITATIONS

This geotechnical report has been prepared for the exclusive use of **MCCLURE** for the specific application to the subject project. The information and recommendations contained in this report have been made in accordance with generally accepted geotechnical and foundation engineering practices; no other warranties are implied or expressed.

The assessments and recommendations submitted in this report are based in part upon the data obtained from the borings. The nature and extent of variations between the borings may not be evident at this time. If variations appear evident at a later date, it may be necessary to re-evaluate the recommendations of this report.

We emphasize that this report was prepared for design purposes only and may not be sufficient to prepare an accurate construction bid. Contractors reviewing this report should acknowledge that the information and recommendations contained herein are for design purposes.

If conditions at the site have changed due to natural causes or other operations, this report should be reviewed by TSi to determine the applicability of the analyses and recommendations considering the changed conditions. The report should also be reviewed by TSi if changes occur in the structure location, size, and type, in the planned loads, elevations, grading and site development plans or the project concepts.

TSi requests the opportunity to review the final plans and specifications for the project prior to construction to verify that the recommendations in this report are properly interpreted and incorporated in the design and construction documents. If TSi is not accorded the opportunity to make this recommended review, we can assume no responsibility for the misinterpretation of our recommendations.


APPENDIX A

Site and Boring Location Plan



Note: Boring B-8
Relocated to West
side of Roadway
due to fencing &
overhead trees.

Legend
 Boring Location

Figure 1, Boring Location Plan		Project No. 20192013
Paseo Gateway Roadway Improvements Kansas City, MO		
Not to Scale	Approved by: TBS	

APPENDIX B

Boring Logs

General Notes

Unified Soil Classification System

LOG OF BORING NO. B-01

Project Description: **Paseo Gateway Roadway Improvements**
Kansas City, Missouri

TSi Geotechnical
 8248 NW 101st Terrace, #5
 Kansas City, MO 64153
 (816) 599-7965



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
				Brown, silty lean CLAY, with roots and organics										
		SS-1		Brown, silty lean CLAY (CL)	67		2 2 4				22	35	20	15
5		SS-2			100		3 4 5				22			
		SS-3		- with limestone fragments below 6.0 ft.	39		40 50/6"				25			
		SS-4			98		50/2"				9			
10				LIMESTONE, gray, highly weathered										
		SS-5			100		50/3"				9			
15				Boring terminated at 15.0 ft.										
20														
25														

KC LOG WITH LAB PASEO BORING LOGS.GPJ 5/21/19

Completion Depth: 15.0
 Date Boring Started: 5/1/19
 Date Boring Completed: 5/1/19
 Engineer/Geologist: SM
 Project No.: 20192013

Remarks: Boring drilled using CME-550 drill rig with auto SPT.
 Groundwater was not encountered during drilling.

The stratification lines represent approximate strata boundaries.
 In situations, the transition may be gradual.

LOG OF BORING NO. B-02

Project Description: **Paseo Gateway Roadway Improvements**
Kansas City, Missouri

TSi Geotechnical
 8248 NW 101st Terrace, #5
 Kansas City, MO 64153
 (816) 599-7965



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION									
				Brown, silty lean CLAY, with roots and organics									
		SS-1		Brown, silty lean CLAY (CL)	67		3 3 4			22			
5		ST-2			83			1.04	104	21	37	19	18
		SS-3			89		3 4 5			23			
10		SS-4		- with limestone fragments below 8.5 ft.	39		6 4 7			24			
		SS-5			100		50/3"			24			
15				Boring terminated at 15.0 ft.									
20													
25													

KC LOG WITH LAB PASEO BORING LOGS.GPJ 5/21/19

Completion Depth: 15.0
 Date Boring Started: 5/1/19
 Date Boring Completed: 5/1/19
 Engineer/Geologist: SM
 Project No.: 20192013

Remarks: Boring drilled using CME-550 drill rig with auto SPT.
 Groundwater was not encountered during drilling.

The stratification lines represent approximate strata boundaries.
 In situations, the transition may be gradual.

LOG OF BORING NO. B-03

Project Description: **Paseo Gateway Roadway Improvements**
Kansas City, Missouri

TSi Geotechnical
 8248 NW 101st Terrace, #5
 Kansas City, MO 64153
 (816) 599-7965



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION													
		SS-1		Brown, silty lean CLAY, with roots and organics	33		3 50/6"			22	39	20	19
		SS-2		Brown, silty lean CLAY (CL), trace limestone	52		50/5"			2			
5		SS-3		LIMESTONE, light brown, highly weathered, with clay	104		50/1"			3			
		SS-4			100		50/1.5"			5			
10				- no clay below 10.0 ft.	87	0							
		RUN1											
15				Boring terminated at 14.5 ft.									
20													
25													

KC LOG WITH LAB PASEO BORING LOGS.GPJ 5/21/19

Completion Depth: 15.0
 Date Boring Started: 5/1/19
 Date Boring Completed: 5/1/19
 Engineer/Geologist: SM
 Project No.: 20192013

Remarks: Boring drilled using CME-550 drill rig with auto SPT. Groundwater was not encountered during drilling. Auger refusal was encountered at 10.0 feet.

The stratification lines represent approximate strata boundaries.
 In situations, the transition may be gradual.

LOG OF BORING NO. B-04

Project Description: **Paseo Gateway Roadway Improvements**
Kansas City, Missouri

TSi Geotechnical
 8248 NW 101st Terrace, #5
 Kansas City, MO 64153
 (816) 599-7965



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
		SS-1		Brown, silty lean CLAY, with roots and organics Brown, silty lean CLAY (CL)	39		2 3 4				19	36	21	15
5		SS-2			61		3 4 5				22			
		SS-3		- with limestone below 6.0 ft.	22		6				25			
		RUN1		LIMESTONE, gray, hard, highly weathered	100	0								
10		RUN2			81	11								
15				Boring terminated at 14.0 ft.										
20														
25														
Completion Depth: 14.0 Date Boring Started: 4/25/19 Date Boring Completed: 4/25/19 Engineer/Geologist: SM Project No.: 20192013				Remarks: Boring drilled using CME-550 drill rig with auto SPT. Groundwater was not encountered during drilling. Auger refusal was encountered at 8.3 ft.										

KC LOG WITH LAB PASEO BORING LOGS.GPJ 5/21/19

The stratification lines represent approximate strata boundaries.
 In situations, the transition may be gradual.

LOG OF BORING NO. B-05

Project Description: **Paseo Gateway Roadway Improvements**
Kansas City, Missouri

TSi Geotechnical
 8248 NW 101st Terrace, #5
 Kansas City, MO 64153
 (816) 599-7965



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index	
MATERIAL DESCRIPTION															
	G	GB-1		Light brown and brown, lean CLAY, with roots and organics Brown, lean CLAY (CL)							22	39	22	17	
5	G	GB-2										26			
	G	GB-3										21	32	19	13
10	G	GB-4										23			
Boring terminated at 10.0 ft.															

KC LOG WITH LAB PASEO BORING LOGS.GPJ 5/21/19

The stratification lines represent approximate strata boundaries.
 In situations, the transition may be gradual.

LOG OF BORING NO. B-06

Project Description: **Paseo Gateway Roadway Improvements**
Kansas City, Missouri

TSi Geotechnical
 8248 NW 101st Terrace, #5
 Kansas City, MO 64153
 (816) 599-7965



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
				Brown, silty lean CLAY, with roots and organics										
		SS-1		Brown, silty lean CLAY (CL), trace limestone	72		4 5 3				26	35	20	15
5		ST-2			50						26			
				- with limestone below 6.0 ft.										
		SS-3			22		2 2 2				12			
10		SS-4			44		4 1 2				28			
15		SS-5			17		4 3 3				30			
				Boring terminated at 15.0 ft.										
20														
25														

KC LOG WITH LAB PASEO BORING LOGS.GPJ 5/21/19

Completion Depth: 15.0
 Date Boring Started: 5/1/19
 Date Boring Completed: 5/1/19
 Engineer/Geologist: SM
 Project No.: 20192013

Remarks: Boring drilled using CME-550 drill rig with auto SPT. Groundwater was not encountered during drilling. ST-2 unconfined and unit weight could not be obtained due to low recovery.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. B-07

Project Description: **Paseo Gateway Roadway Improvements**
Kansas City, Missouri

TSi Geotechnical
 8248 NW 101st Terrace, #5
 Kansas City, MO 64153
 (816) 599-7965



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
		ST-1		Brown, silty lean CLAY (FILL), with limestone fragments	17						15	37	20	17
5		SS-2			67		3 6 8				18			
		SS-3			61		2 4 6				21			
10		ST-4			71				0.86	103	24			
		SS-5			22		1 2 1				27			
15				Boring terminated at 15.0 ft.										
20														
25														
Completion Depth: 15.0 Date Boring Started: 4/25/19 Date Boring Completed: 4/25/19 Engineer/Geologist: SM Project No.: 20192013					Remarks: Boring drilled using CME-550 drill rig with auto SPT. Groundwater was not encountered during drilling. ST-1 unconfined and unit weight could not be obtained due to low recovery.									

KC LOG WITH LAB PASEO BORING LOGS.GPJ 5/21/19

The stratification lines represent approximate strata boundaries.
 In situations, the transition may be gradual.

LOG OF BORING NO. B-08

Project Description: **Paseo Gateway Roadway Improvements**
Kansas City, Missouri

TSi Geotechnical
 8248 NW 101st Terrace, #5
 Kansas City, MO 64153
 (816) 599-7965



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION									
				Brown, silty lean CLAY, with roots and organics									
		SS-1		Brown and gray, silty lean CLAY (CL)	56		5 4 6			19			
5		SS-2		- with limestone fragments below 3.5 ft.	61		11 11 30			18			
		SS-3			56		8 3 5			17			
10		SS-4			22		5 3 5			14			
15		SS-5			78		8 7 50/6"			20			
				Boring terminated at 15.0 ft.									
20													
25													

KC LOG WITH LAB PASEO BORING LOGS.GPJ 5/21/19

Completion Depth: 15.0
 Date Boring Started: 5/1/19
 Date Boring Completed: 5/1/19
 Engineer/Geologist: SM
 Project No.: 20192013

Remarks: Boring drilled using CME-550 drill rig with auto SPT.
 Groundwater was not encountered during drilling.

The stratification lines represent approximate strata boundaries.
 In situations, the transition may be gradual.

LOG OF BORING NO. B-09

Project Description: **Paseo Gateway Roadway Improvements**
Kansas City, Missouri

TSi Geotechnical
 8248 NW 101st Terrace, #5
 Kansas City, MO 64153
 (816) 599-7965



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
		SS-1		Brown, silty lean CLAY (FILL), with concrete fragments - trace brick below 6.0 ft.	22		3 5 8				26			
5		ST-2			29				0.21	92	21			
		SS-3			22		2 1 2				21			
10		SS-4			50		1 1 2				25			
15		SS-5			11		6 4 5				19			
				Boring terminated at 15.0 ft.										
20														
25														
Completion Depth: 15.0 Date Boring Started: 4/24/19 Date Boring Completed: 4/24/19 Engineer/Geologist: SM Project No.: 20192013				Remarks: Boring drilled using CME-550 drill rig with auto SPT. Groundwater was not encountered during drilling.										

KC LOG WITH LAB PASEO BORING LOGS.GPJ 5/21/19

The stratification lines represent approximate strata boundaries.
 In situations, the transition may be gradual.



GENERAL NOTES

The number of borings is based on: topographic and geologic factors; the magnitude of structure loading; the size, shape, and value of the structure; consequences of failure; and other factors. The type and sequence of sampling are selected to reduce the possibility of undiscovered anomalies and maintain drilling efficiency. Attempts are made to detect and/or identify occurrences during drilling and sampling such as the presence of water, boulders, gas, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation in resistance to driving split-spoon samplers, unusual odors, etc. However, lack of notation regarding these occurrences does not preclude their presence.

Although attempts are made to obtain stabilized groundwater levels, the levels shown on the Logs of Boring may not have stabilized, particularly in more impermeable cohesive soils. Consequently, the indicated groundwater levels may not represent present or future levels. Groundwater levels may vary significantly over time due to the effects of precipitation, infiltration, or other factors not evident at the time indicated.

Unless otherwise noted, soil classifications indicated on the Logs of Boring are based on visual observations and are not the result of classification tests. Although visual classifications are performed by experienced technicians or engineers, classifications so made may not be conclusive.

Generally, variations in texture less than one foot in thickness are described as layers within a stratum, while thicker zones are logged as individual strata. However, minor anomalies and changes of questionable lateral extent may appear only in the verbal description. The lines indicating changes in strata on the Logs of Borings are approximate boundaries only, as the actual material change may be between samples or may be a gradual transition.

Samples chosen for laboratory testing are selected in such a manner as to measure selected physical characteristics of each material encountered. However, as samples are recovered only intermittently and not all samples undergo a complete series of tests, the results of such tests may not conclusively represent the characteristics of all subsurface materials present.

NOTATION USED ON BORING LOGS

APPROXIMATE PROPORTIONS

TRACE	<15%
WITH	15-30%
MODIFIER	>30%

Clay or clayey may be used as major material or modifier, regardless of relative proportions, if the clay content is sufficient to dominate the soil properties.

PARTICLE SIZE

BOULDERS	>12 Inches
COBBLES	12 Inches – 3 Inches
GRAVEL	
Coarse	3 Inches – ¾ Inch
Fine	¾ Inch – No. 4 Sieve (4.750 mm)
SAND	
Coarse	No. 4 – No. 10 Sieve (2.000 mm)
Medium	No. 10 – No. 40 Sieve (0.420 mm)
Fine	No. 40 – No. 200 Sieve (0.074 mm)
SILT	No. 200 Sieve - 0.002 mm
CLAY	< 0.002 mm

PENETRATION – BLOWS

Number of impacts of a 140-pound hammer falling a distance of 30 inches to cause a standard split-barrel sampler, 1 3/8 inches I.D., to penetrate a distance of 6 inches. The number of impacts for the first 6 inches of penetration is known as the seating drive. The sum of the impacts for the last 12 inches of penetration is the Standard Penetration Test Resistance or “N” value, blows per foot. For example, if blows = 6-8-9, “N” = 8+9 or 17.

OTHER NOTATIONS

Recovery % – length of recovered soil divided by length of sample attempted.

50/2” Impacts of hammer to cause sampler to penetrate the indicated number of inches

WR Sampler penetrated under the static loading of the weight of the drill rods

WH Sampler penetrated under the static loading the weight of the hammer and drill rods

HSA Hollow stem auger drilling method

FA Flight auger drilling method

RW Rotary wash drilling methods with drilling mud

AH Automatic hammer used for Standard Penetration Test sample

SH Safety hammer with rope and cathead used for Standard Penetration Test sample

GRAPHIC SYMBOLS

▽ Depth at which groundwater was encountered during drilling

▼ Depth at which groundwater was measured after drilling

▲ Standard Penetration Test Sample, ASTM D1586

■ 3-inch diameter Shelby Tube Sample, ASTM D1587

◻ Sample grabbed from auger

▬ NX Size rock core sample



UNIFIED SOIL CLASSIFICATION SYSTEM, (ASTM D-2487)

Major Divisions			Group Symbols		Typical Names	Laboratory Classification Criteria																									
<div>Coarse-grained soils (More than half of materials is larger than No. 200 sieve size)</div> <div><div>Gravels (More than half of coarse fraction is larger than No. 4 sieve size)</div><div>GW GP GM^a GC</div><div>Gravels with fines (Appreciable amount of fines)</div><div>Silty gravels, gravel-sand-silt mixtures</div></div> <div><div>Sands (More than half of coarse fraction is smaller than No. 4 sieve size)</div><div>SW SP</div><div>Clean sands (Little or no fines)</div><div>Poorly graded sands, gravelly sands, little or no fines</div></div> <div><div>Sands with fines (Appreciable amount of fines)</div><div>SM^a SC</div><div>d u</div><div>Silty sands, sand-mix mixtures</div><div>Clayey sands, sand-clay mixtures</div></div> <div><div>Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 per cent More than 12 per cent 5 to 12 per cent</div><div>GW, GP, SW, SP GM, GC, SM, SC Borderline cases requiring dual symbols^b</div></div> <tr><td colspan="2">$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3</td><td colspan="2" rowspan="2">Not meeting all gradation requirements for GW</td></tr> <tr><td colspan="2">Atterberg limits below “A” line or P.I. less than 4</td></tr> <tr><td colspan="2">Atterberg limits below “A” line with P.I. greater than 7</td><td colspan="2" rowspan="2">Above “A” line with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols</td></tr> <tr><td colspan="2">$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3</td></tr> <tr><td colspan="2">Not meeting all gradation requirements for SW</td></tr> <tr><td colspan="2">Atterberg limits about “A” line or P.I. less than 4</td><td colspan="2" rowspan="2">Limits plotting in hatched zone with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols</td></tr> <tr><td colspan="2">Atterberg limits about “A” line with P.I. greater than 7</td></tr> <tr><td colspan="6" rowspan="7"><div>Fine-grained soils (More than half of materials is smaller than No. 200 sieve size)</div><div><div>Silts and clays (Liquid limit less than 50)</div><div>ML CL OL</div><div>Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays Organic silts and organic silty clays of low plasticity</div></div><div><div>Silts and clays (Liquid limit greater than 50)</div><div>MH CH OH</div><div>Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts Inorganic clays of medium to high plasticity, organic silts Organic clays of medium to high plasticity, organic silts</div></div><div>Highly organic soils Pt Peat and other highly organic soils</div><div><p>For classification of fine-grained soils and fine-grained fraction of coarse-grained soils: Equation of "A"-line Horizontal at PI=4 to LL=25.5, then PI=0.73 (LL-20) Equation of "U"-line Vertical at LL=16 to PI=7, then PI=0.9 (LL-8)</p></div></td></tr>						$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3		Not meeting all gradation requirements for GW		Atterberg limits below “A” line or P.I. less than 4		Atterberg limits below “A” line with P.I. greater than 7		Above “A” line with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols		$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3		Not meeting all gradation requirements for SW		Atterberg limits about “A” line or P.I. less than 4		Limits plotting in hatched zone with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols		Atterberg limits about “A” line with P.I. greater than 7		<div>Fine-grained soils (More than half of materials is smaller than No. 200 sieve size)</div> <div><div>Silts and clays (Liquid limit less than 50)</div><div>ML CL OL</div><div>Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays Organic silts and organic silty clays of low plasticity</div></div> <div><div>Silts and clays (Liquid limit greater than 50)</div><div>MH CH OH</div><div>Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts Inorganic clays of medium to high plasticity, organic silts Organic clays of medium to high plasticity, organic silts</div></div> <div>Highly organic soils Pt Peat and other highly organic soils</div> <div><p>For classification of fine-grained soils and fine-grained fraction of coarse-grained soils: Equation of "A"-line Horizontal at PI=4 to LL=25.5, then PI=0.73 (LL-20) Equation of "U"-line Vertical at LL=16 to PI=7, then PI=0.9 (LL-8)</p></div>					
						$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3				Not meeting all gradation requirements for GW																					
						Atterberg limits below “A” line or P.I. less than 4																									
						Atterberg limits below “A” line with P.I. greater than 7		Above “A” line with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols																							
						$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3																									
						Not meeting all gradation requirements for SW																									
						Atterberg limits about “A” line or P.I. less than 4		Limits plotting in hatched zone with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols																							
						Atterberg limits about “A” line with P.I. greater than 7																									
						<div>Fine-grained soils (More than half of materials is smaller than No. 200 sieve size)</div> <div><div>Silts and clays (Liquid limit less than 50)</div><div>ML CL OL</div><div>Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays Organic silts and organic silty clays of low plasticity</div></div> <div><div>Silts and clays (Liquid limit greater than 50)</div><div>MH CH OH</div><div>Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts Inorganic clays of medium to high plasticity, organic silts Organic clays of medium to high plasticity, organic silts</div></div> <div>Highly organic soils Pt Peat and other highly organic soils</div> <div><p>For classification of fine-grained soils and fine-grained fraction of coarse-grained soils: Equation of "A"-line Horizontal at PI=4 to LL=25.5, then PI=0.73 (LL-20) Equation of "U"-line Vertical at LL=16 to PI=7, then PI=0.9 (LL-8)</p></div>																									

^aDivision of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 26 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

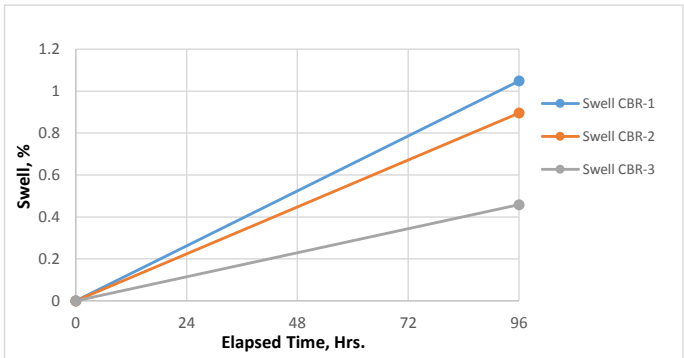
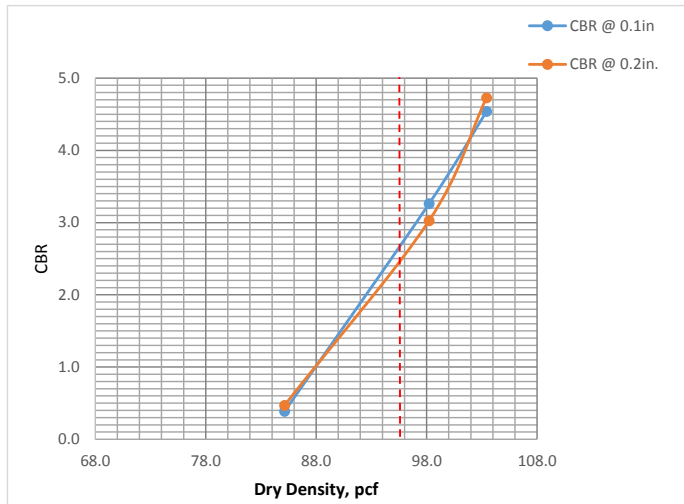
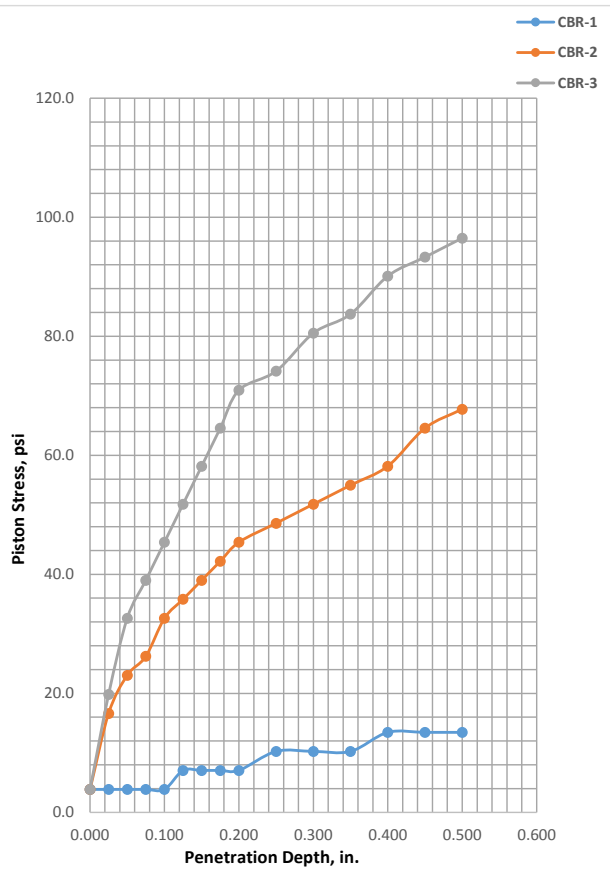
^bBorderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

APPENDIX C

Laboratory Test Results

CALIFORNIA BEARING RATIO TEST REPORT ASTM D 1883-07

% CBR Value @ 95% Compaction = 2.7 @ 0.1 in. penetration
% CBR Value @ 95% Compaction = 2.5 @ 0.2 in. penetration



Specimen ID	Molded			CBR%		Moisture of Top 1" Layer, %	Surcharge lbs	Max Swell, %
	Density, pcf	Percent of Max. Density	Moisture	0.1 in.	0.2 in			
CBR-1	85.1	84.5	19.7	0.4	0.5	32.1	10	1.0
CBR-2	98.2	97.4	19.5	3.3	3.0	25.6	10	0.9
CBR-3	103.4	102.6	19.3	4.5	4.7	23.0	10	0.5
Material Description				USCS	MAX DENSITY, pcf	OPTIMUM MOISTURE, %	LL	PI
Brown lean clay				CL	100.8	20.5	39	17

Remarks:

Compaction Method: ASTM D698

Project: Paseo Gateway Road Improvements



8248 NW 101st
Terrace #5
Kansas City,
Missouri 64153
p| 816.599.7965
f| 816.599.7967

Location: Kansas City, MO

Client: McClure

Sample No.: A

Boring: Bulk B-1, B-3

Depth: 0 to 5 ft.

Project No.: 20192013

Date: 5/13/2019



PROCTOR TEST

PROJECT NAME: Paseo Gateway Road Improvements

PROJECT No.: 20192013

SAMPLE NUMBER: A

SAMPLE LOCATION: Bulk B-1 and B-3

DEPTH: 0 to 5 feet

VISUAL CLASS. (USCS): Brown lean clay

TYPE OF COMPACTION	Std.	D698		
SIEVE ANALYSIS RESULTS	0.75	0.375	No. 4	PROCEDURE
% Retained(cummulative)				A

SOIL WEIGHT DATA					
Determination Number	1	2	3	4	5
Weight- Soil + Mold (wet),g	3828.3	3833.0	3801.5	3740.0	
Weight of Mold,g	1988.3	1988.3	1988.3	1988.3	
Weight Wet Soil,g	1840.0	1844.7	1813.2	1751.7	
Volume of Mold (ft ³)	0.0333	0.0333	0.0333	0.0333	
MOISTURE DATA					
Weight- Soil + Tare (wet),g	363.5	269.2	393.5	309.9	
Weight- Soil + Tare (dry),g	295.8	223.1	330.8	265.0	
Weight- Tare,g	7.0	6.8	7.5	7.5	
COMPUTED DATA					
Wet unit weight (pcf)	121.8	122.1	120.0	116.0	
Moisture content (%)	23.5	21.3	19.4	17.4	
Dry unit weight (pcf)	98.7	100.7	100.5	98.8	

Maximum Dry Density (pcf)	100.8
Optimum Moisture Content (%)	20.5
Natural Moisture Content (%)*	23.5

Liquid Limit	39
Plastic Limit	22
Plasticity Index	17
CLASSIFICATION. (USCS)*	CL

* with additive

	Date
Tested by: MN	5/8/2019
Calculated by: MN	5/9/2019
Checked by: TBS	5/21/2019
Entered Into Excel by: MN	5/9/2019

NOTE:

Proctor Curve

