City of Kansas City, Missouri
Water Services Department
Kenneth C. Morgan, P.E., Director

Project Manual

FOR

PROJECT/CONTRACT NO. 81001071/1817

SEWER IMPROVEMENTS: 20th STREET – GRAND TO MCGEE

BIDDER/ADDRESS

Company	CM Concrete, Inc.
Contact	Francisco Chavez
Address	16621 W 147th Ter
	Olathe, KS 66062-2677
Phone	816-405-3414
Email	cmconcreteks@gmail.com

Project Manager: Kyle Tonjes, P.E.
Telephone: 816-601-2531
Email: kltonjes@burnsmcd.com

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ADDENDUM NUMBER 1

Project Number 81001071

Project Title: Sewer Improvements: 20th Street – Grand to McGee

ISSUE DATE: 3/25/2026

Bidders are hereby notified that the Bidding and Contract Documents for the above project, for which Bids are to be received on March 31st, 2026, are amended as follows:

Specifications

1. Delete 00412 Unit Prices in its entirety and replace with 00412 Unit Prices attached hereto.

Drawings:

1. Sheet C000- Site Demolition:
   a) Note B should be pointed towards the existing curb location instead of the proposed curb location.
   b) Delete Site Demolition Note I. The existing sewer shown is a combined sewer and shall remain in service.
   c) Revise Note J to read: Power pole in conflict with proposed box culvert to be relocated by Evergy.
   d) All Demolition Notes shown south of the centerline of 20th Street are not applicable to this project.

2. Sheet C401 – Storm Sewer Plan Profile:
   a) Delete Line A. Connect Outlet Control Structure OC-1 to RCB Structure BX-3 with 12" storm sewer pipe.

3. Sheet L190 – Hardscape Details
   a) Detail 1 and Detail 2: Delete reference to Chemically Stabilized Subgrade. Subgrade preparation for sidewalk shall be in accordance with KC Metropolitan Chapter APWA Specification 2301.3.B and shall be incidental to the price for Concrete Sidewalk construction.

NOTE: Bidders must acknowledge receipt of this Addendum by listing the number and date, where provided, on the Bid Form - Document 00410.

Addendum #1

Bidder: _____

00412 UNIT PRICES

Project/Contract Number: 81001071/1817

Project Title: Sewer Improvements: 20th Street - Grand to McGee

TABLE A - BASE BID

NOTE: THESE QUANTITIES HAVE BEEN REDUCED TO REFLECT NO WORK (OTHER THAN STRIPING AND SIGNAGE) BEING PERFORMED ON THE SOUTH HALF OF 20TH STREET. IT IS THE INTENT OF THE CITY THAT ONLY WORK ON THE NORTH SIDE OF 20TH STREET WILL BE INCLUDED IN THIS CONTRACT. THE ENTIRE STRIPING AND SIGNAGE SCOPE WILL BE INCLUDED.

IN THE EVENT OF DISCREPANCY, UNIT PRICE SHALL GOVERN. THE CITY MAY ADD OR DELETE ANY QUANTITY OF WORK TO THE PROJECT AS SPECIFIED IN SUPPLEMENTARY CONDITIONS.

Item No.	Unit	Qty.	Item Description:	Unit Price	Extension
1	LS	1	Mobilization		
2	LS	1	Traffic Control		
3	LS	1	Contractor Provided Surveying and Construction Staking		
4	LS	1	Erosion Control		
5	SY	1,342	Street Pavement Removal (Including Curbs and Medians)		
6	SY	502	Concrete Sidewalk and Driveway Removal		
7	LF	540	Saw Cutting		
8	SY	610	Concrete Sidewalk		
9	SY	73	8" Concrete Commercal Drive Apron		
10	LF	409	Type C-1 Concrete Curb		
11	SY	24	ADA Accessible Ramps (8" Min. Concrete)		
12	CY	700	Unclassified Excavation		
13	SY	801	Street Subgrade Preparation		
14	SY	801	6" Untreated Compacted Aggregate Subbase		
15	SY	801	8" Asphaltic Concrete (Type 1-01) Base		
16	SY	801	2" Asphaltic Concrete (Type 5-01) Surface		
17	LF	320	4' x 3' Reinforced Concrete Box Culvert		
18	LF	24	8" SDR 26 PVC Storm Sewer		
19	LF	120	12" Storm Sewer		
20	EA	2	Outlet Control Structures		
21	EA	3	18" Nyoplast Inlets, Incl. Water Control Structures, 4" Subdrain, and 6" HDPE Connections to RCB		
22	EA	1	4' x 4' Type DI-1 Double Drop Inlet		
23	EA	1	60" Sanitary Sewer Manhole		
24	EA	4	Forebay Type 1		
25	EA	3	5'x6' Pedestrian Bridge		
26	TON	2	Colorado River Jack Stone - 4-10"		
27	TON	3	Multicolor Stone (Oversize) - 2-5"		
28	EA	10	Shade Tree - 2" Caliper		
29	SF	1,767	Landscape Bed - Shrubs, grasses, perennials		
30	SF	1,767	Soil - Shrub Bed (18" of 90% Site Soil & Amendments, 10% Compost)		
31	SF	306	Mulch - Hardwood 3" Depth		
32	EA	2	30' Aluminum Pole with 6' Bracket Arm		
33	EA	2	LED Type C		
34	EA	2	30' Concrete Base		
35	EA	2	Identification Labels		
36	EA	2	6" Anti-Theft Retainers		
37	LF	250	2" Schedule 40 PVC Conduit		
38	LF	275	(3)#8 RHH/RHW/USE Cu		
39	LF	120	1c No. 10 Type RHW/USE Cu Pole & Bracket Cable		
40	EA	4	Fused Connector Kit/10 Amp KTK Fuses		
41	EA	2	Unfused Connector Kit		
42	EA	3	Waterproof Splice Kit		
43	EA	2	Ground Rod (Concrete Base)		
44	EA	17	Permanent Signing		
45	EA	2	Remove & Reset Ex. Sign		
46	LF	430	4" White Line		
47	LF	710	4" Yellow Line		
48	LF	688	6" White Line		
49	LF	32	12' Yellow Line		
50	LF	65	24" White Stop Line		
51	EA	42	24" Crosswalk Line		

Addendum #1

Bidder: _____

00412 UNIT PRICES

Project/Contract Number: 81001071/1817

Project Title: Sewer Improvements: 20th Street - Grand to McGee

TABLE A - BASE BID

NOTE: THESE QUANTITIES HAVE BEEN REDUCED TO REFLECT NO WORK (OTHER THAN STRIPING AND SIGNAGE) BEING PERFORMED ON THE SOUTH HALF OF 20TH STREET. IT IS THE INTENT OF THE CITY THAT ONLY WORK ON THE NORTH SIDE OF 20TH STREET WILL BE INCLUDED IN THIS CONTRACT. THE ENTIRE STRIPING AND SIGNAGE SCOPE WILL BE INCLUDED.

IN THE EVENT OF DISCREPANCY, UNIT PRICE SHALL GOVERN. THE CITY MAY ADD OR DELETE ANY QUANTITY OF WORK TO THE PROJECT AS SPECIFIED IN SUPPLEMENTARY CONDITIONS.

Item No.	Unit	Qty.	Item Description:	Unit Price	Extension
52	SF	500	Green Pavement Markings		
53	EA	5	Bicycle Symbol		
54	EA	2	Solid White Turn Arrow		
55	EA	3	Solid White Thru Arrow		
56	EA	2	"Wait Here" Solid White Markings		
57	LS	1	2-Year Landscaping Plants Establishment and Maintenance Period		
			Total Base Bid (Total of Items 1 through 57) Enter Total in Section 00410 - Bid Form		**$ -**

NOTE: MAY BE PRINTED AND MANUAL FILL-IN, OR FILLED IN ON ELECTRONIC EXCEL SPREADSHEET VERSIONS.

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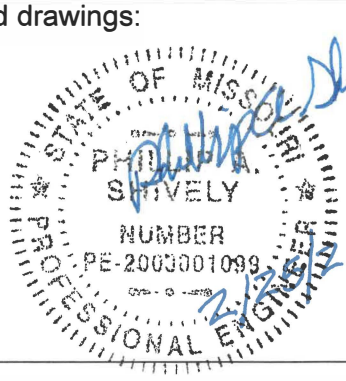
CERTIFICATION PAGE

Project/Contract Number 81001071 / 1817

Project Title Sewer Improvements: 20th St-Grand to McGee

I am responsible for the following specifications and drawings:

Specifications: Div 00, 01, 03, 05



(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.

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CERTIFICATION PAGE

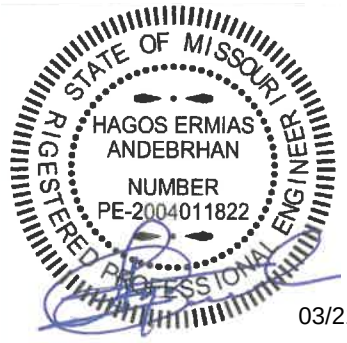
Project Number: 89008851-02536

Project Title: 20th Street Streetscape, Grand to McGee

I am responsible for the following specifications and drawings:

Drawings:
C000 SITE DEMOLITION PLAN
C100 ROADWAY TYPICAL SECTIONS
C200 OVERALL STREET PLAN & PROFILE
C300 ADA RAMP ELEVATION PLANS
C400 STORM SEWER PLAN & PROFILE
C401 STORM SEWER PLAN & PROFILE
C410 STORM SEWER DETAILS
C411 STORM SEWER DETAILS
C412 STORM SEWER DETAILS
C415 EROSION CONTROL SHEET
C420 STREET CROSS SECTIONS

Specifications:
01720 CITY SURVEYING AND CONSTRUCTION STAKING
01722 SURVEYING AND CONSTRUCTION STAKING
02100 CLEARING AND SITE PREPARATION
02200 PAVING
02300 EARTHWORK
02300 GRADING EXCAVATION EMBANKMENT
02300 INCIDENTAL CONSTRUCTION
02500 SANITARY SEWERS
02513 ASPHALT INDEX PAGES
02600 STORM SEWERS
02700 STRUCTURES



03/21/2023

_____ (SEAL)

I am responsible for the following specifications and drawings:

Drawings:
E100 LIGHTING PLAN
E200 LIGHTING PLAN
PM100 PAVEMENT MARKING PLAN
TC100 DETOUR PLAN
TC200 TRAFFIC CONTROL PLAN

Specifications:
02800 STREET LIGHTS

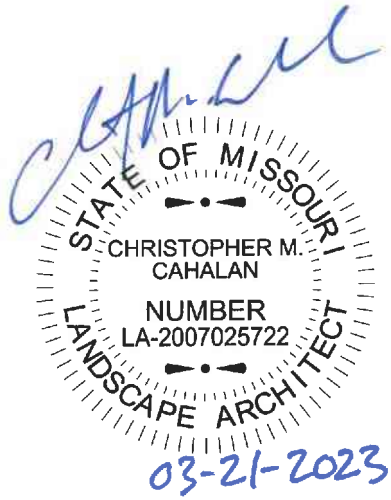
3/21/2023

_____ (SEAL)

I am responsible for the following specifications and drawings:

Drawings:
COVER
L100 OVERALL HARDSCAPE PLAN
L101 HARDSCAPE PLAN
L102 HARDSCAPE PLAN
L190 HARDSCAPE DETAILS
L200 OVERALL LANDSCAPE PLAN
L201 LANDSCAPE PLAN
L202 LANDSCAPE PLAN
L290 LANDSCAPE DETAILS

Specifications:
00005 CERTIFICATION PAGE
00010 TABLE OF CONTENTS
00015 LIST OF DRAWINGS
02000 GENERAL
02250 GREEN INFRASTRUCTURE DRAINAGE
02930 EXTERIOR PLANTS



_____ (SEAL)

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.

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OVERFLOW CONTROL PLAN CONSENT DECREE TABLE OF CONTENTS

Project/Contract Number:

Project Title: Sewer Improvements: 20th Street - Grand to McGee

INTRODUCTORY INFORMATION

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00010 OCP Consent Decree Table of Contents
00015 List of Drawings

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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
00560 Missouri Project Exemption Certificate
00560.01 Kansas City Missouri Tax Exempt Certificate
00610 Performance and Maintenance Bond Form
00615 Payment Bond Form
00620 Insurance Certificate Forms
00630 Revenue Clearance Release Authorization
Revenue Clearance Letter (Sample)
00700 General Conditions

00800 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

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01016 Water Mains Near Sewers
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
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01290.12 Certificate of Substantial Completion
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01290.14 Contractor Affidavit for Final Payment
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01630 Substitution Request
01700 Traffic Control
01900 Contract Closeout

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02200 Paving
02250 Green Infrastructure Drainage
02300 Earthwork
02300 Grading Excavation Embankment
02300 Incidental Construction
02500 Sanitary Sewers
02513 Asphalt Index Pages
02600 Storm Sewers
02700 Structures
02800 Street Lighting
02930 Exterior Plants

DIVISION 3 - CONCRETE
03370 Sanitary Sewer Manhole Construction

DIVISION 5 - METALS
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LIST OF DRAWINGS

Project Number 81001071

Project Title Sewer Separation: 20th Street-Grand to McGee

Item	Set /Title /Description /Designation	Drawing No(s).	Dated
XXXX	COVER PAGE	-	3/21/23
C000	SITE DEMOLITION SHEET	-	3/17/23
C100	ROADWAY TYPICAL SECTIONS	-	3/17/23
C200	OVERALL STREET PLAN & PROFILE	-	3/17/23
C300	ADA RAMP ELEVATION PLANS	-	3/17/23
C400	STORM SEWER PLAN & PROFILE	-	3/17/23
C401	STORM SEWER PLAN & PROFILE	-	3/17/23
C410	STORM SEWER DETAILS	-	3/17/23
C411	STORM SEWER DETAILS	-	3/17/23
C412	STORM SEWER DETAILS	-	3/17/23
C415	EROSION CONTROL SHEET	-	3/17/23
C420	STREET CROSS SECTIONS	-	3/17/23
L100	OVERALL HARDSCAPE PLAN	-	3/17/23
L101	HARDSCAPE PLAN	-	3/17/23
L102	HARDSCAPE PLAN	-	3/17/23
L190	HARDSCAPE DETAILS	-	3/17/23
L200	OVERALL LANDSCAPE PLAN	-	3/17/23
L201	LANDSCAPE PLAN	-	3/17/23
L202	LANDSCAPE PLAN	-	3/17/23
L290	LANDCAPE DETAILS	-	3/17/23
E100	LIGHTING PLAN 20TH STREET	-	3/17/23
E200	LIGHTING PLAN DETAIL SHEET	-	3/17/23
PM100	PAVEMENT MARKING PLAN 20TH STREET	-	3/17/23
TC100	DETOUR PLAN	-	3/17/23
TC101	TRAFFIC CONTROL PLAN	-	3/17/23
TC200	TRAFFIC CONTROL DETAILS	-	3/17/23

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INVITATION TO BID

Project Number 81001071

Project Title Sewer Improvements: 20th Street-Grand to McGee

The Water Services Department of Kansas City, Missouri will receive sealed Bids until 2:00 PM, on **March 31, 2026** at 4800 East 63rd Street, Kansas City, MO 64130 for **81001071 Sewer Improvements: 20th Street-Grand to McGee**. Bids will be opened after that time within Water Services, room # TBD.

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 (11%) MBE participation and (11%) 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.

Project Manager: Kyle Tonjes
Phone Number: 816-601-2531
E-mail: kltonjes@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.gov

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INSTRUCTIONS TO BIDDERS

Project Number: 81001071

Project Title: Sewer Improvements: 20th Street – Grand to McGee

1. Sealed Bids for ***Sewer Improvements: 20th Street – Grand to McGee*** will be received by the Water Services Department at 4800 East 63rd Street, Kansas City, MO 64130 until **2:00 P.M., March 31st, 2026** 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. Certification Regarding Lobbying (EPA Form 6600-06)

w. Other.

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. 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

12. 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.

13. 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.

14. 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.

15. 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.

16. 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.

17. 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.

18. 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.

19. 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 (11%) MBE participation and (11%) 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.

20. 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.

21. 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.

22. 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.

23. 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.

24. 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.

25. 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 officer authorized to sign on behalf of the corporation. Corporation's seal must be attached to the signature.

26. 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.

Kyle Tonjes, P.E., Project Manager
Burns & McDonnell
9400 Ward Pkwy
Kansas City, MO 64114
(816) 601-2531
E-mail: kltonjes@burnsmcd.com

Jamie Driskell, Contract Administration
Burns & McDonnell
9400 Ward Pkwy
Kansas City, MO 64114
(816) Phone Number
E-mail: jdriskell@burnsmcd.com

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

b: Statement of Bidder regarding violations of any federal or state prevailing wage statutes in the three (3) years preceding the date of the bid.	CM Concrete, Inc. has had no written notices of violations of state or federal pervailing wage statutes or had penalties assessed. CM Concrete, Inc. is current on payments of Federal and State income tax withholdings and unemployment insurance.

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.	CM Concrete, Inc. 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.

d: Key Personnel proposed for the Project:		
1	GC Project Manager	Francisco Mendoza
2	On-Site Field Superintendent	Francisco Mendoza
3	QC/QA Manager	Francisco Mendoza
4	Safety Officer	Francisco Mendoza

e: Key Personnel Background Information

1	Years Employment with current Employer	Francisco Chavez - 11 Years;
2	City of Residence	Francisco Chavez - Olathe, KS
3	Other Projects concurrently involved with	Anticipate completion of all existing projects prior to anticipated start date of this project
	Time commitment for the project	Summer 2026
	Time commitment for other projects	Anticipate completion of all existing projects prior to anticipated start date of this project
4	Professional registrations, education, certifications, and credentials held by person.	Francisco Chavez - 15+ Years construction Experience - concrete, asphalt, sewers, grading. Over 10 years in executive position.

f: General tasks involved in the Project	Get submittals ASAP. Utility locates, mobilization, asphalt removal and replacement with concrete.

g: Understanding of technical elements to be addressed for successful completion of project	Contractor has experience with all aspects of this project.

h: Bid schedule	See Attached.

i: Key issues that might affect schedule & proposals to address them.	Additional work being added.

j: Project Safety Plan.		
1	Address unique safety issues	No unique issues at this time.
2	Safety record & environmental compliance record, OSHA reportable accident rates on comparable size projects.	No OSHA reportable accidents in the last 5 years at work site locations and we have had no Environmental Compliance problems.
3	Bidders Experience Modification Ratio	0.82

k: Understanding of Traffic Control Required	As per MUTCD

l: Other special issues likely to be encountered and manner in which bidder suggest resolving them.	None
m: Outline community relations issues and resolutions	There should not be an impact on the community as a whole.
n: Difficulties bidder anticipates with the City	None
o: Bidders quality Assurance/Quality Control Plan	The contractor shall have personnel on the project that are aware of the specifications requirements
p: Statement of Bidder regarding violations of any federal or state DBE/MBE/WBE program in the two (2) years preceding the date of the bid.	CM Concrete, Inc. has had no written notices of violations of any federal, state, or local DBE/MBE/WBE program and 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.	CM Concrete, Inc. has not been rescinded or debarred form any bidding, contractual, procurement, or other such programs by federal, state or local entities.
r: Statement that Bidder current on payment of Federal and State income tax withholdings and unemployment insurance payments	CM Concrete, Inc. is current on all payments 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.	None
t: Statement of Bidder's bond history over the past five (5) years including any incidences of failure to perform.	The company started in 2022 and has not defaulted on any project.
u: MBE / WBE past project performance and compliance with participation goals in comparable size commercial projects	All participaion goals have been met in the past.

a: Form 00410.01 **See Attached**

d: Bid Schedule **To be turned in 48 hrs**

Bidder: CM Concrete Inc.

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

BID FORM/CONTRACT

Project/Contract Number 81001071 / 1817

Project Title: Sewer Improvements: 20th Street – Grand to McGee

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 Price(s) shall be shown in numeric figures only.

TOTAL BASE BID IN NUMERIC FIGURES (From Form 00412)	$ 981,106.00
ALLOWANCE	$ 100,000.00
TOTAL BID IN NUMERIC FIGURES	$ 1,081,106.00

5. 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.

6. The undersigned Bidder agrees that this Bid shall remain subject to selection by CITY, and may not be withdrawn for ninety (90) days after the day Bids are opened.

7. The undersigned Bidder certifies that this Bid contains no modifications, deviations, riders or qualifications.

8. Forms 00412 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.

9. The undersigned Bidder acknowledges receipt of the following addenda listed by number and date appearing on each addendum:

Bidder: CM Concrete Inc.

Addendum Number	Dated	Addendum Number	Dated
1	3/25/2026		

10. 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 CREO KC Instructions for Construction Contracts and the City's Workforce Ordinance (City Code Section 3-515). Within forty-eight (48) hours after bid opening, the construction contractor shall submit **00485.04 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. 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.
11. 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.
12. Section 13 through Section 17 constitutes the Affidavit of Intended Utilization required to be submitted by Bidders.
13. 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 CREO KC 08 Contractor Utilization Plan/Request for Waiver** and **00450.01 Letter of Intent to Subcontract** for each MBE/WBE listed on the 00450 CREO KC 08 Construction Contractor Utilization Plan/Request for Waiver;; 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: 11% MBE 11% WBE

BIDDER PARTICIPATION: 11.1 % MBE 12.3 % WBE

Bidder: CM Concrete Inc.

14. 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 Civil Rights and Equal Opportunity Department)**

A. Name of M/WBE Firm Audrie Seeley & Company LLC
Address 9300 Holmes Rd, Kansas City MO 64131
Telephone No. 816-361-0011
I.R.S. No. 43-1579393
Area/Scope of work Landscaping
Subcontract amount $ 75,811.00

B. Name of M/WBE Firm Thorne and Son Asphalt Paving Inc
Address 11705 E 350 Highway Suite D, Raytown MO, 64138
Telephone No. 816-358-4608
I.R.S. No. 43-1025733
Area/Scope of work Asphalt
Subcontract amount $57,495.78

C. Name of M/WBE Firm RLS Trucking Inc.
Address 8001 Prospect Ave., Kansas City MO 64132
Telephone No. 816-921-1230
I.R.S. No. 74-3054802
Area/Scope of work Demolition/Excavation/Backfill/Sewer
Subcontract amount $120,000.00

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)

15. 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 CREO KC 08 Contractor Utilization Plan/Request for Waiver.**

Bidder: CM Concrete Inc.

16. 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 Civil Rights and Equal Opportunity finds the Bidder established good faith efforts towards meeting the goals as set forth in the CREO-KC Forms and Instructions for Construction Projects and the City's MBE/WBE Ordinance.

17. The Bidder shall comply with Executive Order 11246 of September 24, 1965, entitled "Equal Employment Opportunity," as amended by Executive Order 11375 of October 13, 1967, and as supplemented in Department of Labor regulations (41 CFR chapter 60).

18. The Bidder certifies to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency;

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this document.

Bidder: CM Concrete, Inc.

Business Entity Type:

( ) Missouri Corporation
(X) 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:
CM Concrete, Inc.
Phone No:
Cell No: 816-405-3414
Facsimile No:
Bidder's E-Mail: cmconcreteks@gmail

Federal ID. No. 88-2486361

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)

Francisco Chavez
(Print Name)

Title: CEO

Date: 3-31-26

(Attach corporate seal if applicable)

CM Concrete Inc.
Corporate Seal
2022
Kansas

NOTARY

Subscribed and sworn to before me this 31st day of March, 2026.

My Commission Expires: 3-21-29

K CHILDS
Notary Public - Notary Seal
State of Missouri
Commissioned for Jackson County
My Commission Expires: March 21, 2029
Commission Number: 13484790

Bidder: CM Concrete Inc.

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, ($1,081,106). 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: **81001071/1817**

Project Title: **Sewer Improvements: 20th Street – Grand to McGee**

Firm's Legal Name	CM Concrete, Inc. (Previously – CM Concrete, LLC)
Mailing Address	16621 W 146th Ter, Olathe, KS 66062
Contact – Name & Email	Francisco Chavez – cmconcreteks@gmail.com
Contact – Phone & Fax	(816)405-3414

NO.	PROJECT & LOCATION	OWNER NAME & ADDRESS CONTACT & PHONE NUMBER	PROJECT DURATION & DATE COMPLETED	$ VALUE
1.	Glendell Acres Park Improvements Edgerton, KS	City of Edgerton, KS Project Manager: Holly Robertson Phone Number: 913-893-6231	12/3/24 8 Months	$580,874.47
2.	Bent Tree Neighborhood – Sidewalks – Spot Repair	City of Kansas City, MO Project Manager: Mia Puthumana Phone Number: (816) 513-4703	4/24/2024 9 Months	$570,149.65
3.	Agnes Ave. and E 51st & Wabash Ave. and E Gregory	City of Kansas City, MO Project Manager: Randy Alewine, P.E. Phone Number: (816) 513-6924	12/7/2022 5 months	$125,133.00
4	Madison Ave -72nd St to 73rd	City of Kansas City, MO Project Manager: Randy Alewine, P.E. Phone Number: (816) 513-6924	9/30/2022 5 Months	$156,820.11
5	Indian Creek Trail Improvements - Rebid	City of Kansas City, MO Scott Overbay 816-513-7628	10/15/2022 2 months	$31,782.99
6	Montgall – E 25th to E 26th	City of Kansas City, MO Project Manager: Uday Manepalli, P.E., PMP Telephone: (816) 914-8775	11/16/21 2 months	$87,445.50
7	E 96th Terr. High Ct. to Dodgion Ct.	City of Kansas City, MO Project Manager: Randy Alewine, P.E. Phone Number: (816) 513-6924	3/16/22 1 Month	$28,830.00
8	Big Shoal Creek Trail – Segments 1, 2, & 3	City of Kansas City, MO Scott Overbay 816-513-7628	10/27/2021 15 Months	$167,411.75
9	Blue River Trail	City of Kansas City, MO Morteza S. Dastjerdi Phone: 816-513-0370	6/16/21 11 Months	$139,564.57

EXPERIENCE AND REFERENCE SUMMARY – CURRENT PROJECTS

Project/ Contract Number: 81001071

Project Title: Sewer Improvements: 20th Street- Grand to McGee

Sealed Bids

Firm's Legal Name	**CM CONCRETE INC**
Mailing Address	**16621 W 146TH TER OLATHE, KANSAS 66061**
Contact – Name & E-Mail	**Francisco Chavez - cmconcreteks@gmail.com**
Contact – Phone & Fax	**Frncisco Chavez - 816-405-3414**

NO.	PROJECT & LOCATION	CONTRACT AMOUNT/ % COMPLETE	OWNER NAME & ADDRESS CONTACT & PHONE NUMBER	LENGTH, DIAMETER & MATERIAL OF CONSTRUCTION OR DESCRIPTION OF REPAIRS	START DATE
1.	Indian Creek Trail Resurfing	$377,460.00	City of Kansas City MO Jessica Blackwell Phone: 816-908-4077	Trail Repair	08/03/2026
2.	22nd Street Sidewalk	$317,880.00	City of St. Joseph, MO Kimberley Eaton Phone: 816-271-4651	Sidewalk Repair	
3.	Corner Repair FY26-27- Citywide ADA#2	$763,242.50	City of Kansas City MO Nicholas Berry	Corners Repair	
4.					

LIST OF EQUIPMENT AND STAFFING AVAILABLE FOR PROJECT

Project/ Contract Number: 81001071

Project Title: Sewer Improvements: 20th Street- Grand to McGee_____ **Page** ____ **of** _____

	EQUIPMENT AVAILABLE FOR CONSTRUCTION (OR ATTACH LIST)		STAFFING BREAKDOWN	NUMBER OF EACH CATEGORY
1.	3 Kubotta	1.	OFFICE STAFF	2
2.	2 Takeuchi	2.	SUPERVISORS	1
3.	1 Case Skid steer	3.	FIELD STAFF – CREW FOREMEN	2
4.	2 Dump Trailers	4.	FIELD STAFF – OPERATORS (NOT FOREMEN)	3
5.	2 Load Trailers	5.	FIELD STAFF – LABORERS (NOT FOREMEN)	6
6.	4 trucks and 1 Dump Truck	6.		

Addendum #1 Bidder: **00412 UNIT PRICES**

Project/Contract Number: 81001071/1817

Project Title: Sewer Improvements: 20th Street - Grand to McGee **TABLE A - BASE BID**

CM Concrete, Inc.

NOTE: THESE QUANTITIES HAVE BEEN REDUCED TO REFLECT NO WORK (OTHER THAN STRIPING AND SIGNAGE) BEING PERFORMED ON THE SOUTH HALF OF 20TH STREET. IT IS THE INTENT OF THE CITY THAT ONLY WORK ON THE NORTH SIDE OF 20TH STREET WILL BE INCLUDED IN THIS CONTRACT. THE ENTIRE STRIPING AND SIGNAGE SCOPE WILL BE INCLUDED.

IN THE EVENT OF DISCREPANCY, UNIT PRICE SHALL GOVERN. THE CITY MAY ADD OR DELETE ANY QUANTITY OF WORK TO THE PROJECT AS SPECIFIED IN SUPPLEMENTARY CONDITIONS.

Item No.	Unit	Qty.	Item Description:	Unit Price	Extension
1	LS	1	Mobilization	165,000.00	165,000.00
2	LS	1	Traffic Control	18,000.00	18,000.00
3	LS	1	Contractor Provided Surveying and Construction Staking	15,000.00	15,000.00
4	LS	1	Erosion Control	15,000.00	15,000.00
5	SY	1,342	Street Pavement Removal (Including Curbs and Medians)	30.00	40,260.00
6	SY	502	Concrete Sidewalk and Driveway Removal	25.00	12,550.00
7	LF	540	Saw Cutting	5.00	2,700.00
8	SY	610	Concrete Sidewalk	240.00	146,400.00
9	SY	73	8" Concrete Commercal Drive Apron	280.00	20,440.00
10	LF	409	Type C-1 Concrete Curb	75.00	30,675.00
11	SY	24	ADA Accessible Ramps (8" Min. Concrete)	360.00	8,640.00
12	CY	700	Unclassified Excavation	30.00	21,000.00
13	SY	801	Street Subgrade Preparation	5.00	4,005.0
14	SY	801	6" Untreated Compacted Aggregate Subbase	10.00	8,010.00
15	SY	801	8" Asphaltic Concrete (Type 1-01) Base	60.00	48,060.00
16	SY	801	2" Asphaltic Concrete (Type 5-01) Surface	24.00	19,224.00
17	LF	320	4' x 3' Reinforced Concrete Box Culvert	550.00	176,000.00
18	LF	24	8" SDR 26 PVC Storm Sewer	40.00	960.00
19	LF	120	12" Storm Sewer	80.00	9,600.00 4,000.00 corrected total
20	EA	2	Outlet Control Structures	2,000.00	6,000.00
21	EA	3	18" Nyoplast Inlets, Incl. Water Control Structures, 4" Subdrain, and 6" HDPE Connections to RCB	2,500.00	7,500.00
22	EA	1	4' x 4' Type DI-1 Double Drop Inlet	5,000.00	5,000.00
23	EA	1	60" Sanitary Sewer Manhole	7,500.00	7,500.00
24	EA	4	Forebay Type 1	5,500.00	22,000.00

25	EA	3	5'x6' Pedestrian Bridge	7,500.00	22,500.00
26	TON	2	Colorado River Jack Stone - 4-10"	900.00	1,800.00
27	TON	3	Multicolor Stone (Oversize) - 2-5"	700.00	2,100.00
28	EA	10	Shade Tree - 2" Caliper	700.00	7,000.00
29	SF	1,767	Landscape Bed - Shrubs, grasses, perennials	20.00	35,340.00
30	SF	1,767	Soil - Shrub Bed (18" of 90% Site Soil & Amendments, 10% Compost)	10.00	17,670.00
31	SF	306	Mulch - Hardwood 3" Depth	1.00	306.00
32	EA	2	30' Aluminum Pole with 6' Bracket Arm	3,000.00	6,000.00
33	EA	2	LED Type C	750.00	1,500.00
34	EA	2	30' Concrete Base	2,000.00	4,000.00
35	EA	2	Identification Labels	100.00	200.00
36	EA	2	6" Anti-Theft Retainers	300.00	600.00
37	LF	250	2" Schedule 40 PVC Conduit	30.00	7,500.00
38	LF	275	(3)#8 RHH/RHW/USE Cu	12.00	3,300.00
39	LF	120	1c No. 10 Type RHW/USE Cu Pole & Bracket Cable	5.00	600.00
40	EA	4	Fused Connector Kit/10 Amp KTK Fuses	150.00	600.00
41	EA	2	Unfused Connector Kit	200.00	400.00
42	EA	3	Waterproof Splice Kit	100.00	300.00
43	EA	2	Ground Rod (Concrete Base)	150.00	300.00
44	EA	17	Permanent Signing	390.00	6,630.00
45	EA	2	Remove & Reset Ex. Sign	150.00	300.00
46	LF	430	4" White Line	1.50	650.00 645.00 corrected total
47	LF	710	4" Yellow Line	1.50	1,065.00
48	LF	688	6" White Line	2.00	1,376.00
49	LF	32	12' Yellow Line	5.00	160.00
50	LF	65	24" White Stop Line	20.00	1,300.00
51	EA	42	24" Crosswalk Line	70.00	2,940.00

Addendum #1 Bidder: **00412 UNIT PRICES**

Project/Contract Number: 81001071/1817

Project Title: Sewer Improvements: 20th Street - Grand to McGee_**TABLE A - BASE BID**

CM Concrete, Inc.

NOTE: THESE QUANTITIES HAVE BEEN REDUCED TO REFLECT NO WORK (OTHER THAN STRIPING AND SIGNAGE) BEING PERFORMED ON THE SOUTH HALF OF 20TH STREET. IT IS THE INTENT OF THE CITY THAT ONLY WORK ON THE NORTH SIDE OF 20TH STREET WILL BE INCLUDED IN THIS CONTRACT. THE ENTIRE STRIPING AND SIGNAGE SCOPE WILL BE INCLUDED.

IN THE EVENT OF DISCREPANCY, UNIT PRICE SHALL GOVERN. THE CITY MAY ADD OR DELETE ANY QUANTITY OF WORK TO THE PROJECT AS SPECIFIED IN SUPPLEMENTARY CONDITIONS.

Item No.	Unit	Qty.	Item Description:	Unit Price	Extension
52	SF	500	Green Pavement Markings	5.00	2,500.00
53	EA	5	Bicycle Symbol	400.00	2,000.00
54	EA	2	Solid White Turn Arrow	350.00	700.00
55	EA	3	Solid White Thru Arrow	350.00	1,050.00
56	EA	2	"Wait Here" Solid White Markings	450.00	900.00
57	LS	1	2-Year Landscaping Plants Establishment and Maintenance Period	40,000.00	40,000.00
ALLOWANCE				$100,000.00 (not shown)	
			Total Base Bid (Total of Items 1 through 57) Enter Total in Section 00410 - Bid Form		**$ 983,111.00**

NOTE: MAY BE PRINTED AND MANUAL FILL-IN, OR FILLED IN ON ELECTRONIC EXCEL SPREADSHEET VERSIONS.

Corrected bid price with Allowance included is **$1,081,106.00**

Bidder: _____

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

ALLOWANCE FORM

Project Number: 81

Project Title: Sewer Improvements: 20th Street - Grand to McGee

Allowance No.:	Allowance Description:	Allowance in Figures:
1	General Allowance for addition of construction items not shown on the drawings or required in the specifications or modifications to items shown or specified.	$100,000.00

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

BID BOND

Project Number 81001071/1817

Project Title Sewer Improvements: 20th Street – Grand to McGee

Bond Number n/a

KNOW ALL MEN BY THESE PRESENTS: That CM Concrete, Inc of 16621 W 146th Terr, Olathe, KS 66062, as Principal, and Granite Re, Inc 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

Five percent (5%) of amount bid Dollars ($ 5% of bid), 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 31st day of March. 2026.

CM Concrete Inc.
Corporate Seal
2022
Kansas

BIDDER AND PRINCIPAL

Name, address and facsimile number of Bidder and Principal

CM Concrete, Inc
16621 W 146th Terrace
Olathe, KS 66061
816-228-5777

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

By: Francisco Chavez

Title: CEO

(Attach corporate seal if applicable)

SURETY

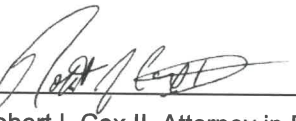
Name, address and facsimile number of Surety:

Granite Re, Inc

14001 Quailbrook Drive

Oklahoma City, OK 73134

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: Robert L Cox II, Attorney in Fact

Date: March 31, 2026

(Attach seal and Power of Attorney)

GRANITE RE, INC.

GENERAL POWER OF ATTORNEY

Know all Men by these Presents:

That GRANITE RE, INC., a corporation organized and existing under the laws of the State of MINNESOTA and having its principal office at the City of OKLAHOMA CITY in the State of OKLAHOMA does hereby constitute and appoint:

ROBERT L. COX II; KATHY JOHNSON; RODNEY DEMAREE; KACEE MCCROREY; JULIE MESSBARGER; LUKE LAMBERT; BLAKE MARNHOLTZ its true and lawful Attorney-in-Fact(s) for the following purposes, to wit:

To sign its name as surety to, and to execute, seal and acknowledge any and all bonds, and to respectively do and perform any and all acts and things set forth in the resolution of the Board of Directors of the said GRANITE RE, INC. a certified copy of which is hereto annexed and made a part of this Power of Attorney; and the said GRANITE RE, INC. through us, its Board of Directors, hereby ratifies and confirms all and whatsoever the said:

ROBERT L. COX II; KATHY JOHNSON; RODNEY DEMAREE; KACEE MCCROREY; JULIE MESSBARGER; LUKE LAMBERT; BLAKE MARNHOLTZ may lawfully do in the premises by virtue of these presents.

In Witness Whereof, the said GRANITE RE, INC. has caused this instrument to be sealed with its corporate seal, duly attested by the signatures of its President and Assistant Secretary, this 31st day of July, 2023.

GRANITE RE, INC. CORPORATE SEAL MINNESOTA

Kenneth D. Whittington, President

Kyle P. McDonald, Assistant Secretary

STATE OF OKLAHOMA)
) SS:
COUNTY OF OKLAHOMA)

On this 31st day of July, 2023, before me personally came Kenneth D. Whittington, President of the GRANITE RE, INC. Company and Kyle P. McDonald, Assistant Secretary of said Company, with both of whom I am personally acquainted, who being by me severally duly sworn, said, that they, the said Kenneth D. Whittington and Kyle P. McDonald were respectively the President and the Assistant Secretary of GRANITE RE, INC., the corporation described in and which executed the foregoing Power of Attorney; that they each knew the seal of said corporation; that the seal affixed to said Power of Attorney was such corporate seal, that it was so fixed by order of the Board of Directors of said corporation, and that they signed their name thereto by like order as President and Assistant Secretary, respectively, of the Company.

My Commission Expires:
April 21, 2027
Commission #: 11003620
(Expiration of notary's commission does not invalidate this instrument)

BETHANY J. ALRED #11003620 EXP. 04/21/27 STATE OF OKLAHOMA NOTARY PUBLIC

Notary Public

GRANITE RE, INC.

Certificate

THE UNDERSIGNED, being the duly elected and acting Assistant Secretary of Granite Re, Inc., a Minnesota Corporation, HEREBY CERTIFIES that the following resolution is a true and correct excerpt from the July 15, 1987, minutes of the meeting of the Board of Directors of Granite Re, Inc. and that said Power of Attorney has not been revoked and is now in full force and effect.

"RESOLVED, that the President, any Vice President, the Assistant Secretary, and any Assistant Vice President shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the Company in the course of its business. On any instrument making or evidencing such appointment, the signatures may be affixed by facsimile. On any instrument conferring such authority or on any bond or undertaking of the Company, the seal, or a facsimile thereof, may be impressed or affixed or in any other manner reproduced; provided, however, that the seal shall not be necessary to the validity of any such instrument or undertaking."

IN WITNESS WHEREOF, the undersigned has subscribed this Certificate and affixed the corporate seal of the Corporation this 31st day of March, 20 26.

GRANITE RE, INC. CORPORATE SEAL MINNESOTA

Kyle P. McDonald, Assistant Secretary

GR0800-1

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 it's 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.

CONTRACTOR UTILIZATION PLAN/REQUEST FOR WAIVER

Project Number 81001071/1817

Project Title SEWER IMPROVEMENTS: 20th STREET GRAND TO MC

Water Department
(Department Project) Department

CM Concrete, Inc.
(Bidder/Proposer)

STATE OF MISSOURI)
) ss
COUNTY OF JACKSON)

I, Francisco Chavez, 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 11 **% MBE** and 11 **% 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: 11.1 **% MBE** 12.1 **% WBE**

   POST-BID/POST-RFP ESTIMATED BUDGET: $ 1,081,106.00

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 RLS Trucking, Inc.
   Address 8001 Prospect Ave., Kansas City, MO 64132
   Telephone No. 816-921-1230
   I.R.S. No. 74-3054802

Name of M/WBE Firm Audrie Seeley & Company, LLC
Address 9300 Holmes, Kansas City, MO 64131
Telephone No. 816-361-0011
I.R.S. No. 43-1579393

Name of M/WBE Firm Thorne and Son Asphalt
Address 11705 E 350 Highway Suite D, Raytown, MO 64138
Telephone No. 816-358-4608
I.R.S. No. 43-1025733

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
RLS Trucking, Inc.	Contractor	120000.00	20000.0	11.1

TOTAL MBE $ / TOTAL MBE %: $120000.00 11.1 %

WBE FIRMS:

Name of WBE Firm	Supplier/Broker/Contractor	Subcontract Amount*	Weighted Value**	% of Total Contract
Thorne and Son Asphal	Contractor	57,495.78	7,495.7	5.1
Audrie Seeley & Compa	Contractor	75,811.00	5,811.0	7.0

TOTAL WBE $ / TOTAL WBE %: $133,306.78 12.1 %

*"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.

5. 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 bythe 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: Francisco Chavez
Address: 16821 W 146th Ter
Olathe, KS 66062
Phone Number: 816-405-3414
Facsimile number:
E-mail Address: cmconcreteks@gmail.com

CM Concrete Inc.
Corporate Seal
2022
Kansas

By:
Title: CEO
Date: 4/2/26
(Attach corporate seal if applicable)

Subscribed and sworn to before me this 2nd day of April, 2026.

My Commission Expires: 3-21-29

Notary Public

K CHILDS
Notary Public - Notary Seal
State of Missouri
Commissioned for Jackson County
My Commission Expires: March 21, 2029
Commission Number: 21

LETTER OF INTENT TO SUBCONTRACT

Check one:
Original LOI: ☑
Updated LOI: ☐

Project Name/Title SEWER IMPROVEMENTS: 20th STREET – GRAND TO MCGEE

Project Location/Number 81001071/1817

PART 1: Prime Contractor CM Concrete, Inc. agrees to enter into a contractual agreement with M/W/DBE Subcontractor Audrie Seeley & Company, LLC 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.]

Landscaping

for an estimated amount of $ 75,811.00 (or 7.0 % 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: Audrie Seeley & Company, LLC

Full address: 9300 Holmes Rd (Street number and name) Kansas City MO 64131 (City, State and Zip Code)

Primary contact: Kim Seeley (Name) 816-361-0011 (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: Landscape

c) The dollar value of this agreement is: $75,811.00

PART 3:

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: CM Concrete, Inc.

Signature: Prime Contractor

Francisco Chavez
Print Name

CEO
Title

4/2/26
Date

State of Missouri)

County of Jackson)

I, Francisco Chavez, 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 2nd day of April, 2026

My Commission Expires: 3-21-29

Notary Public

STAMP:

K. CHILDS
Notary Public - Notary Seal
State of Missouri
Commissioned for Jackson County
My Commission Expires: March 21, 2029
Commission Number: 19455709

MWDBE SUBCONTRACTOR BUSINESS NAME: Audrie Seeley & Company, LLC

Signature: Subcontractor

Audrie Seeley
Print Name

Owner
Title

5/20/26
Date

State of Missouri)

County of Jackson)

I, Audrie Seeley, 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 20th day of May, 2026

My Commission Expires: 8/9/2028

Rosalinda Kennedy
Notary Public

STAMP:

ROSALINDA KENNEDY
Notary Public - Notary Seal
STATE OF MISSOURI
County of Jackson
My Commission Expires: Aug. 09, 2028
Commission #20226446

LETTER OF INTENT TO SUBCONTRACT

Check one:
Original LOI: ✔
Updated LOI: ☐

Project Name/Title SEWER IMPROVEMENTS: 20th STREET – GRAND TO MCGEE

Project Location/Number 81001071/1817

PART 1: Prime Contractor CM Concrete, Inc. agrees to enter into a contractual agreement with M/W/DBE Subcontractor Thorne and Son Asphalt Paving, Inc. 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.]

Surfacing

for an estimated amount of $ 57,195.78 (or 5.1 % 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: Thorne and Son Asphalt Paving, Inc.

Full address: 11705 E 350 highway Suite D Raytown MO 64138
Street number and name — City, State and Zip Code

Primary contact: Tom Tinsley — 816-358-4608
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:

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: CM Concrete, Inc.

Signature: Prime Contractor — Francisco Chavez (Print Name)

CEO (Title) — 4/2/26 (Date)

State of Missouri)
County of Jackson)

I, Francisco Chavez, 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 April, 2026

My Commission Expires: 3-21-29

Notary Public

STAMP:

K CHILDS
Notary Public - Notary Seal
State of Missouri
Commissioned for Jackson County
My Commission Expires: March 21, 2029
Commission Number: 13487[illegible]

MWDBE SUBCONTRACTOR BUSINESS NAME: Thorne and Son Asphalt Paving, Inc.

Kelly Mozee — Signature: Subcontractor — Kelly Mozee (Print Name)

President (Title) — 5-14-26 (Date)

State of MO)
County of Jackson)

I, Angela Benedetti, 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 14 day of May, 2026

My Commission Expires: 3-5-27

Angela Benedetti — Notary Public

STAMP:

ANGELA BENEDETTI
NOTARY PUBLIC - NOTARY SEAL
STATE OF MISSOURI
MY COMMISSION EXPIRES MARCH 5, 2027
JACKSON COUNTY
COMMISSION #19638229

TIMETABLE FOR MBE/WBE UTILIZATION

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

I, Fr aci scoChave z _____, acting in my capacity as CEO _____
(Name) *(Position with Firm)*
of CM Concrete, Inc. _____, 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 50 % Middle 1/3 20 % Final 1/3 30 %

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)

CEO
_____
(Position with Firm)

4/2/26
_____
(Date)

REQUEST FOR MODIFICATION OR SUBSTITUTION

*(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.)*

BIDDER/PROPOSER/CONTRACTOR: _____
ADDRESS: _____
PROJECT NUMBER OR TITLE: _____
AMENDMENT/CHANGE ORDER NO: (if applicable) _____

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

1. I am the duly authorized representative of the above Bidder/Contractor/Proposer and am authorized to request this substitution or modification on behalf of the Bidder/Contractor/Proposer.

2. I hereby request that the Director of CREO KC recommend or approve: (check appropriate space(s))

   a. ☐ A substitution of the certified MBE/WBE firm _____,
   (Name of new firm)
   to perform _____,
   (Scope of work to be performed by new firm)

   for the MBE/WBE firm _____ which is currently
   (Name of old firm)
   listed on the Bidder's/Contractor's/Proposer's Contractor Utilization Plan to

   perform the following scope of work: _____.
   (Scope of work of old firm)

   b. ☐ A modification of the amount of MBE/WBE participation currently listed on the Bidder's/Contractor's/Proposer's Contractor Utilization Plan from

   _____ % MBE_____% WBE *(Fill in % of MBE/WBE Participation currently listed on Contractor Utilization Plan)*

   TO

   _____% MBE _____% WBE *(Fill in New % of MBE/WBE Participation requested for Contractor Utilization Plan)*

   c. Attach 00450.01 Letter of Intent to Subcontract letter for each new MBE/WBE to be added.
   d. Attach a copy of the most recent 00485.01 or on-line M/WBE Monthly Utilization Report

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.

City of Kansas City, Missouri
Human Relations Department
Construction Contractor Employee Identification Report

Company Name: CM Concrete, Inc.
Company Address: 16621 W 146th Ter
Company City, State, Zip: Olathe, KS 66062

Prime's Name: CM Concrete, Inc.
KCMO Project Name: SEWER IMPROVEMENTS: 20th STRE
KCMO Project Number: 81001071/1817

Name of Person Completing Report: Kevin Childs
Phone Number: (816)405-3414
Email: cmconcreteks@gmail.com

Today's Date: 4/2/2026
City Department: Public Works

Instructions:

1) Each applicable Prime Contractors **must complete this form for its company within 48 hours of bid opening**
2) The Human Relations 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 in the center titled "What are you looking for?". Type in the "What are you looking for?" field *Contract Central*. 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*
African American	0	0
Asian/Pacific Islander American	0	0
Caucasian American	0	0
Hispanic/Latino American	2	0
Native American	0	0
Other	0	0
	2	0

Males		*KCMO Resident*
African American	######	0
Asian/Pacific Islander American	######	0
Caucasian American	######	0
Hispanic/Latino American	######	2
Native American	######	0
Other	######	0
	######	2

Number of KCMO Residents	2
Number of Journeyman	13
Number of Apprentice	0

	Journeyman	*Apprentice*
Foreman/Supervisor	0	--
Asbestos Worker	0	0
Boilermaker	0	0
Bricklayer	0	0
Carpenter	0	0
Cement Mason	2	0
Electrician	0	0
Elevator Constructor	0	0
Glazier	0	0
Iron Worker	0	0
Laborer	10	0
	12	0

	Journeyman	*Apprentice*
Operating Engineer	1	0
Painter	0	0
Pipe Fitter/Plumber	0	0
Plasterer	0	0
Roofer	0	0
Sheet Metal	0	0
Sprinkler Fitter	0	0
Truck Driver	0	0
Welder	0	0
Other	0	--
	1	0

Company Name: CM Concrete, Inc. KCMO Project Name: SEWER IMPROVEMENTS: 20t KCMO Project Number: 81001071/1817

	Name		Job Title (*use drop down menu*)	Address	City	State	Zip Code	KCMO Resident	Gender	Ethnicity
	Last	First								
1	Gonzalez	Abelino	Laborer_(Journeyman)	3993 Marshall Rd	Ottawa	KS	66067	No	Male	Hispanic/Latino_American
2	Ruiz	Bryan	Cement_Mason_(Journeyman)	801 S Harrison St., Apt 335	Olathe	KS	66061	No	Male	Hispanic/Latino_American
3	Chavez Lagunes	Cesar	Laborer_(Journeyman)	174 Lawn Dr.	Belton	MO	64012	No	Male	Hispanic/Latino_American
4	Chavez	Cristian	Cement_Mason_(Journeyman)	16621 W 146th Ter	Olathe	KS	66062	No	Male	Hispanic/Latino_American
5	Chavez-Mendoza	Francisco	Laborer_(Journeyman)	16621 W 146th Ter	Olathe	KS	66062	No	Male	Hispanic/Latino_American
6	Estrada Ocana	Jairo	Laborer_(Journeyman)	8917 Kentucky Ave	Kansas City	MO	64138	Yes	Male	Hispanic/Latino_American
7	Alvarez	Jorge	Laborer_(Journeyman)	1942 N 24th St	Kansas City	KS	66104	No	Male	Hispanic/Latino_American
8	Chavez	Jose	Laborer_(Journeyman)	2209 S 18th St	Kansas City	KS	66106	No	Male	Hispanic/Latino_American
9	Chavez	Maria	Laborer_(Journeyman)	3208 Everette Ave	Kansas City	KS	66102	No	Female	Hispanic/Latino_American
10	Estrada-Valenzuela	Mario	Operating_Engineer_(Journeyman)	1315 N 86th St	Kansas City	KS	66112	No	Male	Hispanic/Latino_American
11	Mendez Gomez	Marvin	Laborer_(Journeyman)	6132 Belleftonatine Ave	Kansas City	MO	64130	Yes	Male	Hispanic/Latino_American
12	Camino Blas	Pedro	Laborer_(Journeyman)	4324 Walker Ave	Kansas City	KS	66102	No	Male	Hispanic/Latino_American
13	Chavez Escamilla	Yoselin	Laborer_(Journeyman)	16621 W 146th Ter	Olathe	KS	66062	No	Female	Hispanic/Latino_American
14										
15										
16										

CITY OF FOUNTAINS
HEART OF THE NATION
KANSAS CITY
MISSOURI

AFFIDAVIT OF TRAINING PROGRAM

This form must be submitted with 48 hours of Bid Opening

Bidder CM Concrete, Inc.

Project Title and Number 81001071/1817 SEWER IMPROVEMENTS: 20th STREET – GRAND TO MCGEE

STATE OF MISSOURI)
) ss:
COUNTY OF JACKSON)

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:

In-house training program utilizing on-site training at full prevailing wage rates.

(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:

CEO (Title) of CM Concrete, Inc. (Name of Bidder)

Dated: 4/2/26 By: _____ (Affiant)

Subscribed and sworn to before me this 2nd day of April, 2026.

My Commission Expires: 3-21-29

_____ Notary Public

K. CHILDS
Notary Public - Notary Seal
State of Missouri
Commissioned for Jackson County
My Commission Expires: March 21, 2029
Commission Number: 13455819

CITY OF KANSAS CITY, MISSOURI
Human Relations Department
M/WBE MONTHLY UTILIZATION REPORT

Report Date:	**Project Name:**		**City Project Number:**					
Project Address:			**Contract Award Date:**				**City Vendor ID:**	
General Contractor (GC):			**City Contract Number:**				**City Department Name**	
Contact Person/Phone:			**General Contract Amount:** $		**Total Amount Paid By City To Date:** $			
General Contractor Address:			**Contract Goals:**		_____% DBE _____% MBE _____% WBE			
Email Address:			**Total Contract Days:**				**Completion Date:**	
MBE/DBE Subcontractor	**Date of Certification**	**Date of Subcontract**	**Subcontract Amount**	**% of Total Contract**	**Estimated Start date**	**Amount Paid This Period**	**Amount Paid To Date**	**% of Contract Paid to Date**
WBE/DBE Subcontractor								
Totals								

Contractor should submit report by the 15th of each month.

Director
CREO KC Department
414 E. 12th Street, 4th Floor
Kansas City, MO 64106
Phone: 816-513-1836
FAX: 816-513-1805

Narrative: _____

Report Submitted By: _____ **Date** _____

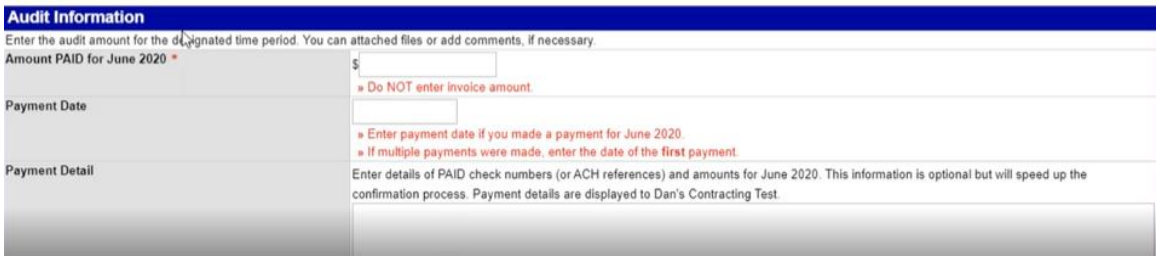
REMINDER: CONTRACTOR is responsible for meeting or exceeding the the D/M/WBE participation amounts in its Contractor Utilization Plan (CUP) as amended by any previously approved Request for Modification/Substitution. Any Change Orders or amendements modifying the amount CONTRACTOR is to be compensated 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 advised to consider the effect of any Change Order or amendment, and to submit a Request for Modification/Substitution if appropriate.

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:

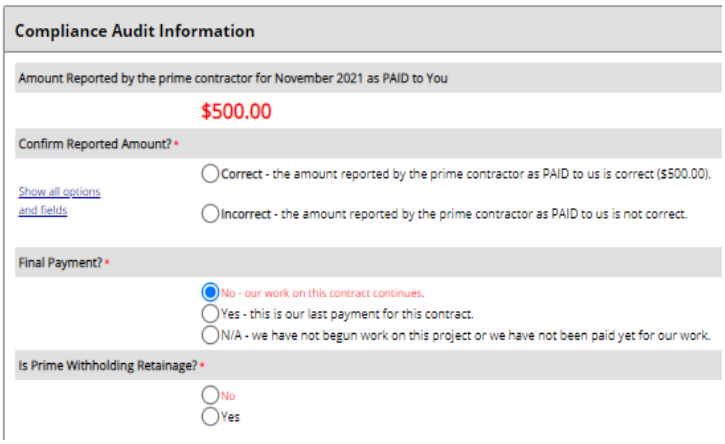


Once information has been entered, select review and save. Complete same steps for all subcontractors. If there were subcontractors that did not receive a payment for the specific audit month, click the Mark Remaining Subcontractors as Zero button to mark remaining subcontractors as 0.

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 ☐	Subcontractor Report ☐
E-mail Address:				Final Cumulative Report:	☐ Yes ☐ 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.

Director CREO KC Department
414 E. 12th Street, 4th Floor Kansas City, MO 64106
Phone: 816-513-1836 Email HRDcontractcompliance@kcmo.org

Report Submitted By: _____

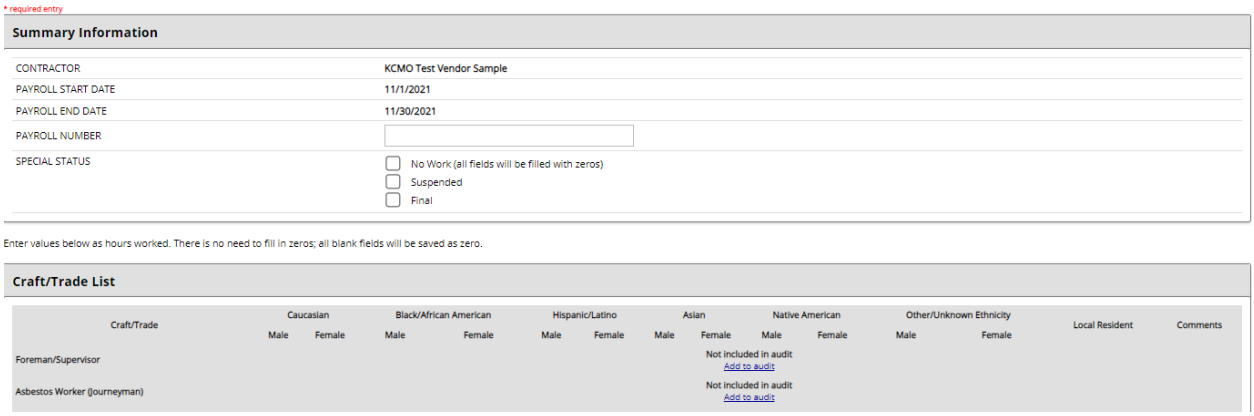
Date: _____

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	
SPECIAL STATUS	☐ No Work (all fields will be filled with zeros) ☐ Suspended ☐ 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 ☐	Subcontractor Report ☐
E-mail Address:		Have you hired any new construction workers this month?	☐ Yes ☐ No #:	Final Cumulative Report:	☐ Yes ☐ 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.

Director CREO KC Department
414 E. 12th Street, 4th Floor, Kansas City, MO 64106
Phone: 816-513-1836 Email HRDcontractcompliance@kcmo.org

Report Submitted By: _____

Date: _____

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

Pre Contract Bidder's Certification

Project Number 81001071

Project Title Sewer Improvements: 20th Street - Grand to McGee

STATE OF Missouri)
) SS
COUNTY OF Jackson)

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.

CM Concrete, Inc. (Bidder's Name)

5/6/26 (Date)

Signature of Person Making This Affidavit

In witness whereof, I have hereunto subscribed my name and affixed my official seal this 6th day of, May ~~2024.~~ 2026.

K. CHILDS
Notary Public - Notary Seal
State of Missouri
Commissioned for Jackson County
My Commission Expires: March 21, 2029
Commission Number: 13458709

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

CONTRACT REQUIRED SUBMISSIONS

Project/Contract Number:_____

Project/Contract Title/Description: _____

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

- ☐ 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

- ☐ 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
  Water Services Department
  Shericka Slack, Buyer
  4800 East 63rd St
  Kansas City, Missouri 64130

- ☐ 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

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

STATE OF MISSOURI

Denny Hoskins
Secretary of State

CORPORATION DIVISION
CERTIFICATE OF GOOD STANDING

I, DENNY HOSKINS, Secretary of State of the STATE OF MISSOURI, do hereby certify that the records in my office and in my care and custody reveal that

CM CONCRETE INC
F001427092

a KANSAS entity was created under the laws of this State on the 26th day of January, 2023, and is in Good Standing, having fully complied with all requirements of this office.

IN TESTIMONY WHEREOF, I hereunto set my hand and cause to be affixed the GREAT SEAL of the State of Missouri. Done at the City of Jefferson, this 27th day of May, 2026.

Denny Hoskins
Secretary of State

Certification Number: CERT-05272026-0146

EMPLOYEE ELIGIBILITY VERIFICATION AFFIDAVIT
(Required for any contract with the City of Kansas City, Missouri in excess of $5,000.00)

STATE OF Missouri)
) ss
COUNTY OF Jackson)

On this 1st day of May, 2026 before me appeared Francisco Chavez, 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 CEO (title) of CM Concrete, Inc. (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 1st day of May, 20 26.

Notary Public

My Commission expires: 3-21-29

K. CHILDS
Notary Public - Notary Seal
State of Missouri
Commissioned for Jackson County
My Commission Expires: March 21, 2029
Commission Number: 19456789

E-Verify

E-VERIFY IS A SERVICE OF DHS AND SSA

Company ID Number: 1581495

THE E-VERIFY MEMORANDUM OF UNDERSTANDING FOR EMPLOYERS

ARTICLE I
PURPOSE AND AUTHORITY

The parties to this agreement are the Department of Homeland Security (DHS) and CM CONCRETE INC (Employer). The purpose of this agreement is to set forth terms and conditions which the Employer will follow while participating in E-Verify.

E-Verify is a program that electronically confirms an employee's eligibility to work in the United States after completion of Form I-9, Employment Eligibility Verification (Form I-9). This Memorandum of Understanding (MOU) explains certain features of the E-Verify program and describes specific responsibilities of the Employer, the Social Security Administration (SSA), and DHS.

Authority for the E-Verify program is found in Title IV, Subtitle A, of the Illegal Immigration Reform and Immigrant Responsibility Act of 1996 (IIRIRA), Pub. L. 104-208, 110 Stat. 3009, as amended (8 U.S.C. § 1324a note). The Federal Acquisition Regulation (FAR) Subpart 22.18, "Employment Eligibility Verification" and Executive Order 12989, as amended, provide authority for Federal contractors and subcontractors (Federal contractor) to use E-Verify to verify the employment eligibility of certain employees working on Federal contracts.

ARTICLE II
RESPONSIBILITIES

A. RESPONSIBILITIES OF THE EMPLOYER

1. The Employer agrees to display the following notices supplied by DHS in a prominent place that is clearly visible to prospective employees and all employees who are to be verified through the system:

    a. Notice of E-Verify Participation

    b. Notice of Right to Work

2. The Employer agrees to provide to the SSA and DHS the names, titles, addresses, and telephone numbers of the Employer representatives to be contacted about E-Verify. The Employer also agrees to keep such information current by providing updated information to SSA and DHS whenever the representatives' contact information changes.

3. The Employer agrees to grant E-Verify access only to current employees who need E-Verify access. Employers must promptly terminate an employee's E-Verify access if the employer is separated from the company or no longer needs access to E-Verify.

Company ID Number: 1581495

Approved by:

Employer	
CM CONCRETE INC	
Name (Please Type or Print) FRANCISCO CHAVEZ	**Title** CEO
Signature Electronically Signed	**Date** 08/26/2020
Department of Homeland Security – Verification Division	
Name (Please Type or Print) USCIS Verification Division	**Title**
Signature Electronically Signed	**Date** 08/27/2020

Reset Form Print Form

Form **5060**

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
Water Services Department of Kansas City, Mo.			1 2 4 9 0 4 6 6
Address	**City**	**State**	**ZIP Code**
4800 E 63rd St	Kansas City	Mo	64130
E-mail Address			
Shericka.Slack@kcmo.org			
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)
	Shericka Slack	___ ___ / ___ ___ / ___ ___ ___ ___

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.

(DI6030)

Bond Number: GRMO73477

KANSAS CITY MISSOURI

PERFORMANCE AND MAINTENANCE BOND

Project Number 81001071/1817

Project Title Sewer Improvements: 20th Street - Grand to McGee

KNOW ALL MEN BY THESE PRESENTS: That CM Concrete, Inc, as PRINCIPAL (CONTRACTOR), and Granite Re, Inc, (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 One million, eighty-one thousand, one hundred six & 00/100 Dollars ($ 1,081,106.00) 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 Contract No.1817 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 6 day of May, 2026

CONTRACTOR
Name, address and facsimile number of Contractor
CM Concrete, Inc
16621 W 146th Terrace
Olathe, KS 66062

CM Concrete Inc.
Corporate Seal
2022
Kansas

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

By: _____
Title: CEO

(Attach corporate seal if applicable)

SURETY

Name, address and facsimile number of Surety:

Granite Re, Inc
14001 Quailbrook Drive
Oklahoma City, OK 73134

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: Robert L. Cox II, Attorney in Fact
Date: _____

GRANITE RE, INC. CORPORATE SEAL MINNESOTA

(Attach seal and Power of Attorney)

Gallagher

Insurance | Risk Management | Consulting

4911 S Arrowhead Dr, Suite 310
Independence, MO 64055
T: 816-525-3155
E: bonds-ind@assuredpartners.com

May 8, 2026

CM Concrete, Inc
16621 W 146th Terrace
Olathe, KS 66062

RE: Project: **Sewer Improvements: 20th Street - Grand to McGee**
Obligee: **City of Kansas City, Missouri**
Bond No: **GRMO73477**

To Whom It May Concern,

Please let this letter serve as authorization to date the bonds and powers of attorney for the above captioned bonds. This authority may be extended by you to the owner, architect, or their designated representatives.

Should you have any questions, please feel free to call.

Sincerely,

Robert L Cox II
Attorney in Fact, Granite Re, Inc

GRANITE RE, INC.

GENERAL POWER OF ATTORNEY

Know all Men by these Presents:

That GRANITE RE, INC., a corporation organized and existing under the laws of the State of MINNESOTA and having its principal office at the City of OKLAHOMA CITY in the State of OKLAHOMA does hereby constitute and appoint

ROBERT L. COX II; KATHY JOHNSON, RODNEY DEMAREE; KACEE MCCROREY, JULIE MESSBARGER, LUKE LAMBERT, BLAKE MARNHOLTZ its true and lawful Attorney-in-Fact(s) for the following purposes, to wit:

To sign its name as surety to, and to execute, seal and acknowledge any and all bonds, and to respectively do and perform any and all acts and things set forth in the resolution of the Board of Directors of the said GRANITE RE, INC. a certified copy of which is hereto annexed and made a part of this Power of Attorney; and the said GRANITE RE, INC. through us, its Board of Directors, hereby ratifies and confirms all and whatsoever the said

ROBERT L. COX II; KATHY JOHNSON; RODNEY DEMAREE; KACEE MCCROREY; JULIE MESSBARGER, LUKE LAMBERT, BLAKE MARNHOLTZ may lawfully do in the premises by virtue of these presents.

In Witness Whereof, the said GRANITE RE, INC. has caused this instrument to be sealed with its corporate seal, duly attested by the signatures of its President and Assistant Secretary, this 31st day of July, 2023.

Kenneth D. Whittington, President

Kyle P. McDonald, Assistant Secretary

STATE OF OKLAHOMA)
) SS:
COUNTY OF OKLAHOMA)

On this 31st day of July, 2023, before me personally came Kenneth D. Whittington, President of the GRANITE RE, INC. Company and Kyle P. McDonald, Assistant Secretary of said Company, with both of whom I am personally acquainted, who being by me severally duly sworn, said, that they, the said Kenneth D. Whittington and Kyle P. McDonald were respectively the President and the Assistant Secretary of GRANITE RE, INC., the corporation described in and which executed the foregoing Power of Attorney, that they each knew the seal of said corporation, that the seal affixed to said Power of Attorney was such corporate seal, that it was so fixed by order of the Board of Directors of said corporation, and that they signed their name thereto by like order as President and Assistant Secretary, respectively, of the Company.

Notary Public

My Commission Expires:
April 21, 2027
Commission #: 11003620

(An expiration of notary's commission does not invalidate this instrument)

GRANITE RE, INC.

Certificate

THE UNDERSIGNED, being the duly elected and acting Assistant Secretary of Granite Re, Inc., a Minnesota Corporation, HEREBY CERTIFIES that the following resolution is a true and correct excerpt from the July 15, 1987, minutes of the meeting of the Board of Directors of Granite Re, Inc. and that said Power of Attorney has not been revoked and is now in full force and effect.

"RESOLVED, that the President, any Vice President, the Assistant Secretary, and any Assistant Vice President shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the Company in the course of its business. On any instrument making or evidencing such appointment, the signatures may be affixed by facsimile. On any instrument conferring such authority or on any bond or undertaking of the Company, the seal, or a facsimile thereof, may be impressed or affixed or in any other manner reproduced; provided, however, that the seal shall not be necessary to the validity of any such instrument or undertaking."

IN WITNESS WHEREOF, the undersigned has subscribed this Certificate and affixed the corporate seal of the Corporation this ____ day of _____, 20____.

Kyle P. McDonald, Assistant Secretary

Bond Number: GRMO73477

PAYMENT BOND

Project Number **81001071/1817**

Project Title **Sewer Improvements: 20th Street - Grand to McGee**

KNOW ALL MEN BY THESE PRESENTS: That CM Concrete, Inc, as PRINCIPAL (CONTRACTOR), and Granite Re, Inc, (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 One million, eighty-one thousand, one hundred six & 00/100 Dollars ($ 1,081,106.00) 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 Contract No.1817, 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 6 day of May, 2024

CONTRACTOR
Name, address and facsimile number of Contractor
CM Concrete, Inc
16621 W 146th Terrace
Olathe, KS 66062

CM Concrete Inc.
Corporate Seal
2022
Kansas

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

By: _____
Title: CEO

(Attach corporate seal if applicable)

SURETY
Name, address and facsimile number of Surety:
Granite Re, Inc
14001 Quailbrook Drive
Oklahoma City, OK 73134

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: Robert L Cox II, Attorney in Fact
Date: _____

GRANITE RE, INC. CORPORATE SEAL MINNESOTA

(Attach seal and Power of Attorney)

GRANITE RE, INC.

GENERAL POWER OF ATTORNEY

Know all Men by these Presents:

That GRANITE RE, INC , a corporation organized and existing under the laws of the State of MINNESOTA and having its principal office at the City of OKLAHOMA CITY in the State of OKLAHOMA does hereby constitute and appoint

ROBERT L. COX II; KATHY JOHNSON; RODNEY DEMAREE; KACEE MCCROREY; JULIE MESSBARGER; LUKE LAMBERT; BLAKE MARNHOLTZ its true and lawful Attorney-in-Fact(s) for the following purposes, to wit

To sign its name as surety to, and to execute, seal and acknowledge any and all bonds, and to respectively do and perform any and all acts and things set forth in the resolution of the Board of Directors of the said GRANITE RE, INC. a certified copy of which is hereto annexed and made a part of this Power of Attorney; and the said GRANITE RE, INC. through us, its Board of Directors, hereby ratifies and confirms all and whatsoever the said

ROBERT L. COX II; KATHY JOHNSON; RODNEY DEMAREE; KACEE MCCROREY; JULIE MESSBARGER; LUKE LAMBERT; BLAKE MARNHOLTZ may lawfully do in the premises by virtue of these presents.

In Witness Whereof, the said GRANITE RE, INC. has caused this instrument to be sealed with its corporate seal, duly attested by the signatures of its President and Assistant Secretary, this 31st day of July, 2023.

Kenneth D. Whittington, President

Kyle P. McDonald, Assistant Secretary

STATE OF OKLAHOMA)
) SS:
COUNTY OF OKLAHOMA)

On this 31st day of July, 2023, before me personally came Kenneth D. Whittington, President of the GRANITE RE, INC. Company and Kyle P. McDonald, Assistant Secretary of said Company, with both of whom I am personally acquainted, who being by me severally duly sworn, said, that they, the said Kenneth D. Whittington and Kyle P. McDonald were respectively the President and the Assistant Secretary of GRANITE RE, INC , the corporation described in and which executed the foregoing Power of Attorney, that they each knew the seal of said corporation, that the seal affixed to said Power of Attorney was such corporate seal, that it was so fixed by order of the Board of Directors of said corporation, and that they signed their name thereto by like order as President and Assistant Secretary, respectively, of the Company.

My Commission Expires:
April 21, 2027
Commission #: 11003620

Notary Public

GRANITE RE, INC.

Certificate

THE UNDERSIGNED, being the duly elected and acting Assistant Secretary of Granite Re, Inc., a Minnesota Corporation, HEREBY CERTIFIES that the following resolution is a true and correct excerpt from the July 15, 1987, minutes of the meeting of the Board of Directors of Granite Re, Inc. and that said Power of Attorney has not been revoked and is now in full force and effect.

"RESOLVED, that the President, any Vice President, the Assistant Secretary, and any Assistant Vice President shall each have authority to appoint individuals as attorneys-in-fact or under other appropriate titles with authority to execute on behalf of the company fidelity and surety bonds and other documents of similar character issued by the Company in the course of its business. On any instrument making or evidencing such appointment, the signatures may be affixed by facsimile. On any instrument conferring such authority or on any bond or undertaking of the Company, the seal, or a facsimile thereof, may be impressed or affixed or in any other manner reproduced provided, however, that the seal shall not be necessary to the validity of any such instrument or undertaking."

IN WITNESS WHEREOF, the undersigned has subscribed this Certificate and affixed the corporate seal of the Corporation this
day of , 20

Kyle P. McDonald, Assistant Secretary

GR0800

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 05/11/2026

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 have ADDITIONAL INSURED provisions or 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	CONTACT NAME: Sergio Salas	
SMART INSURANCE 2036 E Santa Fe St. Olathe KS 66062	PHONE (A/C, No, Ext): (913) 204-0405	FAX (A/C, No): (913) 730-5221
	E-MAIL ADDRESS: info@smartiagency.com	
	INSURER(S) AFFORDING COVERAGE	**NAIC #**
	INSURER A : Travelers Insurance Company	25674
INSURED	INSURER B : PIE CAS INS CO	10997
CM Concrete Inc 16621 W 146 Ter Olathe KS 66062	INSURER C : United Financial Casualty Company	11770
	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 INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	[X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: [X] POLICY [ ] PRO-JECT [ ] LOC [ ] OTHER:	Y	Y	680-1Y865350-26-42	01/18/2026	01/18/2027	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000.00 $ 300,000.00 $ 5,000.00 $ 1,000,000.00 $ 2,000,000.00 $ 2,000,000.00
C	AUTOMOBILE LIABILITY [X] ANY AUTO [ ] OWNED AUTOS ONLY [X] SCHEDULED AUTOS [ ] HIRED AUTOS ONLY [ ] NON-OWNED AUTOS ONLY	Y	Y	978697415	03/14/2026	03/14/2027	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000.00 $ $ $
A	[ ] UMBRELLA LIAB [X] OCCUR [X] EXCESS LIAB [ ] CLAIMS-MADE DED [ ] RETENTION $		Y	XL 1649062B	01/18/2026	01/18/2027	EACH OCCURRENCE AGGREGATE	$ 1,000,000.00 $ 2,000,000.00
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N: N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A	Y	WC PI 3593840-000	02/01/2026	02/01/2027	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 1,000,000.00 $ 1,000,000.00 $ 1,000,000.00

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

Project /Contract No.: 81001071/ 1817

Project Name: Sewer Improvements: 20th Street - Grand to McGee. City Of Kansas City, Missouri Water Services Department and Project are listed as additional insureds on primary and non-contributory basis including products and completed operations under the General Liability and Waiver of subrogation applies as allowed by law. Waiver of subrogation applies as allowed by law on the Workers Composition. Additional Insured and Waiver of subrogation applier by law and under policy rules on Commercial Auto Policy and Umbrella Policy.

CERTIFICATE HOLDER

City Of Kansas City, Missouri
Water Services Department
4800 E. 63rd Street
Kansas City MO 64130

CANCELLATION

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

Sergio Salas

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KANSAS CITY
MISSOURI

Finance Department

Revenue Division

414 E 12th St. 1st Floor
Kansas City, MO 64106-2786

Phone: (816) 513-1120
Fax: (816) 513-1264
Email: revenue@kcmo.org
Website: kcmo.gov/tax

Letter Id: L1916927744
Date: 27-Jan-2026
Taxpayer Id: **-***6361

CM CONCRETE INC
16621 W 147TH TER
OLATHE KS 66062-2677

TAX CLEARANCE STATUS: APPROVED

As of this date, this notice is to inform you that CM CONCRETE INC is current with all taxes and license fees with the City of Kansas City, Mo., Finance Department/ Revenue Division.

Please note this could change if we perform a full review of your accounts in the future. We will let you know if we need to review your accounts. You will need to pay any amounts that are found due at that time.

Eric Davison
Commissioner of Revenue

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

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

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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).

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

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

10. Calendar Day- Any day shown on the calendar, including Saturdays, Sundays, and holidays.

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. 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.

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.

15. 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.

16. 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 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. 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.

17. 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.

18. Contract Times- The number of days or the dates stated in the Supplementary Conditions: (a) to achieve Substantial Completion, 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.

19. 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.

20. Day– Shall constitute a Calendar Day.

21. 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.

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

23. 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.

24. 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.

25. 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.

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

27. 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.

28. 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.

29. 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.

30. 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.

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

32. Milestone- A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

33. 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.

34. 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.

35. 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 of all the Work.

36. PCBs- Polychlorinated biphenyls.

37. 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.

38. 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.

39. 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.

40. 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.

41. 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.

42. 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.

43. 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.

44. 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.

45. 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 part of the Work.

46. Substantial Completion- When Work (or a specified part thereof) has progressed to the point where, in the opinion of DESIGN PROFESSIONAL as evidenced by DESIGN PROFESSIONAL'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.

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

48. 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.

49. 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.

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

51. 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.

52. 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.

53. Work Day - Any day during which the CONTRACTOR is able to work a period of six (6) hours or more. Days that are not Work Days are days during which the CONTRACTOR is unable to work for a period of six (6) hours by reason of strikes, boycotts, labor disputes, embargoes, unusual delays in transportation or shortage of material, acts of God, acts of the public enemy, acts of superior governmental authority, weather conditions, riots, rebellion, sabotage, or any other circumstances for which CONTRACTOR is not responsible or which is not within its control. Saturdays, Sundays, and holidays on which the CONTRACTOR's forces engage in Work requiring the presence of an inspector, will be considered as Work Days.

54. 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 Substantial Completion 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 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.

2.03 Copies of Documents

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

2.04 Commencement of Contract Times; Notice to Proceed

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

2.05 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.

2.06 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 Substantial and Final Completion; 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 Substantial

Completion 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 or any other applicable provisions of the Contract Documents.

2.07 Acceptable Schedules

A. Acceptable schedule: The Contractor shall update and submit to the CITY for review the 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 updated preliminary schedule. The Contractor shall incorporate the CITY's comments and resubmit the updated preliminary schedule within seven (7) Calendar Days from receipt of the CITY's comments.

B. Project Baseline Schedule: The accepted updated 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. 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. In the case of an inconsistency between Drawings and Specifications, the requirements of the Specifications shall govern. 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 A-, 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 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. 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;

6. 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);

7. 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;

8. 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

9. 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 Substantial Completion 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 achieve substantial completion;

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, upon seven (7) calendar days notice, 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 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 Substantial Completion, 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 or retain 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 Civil Rights and Equal Opportunity 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 contractually 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 subcontractor agreement associated with this Contract that explicitly states or implies that the subcontractor 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.

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:

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

2. 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.

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

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

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

(c) Amending/Updating SWPPP.

(d) Site Inspections and submittal of Inspection Reports

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

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

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

5. 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 Contract. 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 or Regulations, 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 2-2001 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 Civil Rights and Equal Opportunity, 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.

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. If CONTRACTOR shall fail to start to perform CONTRACTOR’s obligations under the Contract Documents within sixty (60) days from the Effective Date of the Contract, CONTRACTOR and each of its subcontractors shall be obligated to pay all workers in accordance with any new Wage Order, as subsequently amended by any applicable Wage Increase, issued by the Department of Labor and Industrial Relations within the aforementioned sixty (60) day period. The new Wage Order and any applicable Wage Increase shall govern notwithstanding the fact that the Wage Order being replaced might be physically attached or incorporated in the Contract Documents.

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; and

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**.

1. 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.

2. 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. 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.

Q. **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.

R. 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).

S. 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.

T. 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.

U. 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.

V. 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.

b. CONTRACTOR shall not discriminate on the grounds of race, color, or national or origin (including limited English proficient individuals).

W. 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.

X. 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 Substantial Completion 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 Substantial Completion). 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

A. 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.

B. 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 Substantial Completion 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.

C. 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.

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 a 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, expediters, 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 Substantial Completion. 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.

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 Substantial Completion, 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 Substantial Completion 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 Civil Rights and Equal Opportunity 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 Civil Rights and Equal Opportunity Department.

d. an update to the approved schedule pursuant to paragraphs 6.04 and 6.05.

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 Substantial Completion, 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

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. 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 that shall establish the date of Substantial Completion. 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, 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, 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

A. 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 is 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 final completion;

6. CONTRACTOR disregards Laws or Regulations of any public body 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: "The CONTRACTOR certifies that all statements made and the facts set out in this claim are true and correct and that no false records have been submitted in support of this claim." **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 the denial of a request for or failure to reach an agreement on a change in Contract Price and/or change in Contract Time pursuant to Article 11 and Article 12 respectively. 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, following the conclusion of the seven (7) calendar day period, 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 NATION

KANSAS CITY
MISSOURI

OVERFLOW CONTROL PLAN CONSENT DECREE SUPPLEMENTARY CONDITIONS

Project Number 81001071

Project Title: Sewer Improvements: 20th Street – Grand to McGee

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, no reports of explorations and tests of subsurface conditions at or contiguous to the Site of the Work have been prepared.

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 are available.

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 have been prepared.

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-5.06 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: Kyle Tonjes, P.E., Project Manager

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 21 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-6.07 J Article 6, Paragraph 6.07, concerning Subcontractors, Suppliers and Others, is supplemented by adding Subparagraph J as follows:

CONTRACTOR shall perform with its own organization Work amounting to not less than 51% of the total Contract Price. "Its own organization" shall be construed to include only workers employed and paid by the CONTRACTOR and equipment owned or rented by the CONTRACTOR, with or without operators. Such term does not include employees or equipment of a subcontractor, assignee, or agent of the CONTRACTOR.

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-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. On this Project, by agreement with the CITY, DESIGN PROFESSIONAL will not furnish a Resident Project Representative to represent DESIGN PROFESSIONAL at the Site or assist DESIGN PROFESSIONAL in observing the progress and quality of the Work.

C. CITY will furnish a "CITY's Site Representative" to represent CITY at the Site and assist CITY in observing the progress and quality of the Work. The CITY's Site Representative is not DESIGN PROFESSIONAL's consultant, agent, or employee. CITY's Site Representative will be *to be determined*. The authority and responsibilities of CITY's Site Representative are as follows:

B. The City's Site Representative (SR) will be City's representative at the Site, will act as directed by and under the supervision of the City, and will confer with City regarding SR's actions.

1. General: SR's dealings in matters pertaining to the Work in general shall be with DESIGN PROFESSIONAL, the CITY's Smart Sewer Program Manager, and CONTRACTOR. SR's dealings with Subcontractors shall only be through or with the full knowledge and approval of CONTRACTOR. SR shall generally communicate with CITY and CITY'S Smart Sewer Program Manager and with the the knowledge 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 and Smart Sewer Program Manager 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 Smart Sewer Program Manager 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 Smart Sewer Program Manager and DESIGN PROFESSIONAL when clarifications and interpretations of the Contract Documents are needed and transmit to CONTRACTOR clarifications and interpretations as issued by Smart Sewer Program Manager or 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, Smart Sewer Program Manager, and CONTRACTOR of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which SR 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 SR's recommendations, if any, to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager. Transmit to CONTRACTOR in writing decisions as issued by Smart Sewer Program Manager.

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 SR 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 SR

believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval. If SR believes a Notice of Non-conformance should be issued, the SR 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 and/or the City's Smart Sewer Program Manager 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 City's Smart Sewer Program Manager concerning acceptance and issuance of the notice of acceptability of the work.

C. The SR 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 or Smart Sewer Program Manager'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 the City.
7. Accept Shop Drawing or Sample submittals from anyone other than CONTRACTOR.

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-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 **150 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 **30 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 and no Cents ($ 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 and no Cents ($ 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 storm sewer, paving, sidewalk, curbs and two (2) years for landscaping beds, which longer period of time shall also be applicable to the correction period set forth in Paragraph 13.07 C. All other provisions of Paragraph 13.07 remain unchanged except as necessary to accommodate the revised length of the correction period.

SC-14.02 A. Article 14, Paragraph 14.02, Application for Progress Payments, Subparagraph A is amended by deleting Item 3 and adding the following:

3. CITY shall make payments to CONTRACTOR on a monthly basis. Payments to CONTRACTOR will be made on the basis of ninety-five percent (95%) of the value of the Work satisfactorily completed plus ninety-five percent (95%) of the value of properly stored and insured, unused materials on hand on the Site of the Work. CITY shall retain five percent (5%) of each partial payment until completion and acceptance of the Work covered by the Contract and final payment is due. All Work covered by a payment becomes CITY's property, provided that the Work paid for remains the sole responsibility of CONTRACTOR until all terms and conditions of the Contract have been met.

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:
B. Storm sewer piping and underground storage related work
C. Surface restoration including street pavement, sidewalks, and curbs
D. Landscaping
E. Pavement markings*, signage, and street lighting*

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.

NON-CONFORMANCE NOTICE (NCN)

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: ☐ Internal Quality Audit ☐ Shop Inspection / Testing ☐ Jobsite Inspection / Testing Jobsite Inspection Report No.: ☐ 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/YYY):
Contractor **shall respond** to this Notice on or before this date (MM/DD/YYYY):		
Delivered to Contractor (Name of Recipient):	Signature:	Date (MM/DD/YYY):

Attachments for Nonconforming work? ☐ YES ☐ NO	
If YES, list attachments:	

NON-CONFORMANCE NOTICE (NCN)

STEP 2 – DISPOSITION AND CORRECTIVE ACTION		
Date of Contractor's response to this notice (MM/DD/YYY):		
Description of Proposed Corrective Action:		
Disposition: ☐ Accept As-Is ☐ Accept Pending Further Corrective Action ☐ Reject		
Accepted By (Design Professional):	Signature:	Date:
Accepted By (SSP Project Manager):	Signature:	Date:
Accepted By (Construction Manager):	Signature:	Date:

Corrective Action Attachments? ☐ YES ☐ NO	
If YES, list attachments:	

NON-CONFORMANCE NOTICE (NCN)

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:

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MIKE KEHOE, Governor

Annual Wage Order No. 32

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
Logan Hobbs, Director
Division of Labor Standards

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

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

Prepared by Missouri Department of Labor and Industrial Relations

Building Construction Rates for
JACKSON County

Section 048

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$72.10
Boilermaker	$40.77*
Bricklayer-Stone Mason	$64.45
Carpenter	$67.13
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	$56.83
Plasterer	
Communication Technician	$63.26
Electrician (Inside Wireman)	$74.98
Electrician Outside Lineman	$71.73
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	$96.07
Glazier	$59.60
Ironworker	$72.22
Laborer	$52.24
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	$54.18
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	$66.32
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	$40.77*
Plumber	$82.92
Pipe Fitter	
Roofer	$61.71
Sheet Metal Worker	$78.84
Sprinkler Fitter	$71.59
Truck Driver	$55.76
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	$67.20
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$84.00
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	$53.06
General Laborer	
Skilled Laborer	
Operating Engineer	$61.77
Group I	
Group II	
Group III	
Group IV	
Truck Driver	$52.79
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.

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

ADDENDUM NUMBER ___

Project Number _____

Project Title _____

_____

[NOTE: Add Month/Date/Year for which this Addendum is officially posted by City. Be certain to remove this note before final document is printed.]

ISSUE DATE: _____

[NOTE: Addenda are used to clarify, revise, add to, or delete information in the original bidding documents or in previous addenda prior to opening of bids. Items should be organized in the same order as the original bidding documents Table of Contents. Cite the specific bidding document and the specific location within it where each change is to be made followed by the detailed change. If entire pages or documents are replaced or added as accompanying attachments, state the title of the document and the specific page number(s) removed and/or added. (e.g., Delete Section 01011 - Summary pages 1-6 and add the attached Section 01011 - Summary pages 1-10.). Be certain to remove this note before final document is printed.]

[NOTE: Add Month/Date/Year. Be certain to remove this note before final document is printed.]

Bidders are hereby notified that the Bidding and Contract Documents for the above project, for which Bids are to be received on _____, are amended as follows:

[NOTE: If the bid date is being changed add Month/Day/Year; if not, delete this sentence. Be certain to remove this note before final document is printed.]

The Bid date for this Project stated in Document 00130 - Invitation to Bid shall be changed to: 2:00 PM, on _____.

Information to Bidders The following is provided to Bidders for information only:

[NOTE: Include items under this heading such as Pre-bid meeting attendance list, soils report, etc.; items that should not be contractual, but are useful information to Bidders. Delete this heading and introduction if not applicable for this Addendum. Be certain to remove this note before final document is printed.]

1.

2.

[NOTE: Include Bidder/Proposer questions and answers to those questions. If questions are resolved by a contractual change, reference the contract section and make the appropriate change in one of the sections below. Delete this heading and table if not applicable for this Addendum. Be certain to remove this note before final document is printed.]

Q1.	
A1.	
Q2.	
A2.	
Q3.	

A3.	

[NOTE: Under the following sections, include changes to those documents under the heading with this same title found in Document 00010 - Table of Contents, (including changes to previous addenda). Format for revisions provided below. Delete sections if not applicable to this addendum. Be certain to remove this note before final document is printed.]

Bidding Requirements

1. Add the following section(s):
    a. Document, Sec. __, Subparagraph __, Page ___
    b. Document, Sec. __, Subparagraph __, Page ___

[OR]

2. Delete the following section(s):
    a. Document, Sec. __, Subparagraph __, Page ___
    b. Document, Sec. __, Subparagraph __, Page ___

[OR]

3. Delete and replace the following section(s):
    a. Delete Document, Sec. __, Subparagraph __, Page ___ and replace with the following Document, Sec. __, Subparagraph __, Page ___:
    b. Delete Document, Sec. __, Subparagraph __, Page ___ and replace with the following Document, Sec. __, Subparagraph __, Page ___:

Contracting Requirements

1.

2.

Specifications

1.

2.

Drawings:

1.

2.

NOTE: Bidders must acknowledge receipt of this Addendum by listing the number and date, where provided, on the Bid Form - Document 00410.

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

REQUEST FOR INTERPRETATION

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
- ❑ Contractor
- ❑ Construction Manager
- ❑ Design Professional
- ❑ Consultant _____
- ❑ Other _____

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

REQUEST FOR INTERPRETATION LOG

Project Number _____

Project Title _____

CONTRACTOR _____

OWNER _____

RFI No.	Issue Date	Brief Description of issue and response	Respond Date

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 _____

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

REQUEST FOR PROPOSAL LOG

Project Number _____

Project Title _____

CONTRACTOR _____

OWNER _____

RFP No.	Issue Date	Brief Description of Request	Respond Date	Amount	CO No.

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS 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 "Deputy 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 (☐ increased by) (☐ decreased by) (☐ 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:** **Title:**	(type Name) (type Title)	**Date:**
CONTRACTOR: **Name (Type Company Name)**	**By:** **Title:**	(type Name) (type Title)	**Date:**
CITY: **KC Water**	**By** **Title:**	Andy Shively, P.E. 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 NATION

KANSAS CITY
MISSOURI

OCP CONSENT DECREE
WORK CHANGE DIRECTIVE

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 REPRESENTIVE

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

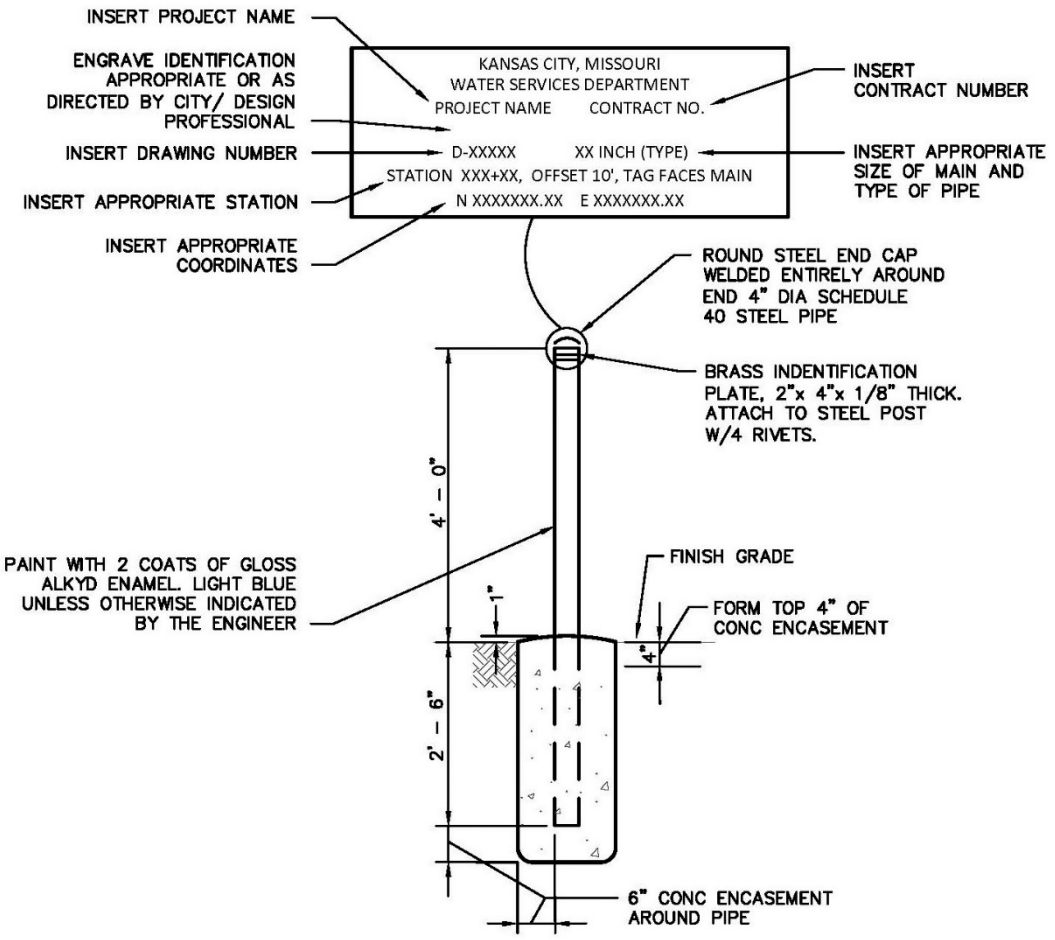
A. Pipeline markers as shown in Construction Detail Drawing No. 01000-1 shall be installed at the locations shown on the Drawings.

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.



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 03; the requirements of this Section shall govern.

1.03 RELATED SECTIONS

A. 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 01700 – Traffic Control.

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 **Sewer Improvements: 20th Street – Grand to McGee** improvements in Kansas City, Jackson County, Missouri.

B. The Contract Drawings show work on the south half of 20th Street that is not included in the unit price quantities in the bid packet. It is the intent of the Water Services Department to do no work on the south side of the street.

C. The work to be performed under these Construction Contract Documents is generally described as follows:

Sewer Improvements: 20th Street – Grand to McGee. The project is to provide a separate storm sewer system along the north side of the block with underground stormwater storage units, including bioretention planting areas and surface restoration of street pavement, curb, gutter, and sidewalk, street lighting striping and signage.

1.07 CONTRACT DRAWINGS

A. The Drawings on which the Form 00412 Adjustment Unit Prices and Contract are to be based are entitled **Sewer Improvements: 20th Street – Grand to McGee**. The Drawings are to be supplemented by additional shop and dimension drawings of materials and equipment and other drawings where specified. The list of drawings comprising the Contract Drawings are found in Section 00015.

B. The Contract Drawings show work on the south side of the street that is not intended to be completed with this contract. The unit price quantities in Section 00412 have been reduced to exclude work on the south side of the street, with the exception of the striping and signage work. The entire striping and signage scope is included in the unit price quantities.

1.08 MATERIALS FURNISHED BY THE CITY

A. 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 CONSTRUCTION CONSTRAINTS

Construction phasing and sequencing shall be part of Contractor's Work Plan. Contractor shall construct the Work with the following limitations:

A. Contractor shall not begin active construction work on the project site until an official notice to proceed has been issued. It is not anticipated that work will be suspended during the summer due to the upcoming World Cup soccer tournament.

B. The Contractor shall maintain one lane of traffic on 20th Street in each direction at all times.

C. Contractor shall be performing work on active water, combined sewer, sanitary sewer, and storm sewer systems. The Contractor shall maintain flow in the systems at all times. If required, temporary bypassing pumping or piping systems shall be utilized to maintain flows in these systems.

D. The Contractor shall be aware that the existing combined sewer system and other utilities may be in fragile condition. The Contractor shall take all precautions necessary to protect these utilities in place. Any damage to these existing utilities shall be repaired or replaced as needed to restore them at no additional cost to the City.

E. Contractor is to consider the depth of fill over all sections of pipe, soil conditions, impact of steep slopes, work safety. and preventing damage to existing structures. Optional installation methods may include open trench excavation with professionally engineered shoring, bored casing, or directional boring.

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 Design Professional 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 Design Professional. The information provided to the Design Professional 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. Field and grate Inlets: Contractor shall provide localized survey as needed to perform localized re-grading to make certain that stormwater flows into field and grate inlets.

F. 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 profiles. Locations are based on City GIS and one-call locates.

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 TRENCH LENGTH:

A. Open trench lengths shall not exceed 100 feet or be open longer than two weeks at any given time on any heading without approval of the City.

B. Excavations shall be protected at all times as specified in Division 1 and as required by local, state and federal regulations.

1.15 INSTALLATION OF MANHOLES:

A. Manholes shall be installed at the locations as shown on the Contract Drawings.

B. Minor field adjustments may be required to avoid or minimize conflicts with other utilities or features. Minor field adjustments can be with concurrence of the City's Resident Project Representative and shall be at no additional cost to the City.

1.16 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.

1.17 PERMITS AND DEGRADATION FEES

The City will waive 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 for each area of pavement disturbed within the street right-of-way, in addition to a traffic control permit however the fees will be waived. Use Public Works Project Number 89008851 along with the Water Services Department Project Number when applying for permits with the Public Works Department.

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 is modified as follows:

1. Paragraph 1.06.C second sentence shall be deleted and replaced with: Gaskets, Plastic Pipe and Liner Material shall be protected from exposure to sunlight.

2. Paragraph 1.09.B.2 append the following at the end of the sentence: and notification to the Owner.
3. Paragraph 1.29.A add the following sentence at the end of this paragraph: The exact location of water source is unknown and shall be confirmed by the Owner at the time of use based on availability, fire demand, and other potential demands on the system.

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 Engineer for preparation of Conforming to Construction Drawings. The Contractor shall provide documents in PDF format, clearly legible, summarizing the work completed.

2. Paragraph 1.07.B.d delete current text and replace with: Not Used.
3. Paragraph 3.04.A delete current sentence and replace with: Contractor shall provide information and assistance to Design Professional sufficient for Design Professional to complete Conforming to Construction Drawings.
4. Paragraph 3.04 B through I shall be deleted.
5. Paragraph 3.06.B delete paragraph c.
6. Paragraph 3.06.C delete entire paragraph, including items a-d, and replace with: Not Used

D. 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. Contractor shall coordinate with Resident Project Representative weekly to verify quantities.
4. 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 to Owner, Engineer, and 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.

E. Section 01322 – Photographic and Video Documentation

1. Paragraph 1.07 Pre-Construction Video will be required as part of the Project.
2. Paragraph 1.07 Interactive Map Index will be required as part of the Project.
3. Paragraph 1.07 Post-Construction Photos and Video will be required as part of the Project.
4. Paragraph 3.09.C Delete all text, including items 1-3, and replace with: Photos and Video shall be submitted on a non-returnable USB or non-returnable solid state hard drive.
5. All photographs and video provided by the CONTRACTOR will be submitted using the Document Control System in accordance with Section 01335.

F. 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.

G. 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

H. Section 01581 – Public Communications

1. The Contractor will be required to attend one public meeting specified in Section 01581.
2. All communication shall be printed in both English and Spanish, typically with one side of the printed material in English and the other side in Spanish.
3. Critical Facilities. For Critical Facilities including, but not limited to, emergency response teams, hospitals, grocery stores, schools, daycares, retirement centers, and government buildings, the Contractor shall notify the owner or tenants at least three weeks in advance of any work. Contractor shall coordinate project schedule with the owner or tenants and accommodate reasonable requests from critical facilities regarding scheduling of the work.
4. Contractor shall contact all other property owners or tenants to notify them of impending work 48 hours in advance of work starting via door knock and door hanger. Door hanger shall include Contractor's contact name and phone number.

I. Section 01700 – Traffic Control

1. Traffic Control Plans:
    a. 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.
    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.

DIVISION 02

J. Section 02930 Exterior Plants

1. Payment for two-year plant establishment and maintenance period as specified in Section 02930-1.10 shall be quarterly at the unit price stated in the Contractor's bid in Section 00412 – Unit Prices. Prior to quarterly payments the Contractor shall submit written records of activities performed as required in Section 02930-1.10.C.

2. Each quarterly payment shall be one-eighth of the lump sum amount included in Section 00412 – Unit Prices.

3. Two-year establishment and maintenance period shall commence at final acceptance of the construction contract. Contractor shall maintain all landscaping beds at their own expense until final acceptance. Upon final acceptance of the construction contract the Contractor may apply for release of all retainage for work completed. No retainage will be held on quarterly payments during the establishment and maintenance period.

DIVISION 03

K. Section 03370

1. All new manholes where stormwater storage outlet control structures are connecting to downstream existing systems shall be 60" diameter sanitary sewer manholes in accordance with Section 03370 including the requirements for anti-microbial additives. Castings shall be 30" diameter in accordance with Section 05010.

END OF SECTION

SECTION 01016 – WATER MAINS NEAR SEWERS

PART 1 - GENERAL

1.01 SUMMARY

This section covers the required separation, horizontal and vertical, of water mains from any existing or proposed sanitary sewer, sewer force main or storm sewer. The horizontal separation shall be ten feet (10') and the vertical separation shall be eighteen inches (18"). If this specification conflicts with other specifications, this specification shall govern. If this specification conflicts with Missouri's Code of State Regulations, the Code of State Regulations govern.

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 02618 – Ductile Iron Pipe for Water Mains.
C. Section 02620 – Ductile Iron Pipe for Sewers.
D. Section 02624 – PVC Gravity Sewer Pipe.

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. Missouri Code of State Regulations.
C. American Society for Testing and Materials (ASTM):

D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
D2412	Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
D3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
F679	Standard Specification for Type PSM Poly Vinyl Chloride (PVC).

1.05 DEFINITIONS

A. Non-Potable Fluid Line: An existing or proposed pipeline that carries non-potable fluids such as, but not limited to drains, storm sewers, sanitary sewers, combined

sewers, sewer service connections, sanitary sewer force mains, process waste or product lines.

B. Non-Potable Fluid Structure: An existing or proposed structure associated with a Non-Potable Fluid Line. Non-Potable Fluid Structures include, but are not limited to, sanitary sewer manholes, sanitary sewer pump stations, storm sewer inlets and storm sewer junction boxes.

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.

1.08 QUALITY ASSURANCE

A. The Contractor is responsible for the quality assurance and quality control of the Work.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Follow the provisions for the delivery, storage and handling of products to and at the site as provided in Section 01000 – General Project Requirements.

PART 2 - PRODUCTS

2.01 PVC PIPE

A. Sewers reconstructed using PVC pipe shall conform to Section 02624 – PVC for Gravity Sewers.

2.02 DUCTILE IRON PIPE

A. Sewers reconstructed using ductile iron pipe shall conform to Section 02620 - Ductile Iron Pipe for Sewers. Joints shall be restrained push-on joints.

PART 3 - EXECUTION

3.01 SEPARATION REQUIREMENTS

A. The Missouri Department of Natural Resources (MDNR) has established the minimum separation requirements between water distribution systems and potential sources of contamination such as Non-Potable Fluid Lines, Non-Potable Fluid Structures and Disposal Facilities.

B. When ten foot (10') horizontal separation cannot be achieved, the strategy for protecting the water distribution system is to be shown on the Drawings. Eighteen inches (18") of vertical separation is required at all times.

C. If the Contractor encounters conditions during construction for which the minimum requirements for separation cannot be met, then the work shall be stopped and the City's representative shall be notified. The strategy to protect the water distribution system shall be provided to the Contractor by the City.

3.02 PARALLEL INSTALLATION

A. Minimum Requirements:
   1. Water mains shall be laid at least 10 feet horizontally, from any non-potable fluid line. The distance shall be measured from edge to edge.
   2. An elevation difference shall be maintained such that the bottom of the water main is at least 18 inches above the top of the non-potable line while also meeting minimum cover requirements for the water main.

B. Conforming to Standards:
   1. In cases where it is not possible to maintain a 10-foot horizontal separation, the City may allow alternative designs on a case-by-case basis consistent with the Code of State Regulations. The following minimum criteria shall be met:
      (a) The water main shall be laid in a separate trench located as far away from the non-potable line as feasible. The water main shall be installed on an undisturbed earth shelf located on one side of the non-potable line so the bottom of the water main is at least eighteen inches (18") above the top of the sanitary sewer.
   2. Alternatively, one or more of the following options may be required:
      (a) The sewer main shall be reconstructed in accordance with paragraph 3.06 SANITARY SEWER RECONSTRUCTION.
      (b) Casing pipe shall be installed so either the water line or the non-potable fluid line is cased in all areas until the horizontal separation requirement is achieved.
         (i) The casing shall be installed so it is a continuous casing.
         (ii) The casing pipe material shall be PVC C900 or ductile iron pipe as specified in PART 2 - PRODUCTS.
      (c) The required length of sewer to be reconstructed or continuously cased shall be the length necessary to achieve the minimum 10 foot horizontal separation.

3.03 CROSSINGS

A. Water mains that cross non-potable fluid lines shall be laid to provide a minimum vertical clear distance of 18 inches between the outside of the water main and the outside of the non-potable fluid line. This shall be the case where the water main is either above or below the non-potable fluid line.

B. At crossings, one full length of water pipe shall be located or centered so both joints will be located as far as possible from the non-potable line.

C. Additional requirements:
   1. When crossing under a non-potable fluid line, the following criteria shall also be met:
      (a) The non-potable fluid line shall be reconstructed in accordance with paragraph 3.06 SANITARY SEWER RECONSTRUCTION.
   2. When crossing under a non-potable fluid line, one or more of the following criteria may also be required by the City/Design Professional:
      (a) The water line shall be constructed using restrained joints. Installed in a casing pipe with casing spacers and end seals (see paragraph 3.07).
      (b) Install casing pipe for non-potable fluid line (see paragraph 3.07):
         (i) The casing shall be continuous.
         (ii) The casing pipe material shall be AWWA C900 pressure pipe or ductile iron pipe as specified in PART 2 - PRODUCTS.

(iii) The full length of casing pipe is to be located so each end of the casing is as far from the point of crossing as possible.

3.04 NON-POTABLE FLUID STRUCTURES

A. No waterline shall be installed closer than 10 feet to any part of a sanitary or combined sewer manhole. For all other Non-potable Fluid Structures, the minimum separation shall be 18 inches.

B. Conforming to Standards:

1. Where the horizontal separation cannot be obtained, the waterline shall be constructed of mechanical or manufactured restrained joint pipe or cased in a continuous casing. Casing pipe must be a material that is approved for use as water main.
2. The full length of water pipe shall be located so both joints will be as far from the manhole as possible, but in no case less than 10 feet or centered on a nominal 20-foot pipe.

C. No water pipe shall pass through or come into contact with any part of a Non-Potable Structure.

3.05 DISPOSAL FACILITIES

A. No water main shall be located closer than 25 feet to any wastewater disposal facility, agricultural waste disposal facility, or landfill.

B. Water mains shall be separated by a minimum of 25 feet from septic tanks and wastewater disposal areas such as cesspools, subsurface disposal fields, pit privies, land application fields, and seepage beds.

C. All such disposal facilities shall be noted on the Drawings.

3.06 SANITARY SEWER RECONSTRUCTION

A. The paragraph applies to the installation of potable water lines crossing under non-potable fluid lines with the eighteen inches (18”) of vertical clearance.

B. As indicated on the Drawings, specified in Section 01015 – Specific Project Requirements, or as otherwise directed by the City, the Contractor shall reconstruct the non-potable fluid line using mechanical or manufactured restrained joint pipe, or fusion welded pipe meeting the following criteria:

1. Pipe material shall be PVC or ductile iron pipe as specified in PART 2 – Products.
2. Install as specified herein and in accordance with drawing No. 01016-1, Sewer Crossing Detail.

3.07 CASINGS FOR PIPE CROSSINGS

A. The casing pipe material shall be C900/C905 PVC.

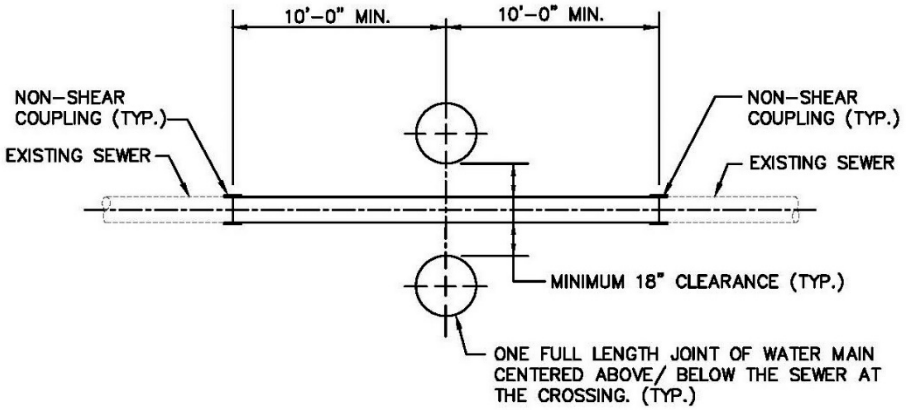
B. The full length of casing pipe shall be located so both joints will be as far from the non-potable pipeline as possible, but in no case less than 10 feet or centered on a nominal 20-foot pipe.

C. See section 02320 – Utility Casings for casing spacer and casing end seal requirements.

3.08 CONCRETE ENCASEMENT

A. Conventional poured concrete encasement is not allowed.

Drawings 01016-1 through 01016-5 are on the following five pages.



ELEVATION
NOT TO SCALE

NOTES:

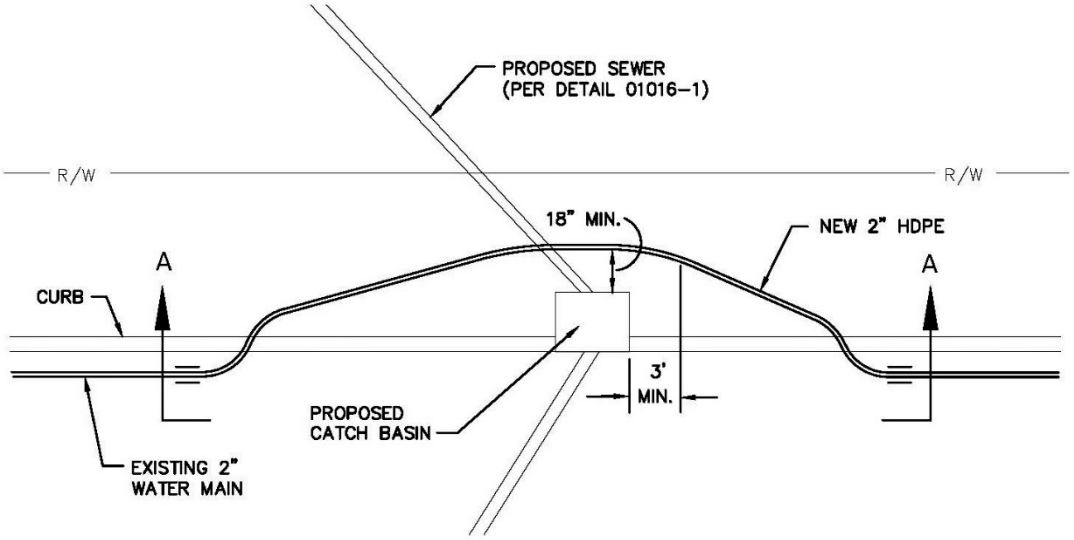
1. IF THE WATER MAIN CROSSES BELOW THE SEWER, THE SEWER SHALL BE REPLACED WITH PVC OR DIP.
2. PVC PIPE SHALL CONFORM TO 02624 PVC GRAVITY SEWER PIPE. DIP SHALL CONFORM TO 02620 DIP FOR SEWERS.

SEWER CROSSING DETAIL

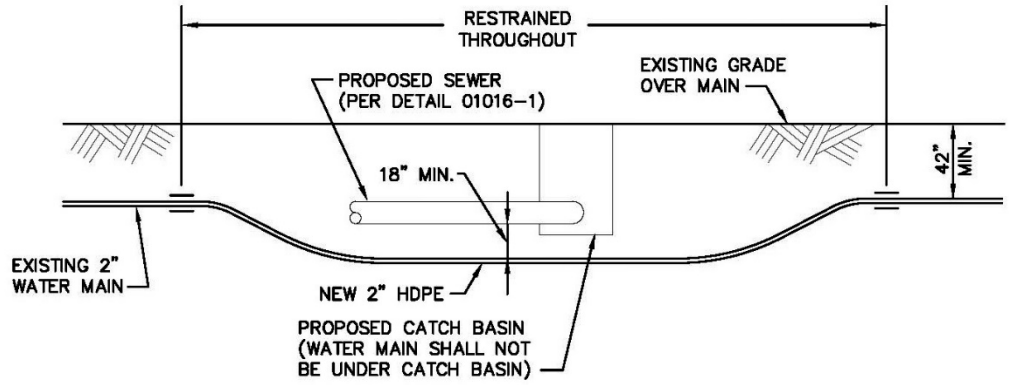
WATER SERVICES
CITY OF KANSAS CITY, MISSOURI
DRAWING NO. 01016-1

DEVELOPED BY: TECHNICAL ADVISORY COMMITTEE
APPROVED BY:
DATE: 3/15/2021

1 OF 1



PLAN
NOT TO SCALE



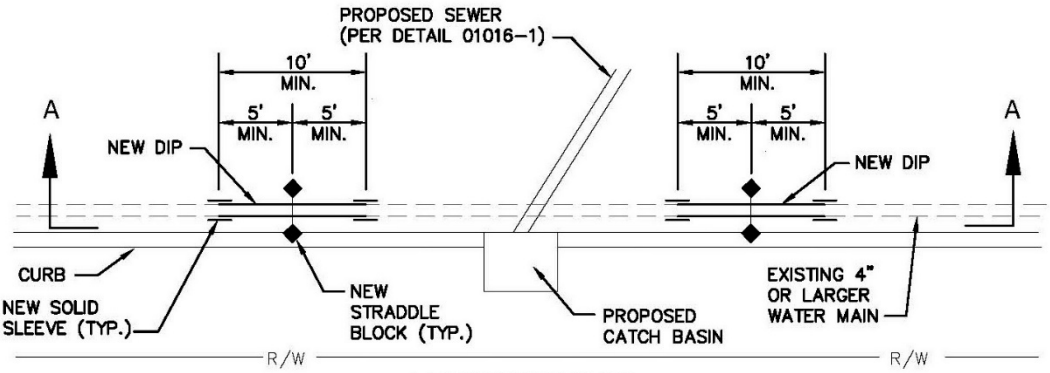
SECTION A-A
NOT TO SCALE

EXISTING 2" OR SMALLER WATER MAIN RELOCATION AT SEWER

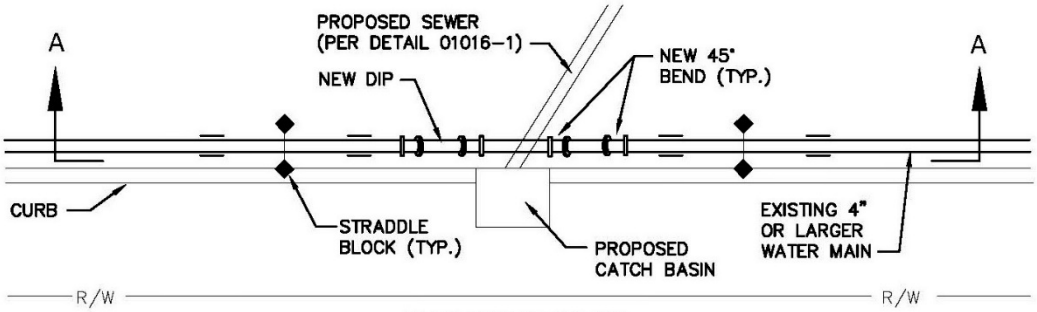
WATER SERVICES
CITY OF KANSAS CITY, MISSOURI
DRAWING NO. 01016-2

DEVELOPED BY: TECHNICAL ADVISORY COMMITTEE
APPROVED BY:
DATE: 3/15/2021

1 OF 1

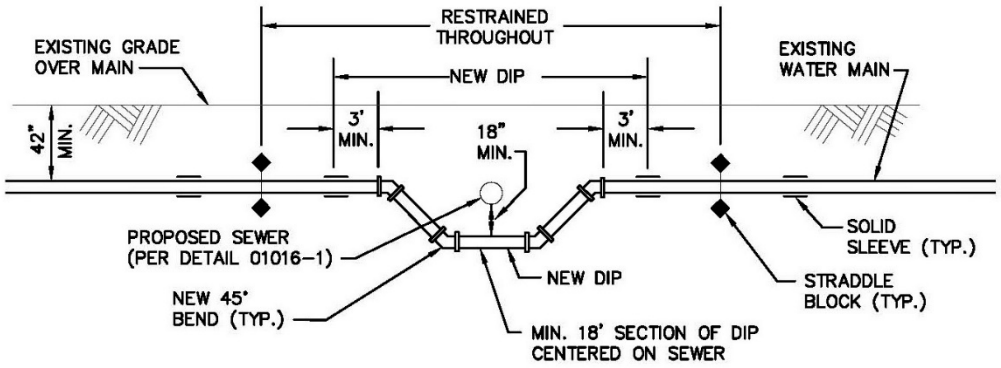


TEMPORARY PLAN



PERMANENT PLAN

NOT TO SCALE
RESTRAIN ALL JOINTS



SECTION A-A

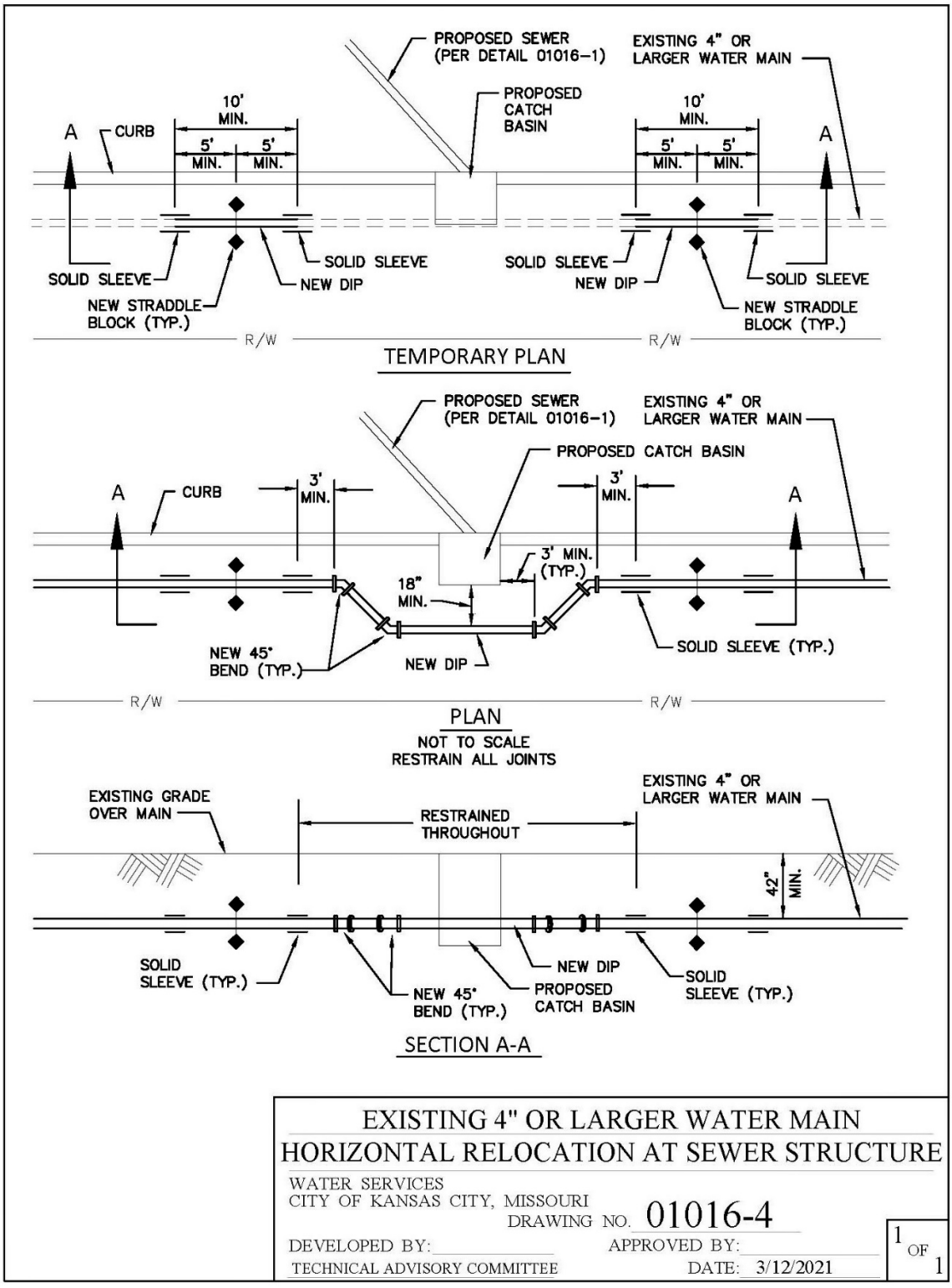
NOT TO SCALE

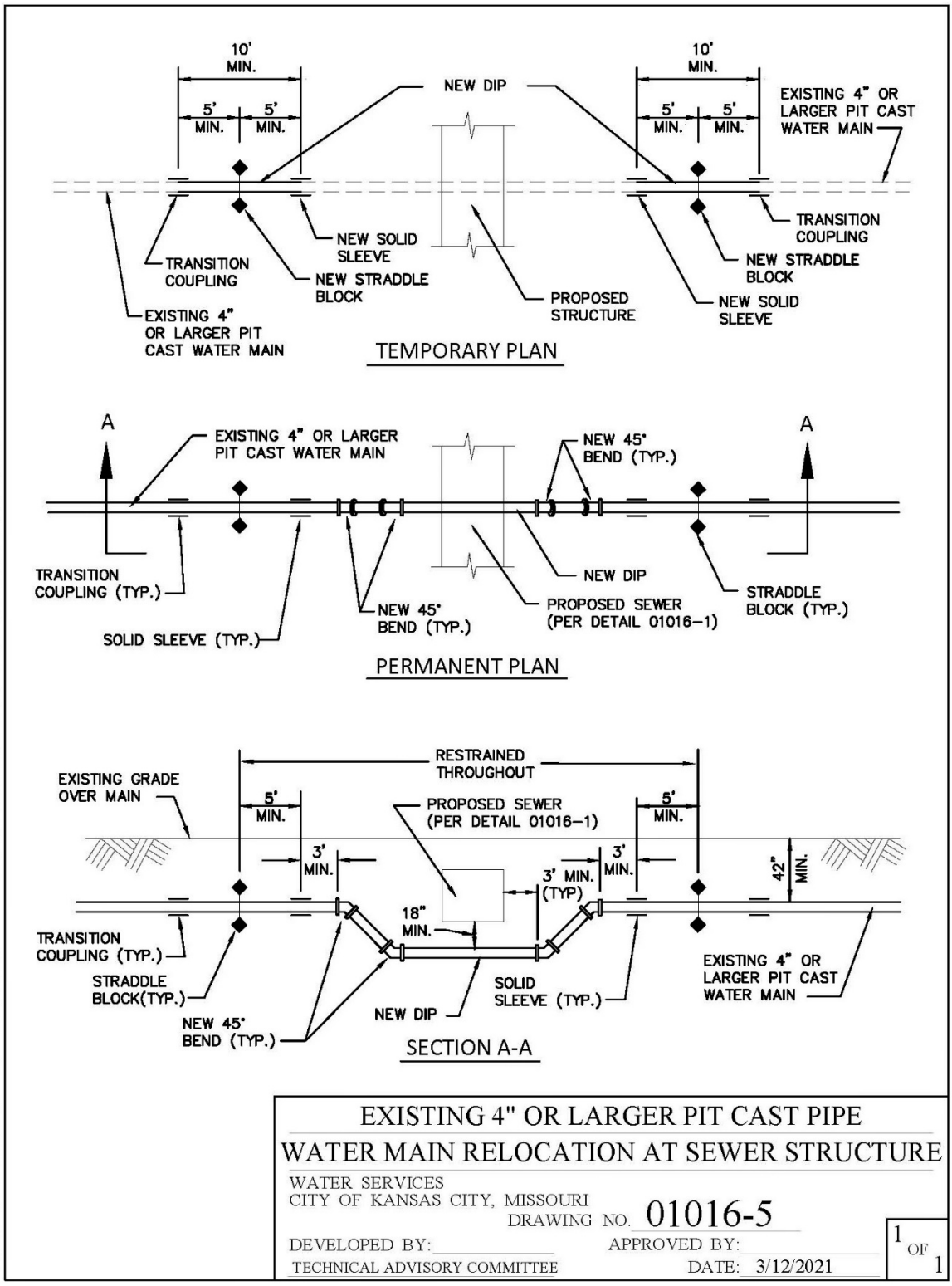
EXISTING 4" OR LARGER WATER MAIN VERTICAL RELOCATION AT SEWER

WATER SERVICES
CITY OF KANSAS CITY, MISSOURI
DRAWING NO. 01016-3

DEVELOPED BY: TECHNICAL ADVISORY COMMITTEE
APPROVED BY:
DATE: 3/12/2021

1 OF 1


PROPOSED SEWER
(PER DETAIL 01016-1)
EXISTING 4" OR
LARGER WATER MAIN
PROPOSED
CATCH
BASIN
10'
MIN.
5'
MIN.
5'
MIN.
A
CURB
SOLID SLEEVE
NEW STRADDLE
BLOCK (TYP.)
NEW DIP
SOLID SLEEVE
R/W
TEMPORARY PLAN
PROPOSED SEWER
(PER DETAIL 01016-1)
EXISTING 4" OR
LARGER WATER MAIN
PROPOSED CATCH BASIN
3'
MIN.
3' MIN.
(TYP.)
18"
MIN.
NEW 45°
BEND (TYP.)
NEW DIP
SOLID SLEEVE (TYP.)
PLAN
NOT TO SCALE
RESTRAIN ALL JOINTS
EXISTING GRADE
OVER MAIN
RESTRAINED
THROUGHOUT
42"
MIN.
SOLID
SLEEVE (TYP.)
NEW 45°
BEND (TYP.)
PROPOSED
CATCH BASIN
SECTION A-A
EXISTING 4" OR LARGER WATER MAIN
HORIZONTAL RELOCATION AT SEWER STRUCTURE
WATER SERVICES
CITY OF KANSAS CITY, MISSOURI
DRAWING NO. 01016-4
DEVELOPED BY:
TECHNICAL ADVISORY COMMITTEE
APPROVED BY:
DATE: 3/12/2021
1 OF 1



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 [❑ increased] [❑ decreased] by this Authorization	$_____
New Allowance Balance	$_____

APPROVAL RECOMMENDED

_____
Design Professional Date

_____
Construction Manager Date

_____
Project Manager Date

CITY APPROVAL

_____
City's Representative Date

CONTRACTOR ACCEPTANCE

_____
Contractor Date

❑ Attachments:

Distribution:
- ❑ City
- ❑ Contractor
- ❑ Construction Manager
- ❑ Design Professional
- ❑ Consultant
- ❑ Other

CITY OF FOUNTAINS
HEART OF THE NATION
KANSAS CITY
MISSOURI

APPLICATION FOR PAYMENT

Project Number _____

Project Title _____

Final Payment[5] ☐

Application Number[2]: _____

CONTRACTOR — Date: _____

Ordinance/Resolution Number: _____

Address — 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)

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)

[1]See General Conditions Article 14.02 A and B
[2]Proof of tax compliance if 1st payment and if Contract amount exceeds $150,000.00
[3]Schedule of Values–Denote any amounts currently disputed in this application. Attach additional dispute documentation if required.
[4]If requesting payment for stored materials, see General Conditions Article 14.02 A.1
[5]If final payment, current proof of tax compliance if Contract is longer than 1 year and amount exceeds $150,000.00.
[6] Per 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 Human Relations Department
[7]Applicable 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 amendements 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

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

SCHEDULE OF VALUES

Project Number _____

Project Title _____

HRD APPROVED CUP		
MBE	**WBE**	**DBE**
$0.00	$0.00	$0.00
%	**%**	**%**

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
SPEC SECTION	UNIT PRICE CONTRACTS			DESCRIPTION OF WORK UNIT ITEM DESCRIPTION	$ UNIT PRICE	NO. OF UNITS	$ TOTAL OR LUMP SUM	UNITS COMPLETE	$ COMPLETED WORK	$ STORED MATERIAL	$ TOTAL COMPLETED AND STORED TO DATE		TOTALS TO DATE			% AT BOTTOM	$ TOTAL PREVIOUS APPLICATIONS	$ AMOUNT THIS APPLICATION L-R
	UNIT ITEM NO.	UNIT	ESTIMATED QUANTITY								$ J+K	% J/H	$ MBE	$ WBE	$ DBE			
																P/L		
																O/L		
																N/L		

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.

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

CERTIFIED PAYROLL REPORT

Project Number:

Project Title:

Payroll Number: (1) ☐ **Final**

WEEK ENDING: (2)		SHEET (3)	of	GRANT AGENCY PROJECT NO.: (4)	
CONTRACTOR: (5)		SUBCONTRACTOR: (6)		DEPT PROJECT OR CONTRACT NO.: (7)	
ADDRESS:		ADDRESS:		LOCATION: (8)	
CITY, STATE ZIP:		CITY, STATE ZIP:		DESCRIPTION: (9)	
FEDERAL I.D. NUMBER: (10a)		FEDERAL I.D. NUMBER: (10b)			

First Name	Last Name	DATE: (13)	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS.	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL
EMPLOYEE NAME: (11)														
ADDRESS:		REG. HRS. (14)								(17) 0.00	$ (21) -			$ (25) -
CITY, STATE ZIP:		O.T. HRS. (15)								(18) 0.00		$ (22) -		$ (26) -
SOCIAL SECURITY NO.: (12)		D.O.T. HRS. (16)								(19) 0.00		$ (23) -		$ (27) -
OCCUPATIONAL TITLE / CLASSIFICATION:							TOTAL FRINGE HOURS (20)			0.00			$ (24) -	$ (28) -
(30)		GROUP: (31)		SKILL GROUP: (32)								FRINGE PAID TO:	☐ APPROVED PLAN (29a)	
												(29)	☐ EMPLOYEE	$ (29b) -

WEEK ALL JOBS:	HOURS:	GROSS EARNINGS:	FEDERAL:	FICA:	STATE:	LOCAL E-TAX:	MISC:	NET PAY:	EARNINGS FOR THIS JOB:	$ (41) -
	(33)	$ (34) -	$ (35) -	$ (36) -	$ (37) -	$ (38) -	$ (39) -	$ (40) -	KANSAS CITY EARNINGS TAX THIS JOB	$ (42) -

First Name	Last Name	DATE:	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS.	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL
EMPLOYEE NAME:														
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			$ -	$ -
		GROUP:		SKILL GROUP:								FRINGE PAID TO:	☐ APPROVED PLAN	$ -
													☐ 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	$ -

First Name	Last Name	DATE:	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS.	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL
EMPLOYEE NAME:														
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			$ -	$ -
		GROUP:		SKILL GROUP:								FRINGE PAID TO:	☐ APPROVED PLAN	$ -
													☐ 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	$ -

First Name	Last Name	DATE:	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL HRS.	BASE RATE	O.T. RATE	FRINGE RATE	TOTAL
EMPLOYEE NAME:														
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			$ -	$ -
		GROUP:		SKILL GROUP:								FRINGE PAID TO:	☐ APPROVED PLAN	$ -
													☐ 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	$ -

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

CERTIFIED PAYROLL REPORT

Project Number: _____

Project Title: _____

Payroll Number: _____ **Final**

| | | |

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
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KANSAS CITY
MISSOURI

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project Number 81001071/1817 Project Title Sewer Improvements: 20th Street-Grand

From Contractor CM Concrete Inc To Water Department Date 05/06/2026

Spec. No.	Section Title		Firm, Address (Check box if Supplier)	Phone, FAX and e-mail	Contact
	MBE		RLS Trucking LLC, 8001 Prospect Ave, KCMO 64134	816-921-1230 rlstruckinginc95 @yahoo.com	Robert Shaw
	WBE		Audrie Seeley & Company LLC, 9300 Holmes Rd. KCMO 64131	816-361-0011 rosa@aseeleyl andscape.com	Rosa Kennedy
	WBE		Thorne and Son Asphalt Paving Inc. 11705 E 350 Highway Suite D, Raytown MO, 64138	816-358-4608 thorneandsona sphalt@yahoo. com	Kelly Mozee
	Supplier	X	Century Concrete, 11011 Cody street suite 150, Overland Park 66210	913-319-6517 angela.ore@as hgrove.com	Angela Ore
	Supplier	X	Triumph Construction, 3131 Belt St. Kansas City MO 64111	816-444-6000 max@triumphc onstructionsup ply.com	Max
	Supplier	X	Construction Anchors Inc., 13900 E 350 Hwy, KCMO 64139	816-525-3640 Jeffs@construc tionanchors.co m	Jeffery Schenke

❑ Attachments:

Signed by: _____ Date 05/06/2026

Distribution: ❑ Owner ☒ Contractor ❑ Construction Manager ❑ Design Professional ❑ Consultant ❑ Other

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

DAILY LABOR FORCE REPORT

Project Number _____ Day _____ Date _____
Project Title _____
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.

Worker's Full Legal Name	**Occupational Title or Classification Group & Skill**	**Hours Worked & Time (i.e. 10AM – 4PM)**	**Race & Gender**

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 _____

Project Title _____

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
DEPUTY DIRECTOR	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 _____

Project Title _____

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 _____

DocuSign Envelope ID: CF07562F-6A3B-4EF2-A92A-60C48F7AB190

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

CITY OF FOUNTAINS
HEART OF THE NATION
KANSAS CITY
MISSOURI

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: • 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: • 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
	• Adjusting. • Curing. • Startup and placement into final use.					
Area Separations	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: • 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* *Required element, all others to be used as applicable based on project scope.			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:
   1. Requirement to provide a Cost Correlation shall be as indicated in Section 01015 – Specific Project Requirements.
   2. 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

A. 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.

B. 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 schedule 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			Site Conditions		Day	
❑ Clear	❑ Snow	❑ Warm	❑ Clear	❑ Dusty	❑ Monday	❑ Thursday
❑ Overcast	❑ Foggy	❑ Hot	❑ Muddy	❑ _____	❑ Tuesday	❑ Friday
❑ Rain	❑ Cold	❑ Temperature Range _____			❑ 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			Site Conditions		Day	
❑ Clear	❑ Snow	❑ Warm	❑ Clear	❑ Dusty	❑ Monday	❑ Thursday
❑ Overcast	❑ Foggy	❑ Hot	❑ Muddy	❑ _____	❑ Tuesday	❑ Friday
❑ Rain	❑ Cold	❑ Temperature Range _____			❑ 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 _____

Project Title _____

TO: _____

ATTN: _____

Date _____

Re: _____

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:

❑ For Approval ❑ Approved as Submitted ❑ Resubmit _____ Copies for Approval

❑ For Your Use ❑ Approved as Noted ❑ Submit _____ Copies for Distribution

❑ As Requested ❑ Returned for Corrections ❑ Return _____ Corrected Prints

❑ For Review and Comment ❑ _____

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, Alternation 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 been 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

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 Contactor 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

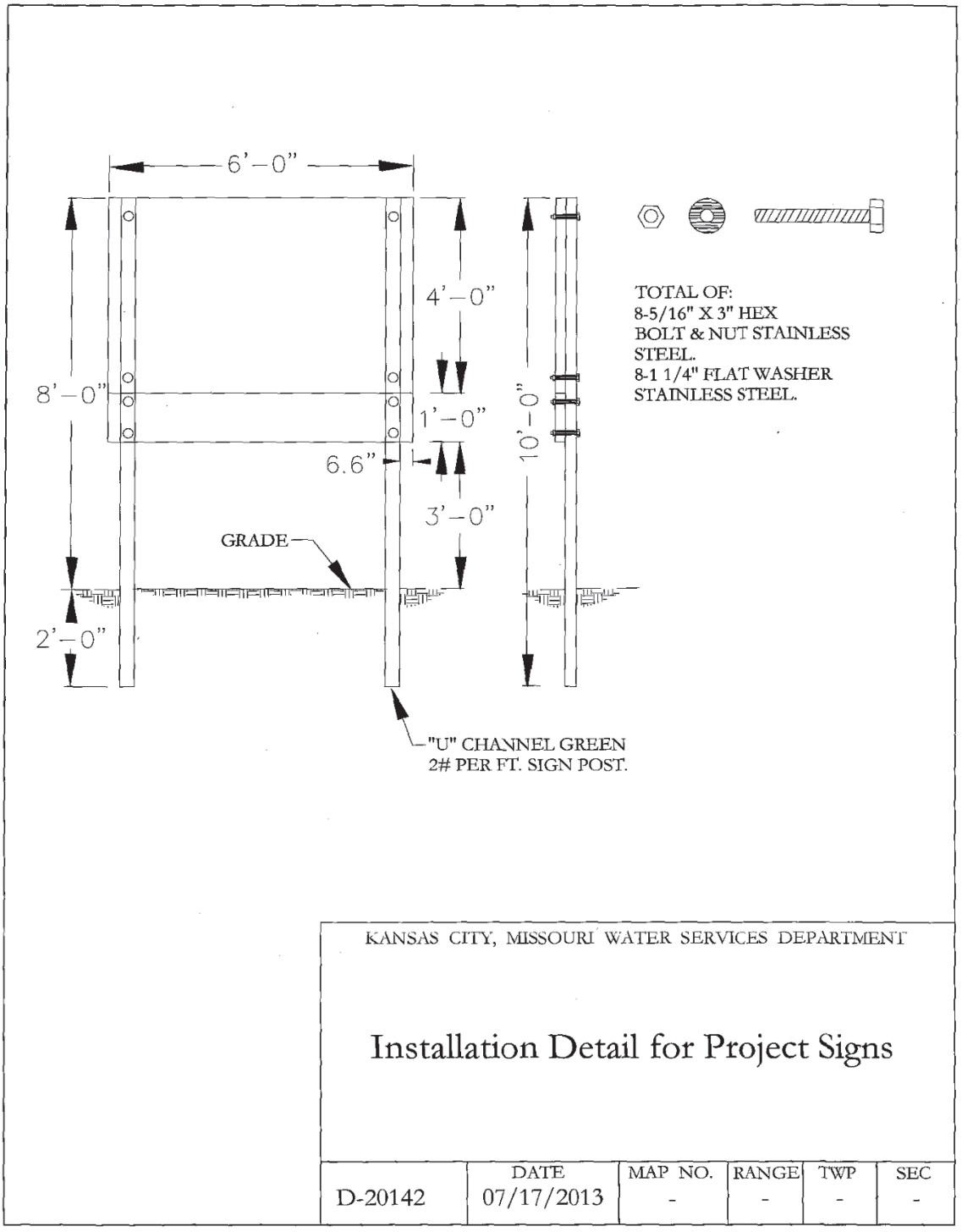


Figure 3 – Installation Detail for Project Signs

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.

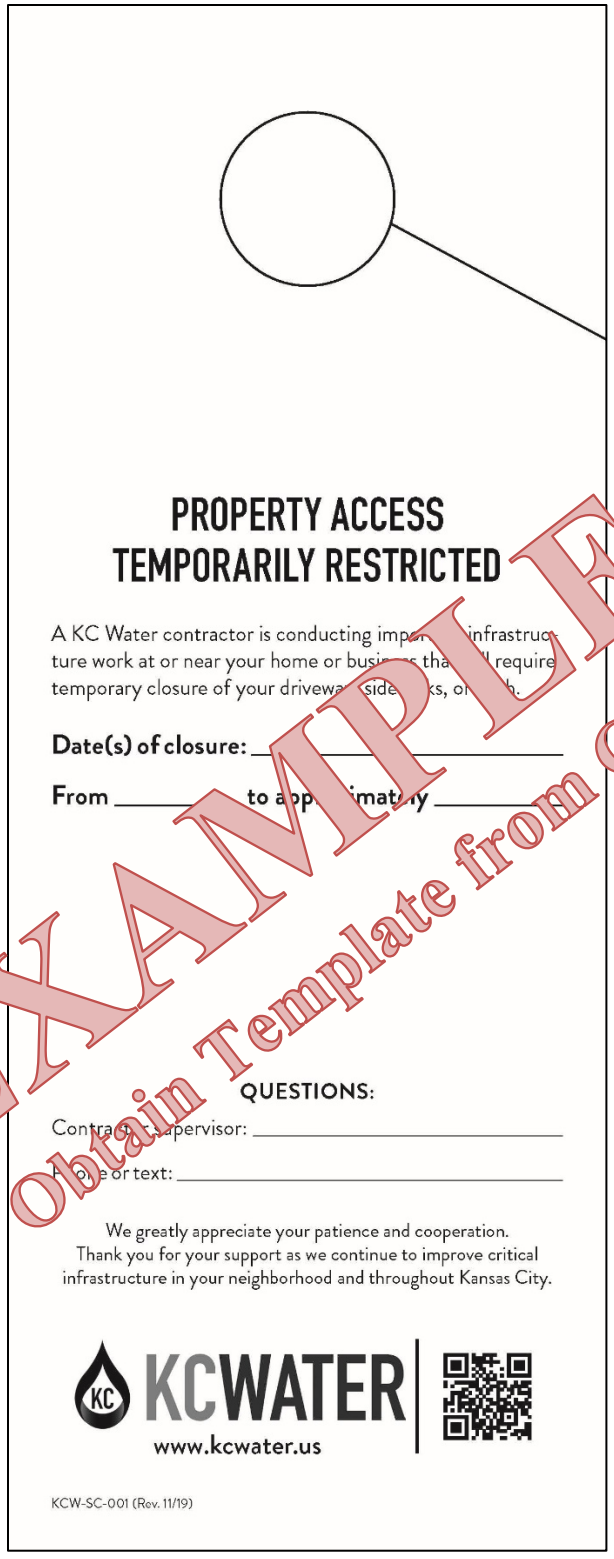
PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

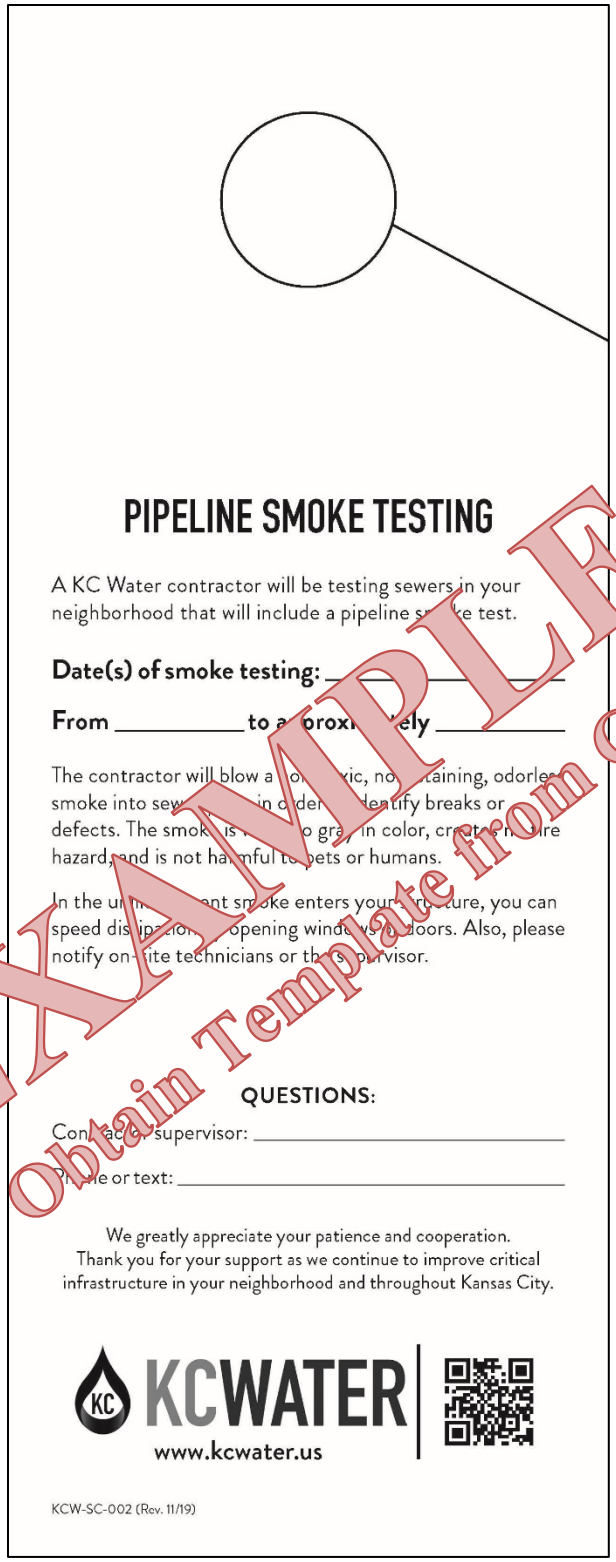
Not used.

See example templates on pages 4-9.



EXAMPLE
Obtain Template from City

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 s[illegible]e test.

Date(s) of smoke testing: _____

From _____ to a[illegible]ely _____

The contractor will blow a [illegible]ic, no[illegible]taining, odorless smoke into sew[illegible] in o[illegible]der [illegible]dentify breaks or defects. The smok[illegible] is [illegible]o gra[illegible] in color, cr[illegible]e[illegible]re hazard, and is not ha[illegible]mful t[illegible]pets or humans.

In the u[illegible]nt sm[illegible]oke enters your [illegible]ructure, you can speed dis[illegible]o[illegible] opening windows or doors. Also, please notify on-[illegible]ite technicians or th[illegible] supervisor.

QUESTIONS:

Con[illegible]ac[illegible] supervisor: _____

[illegible]e or text: _____

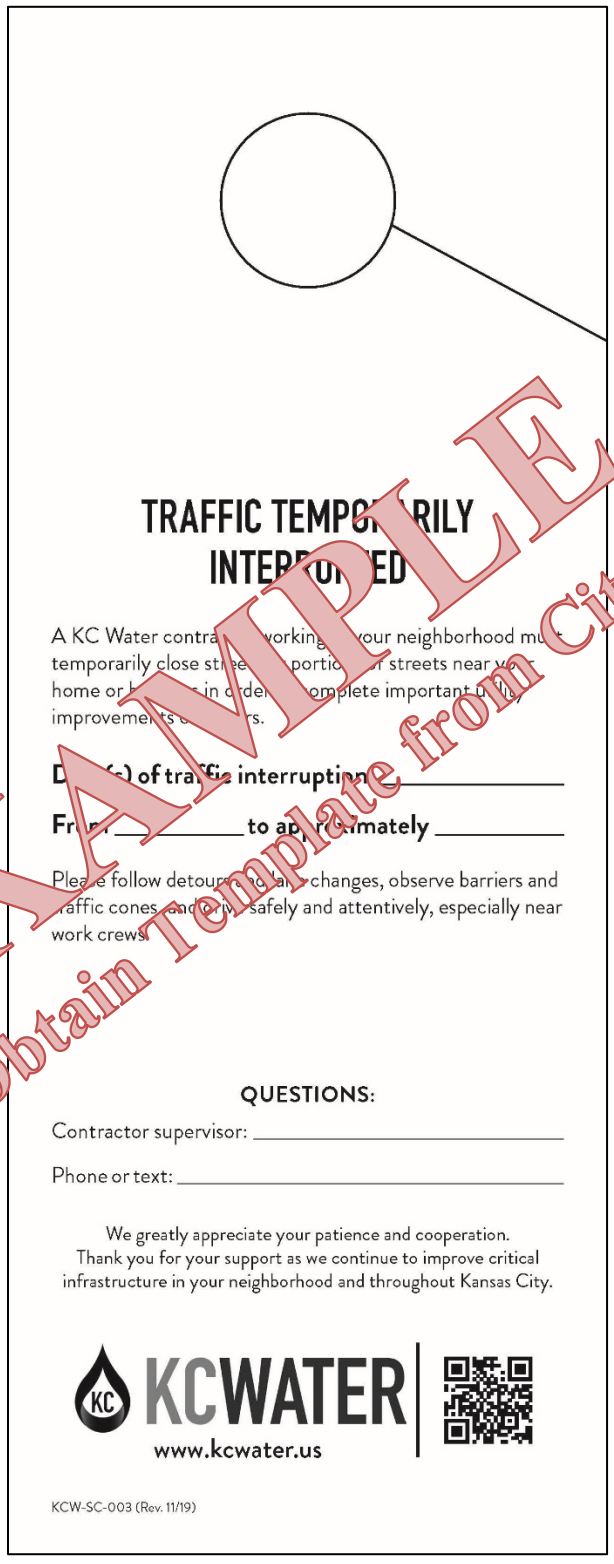
We greatly appreciate your patience and cooperation.
Thank you for your support as we continue to improve critical infrastructure in your neighborhood and throughout Kansas City.

KCWATER
www.kcwater.us

KCW-SC-002 (Rev. 11/19)

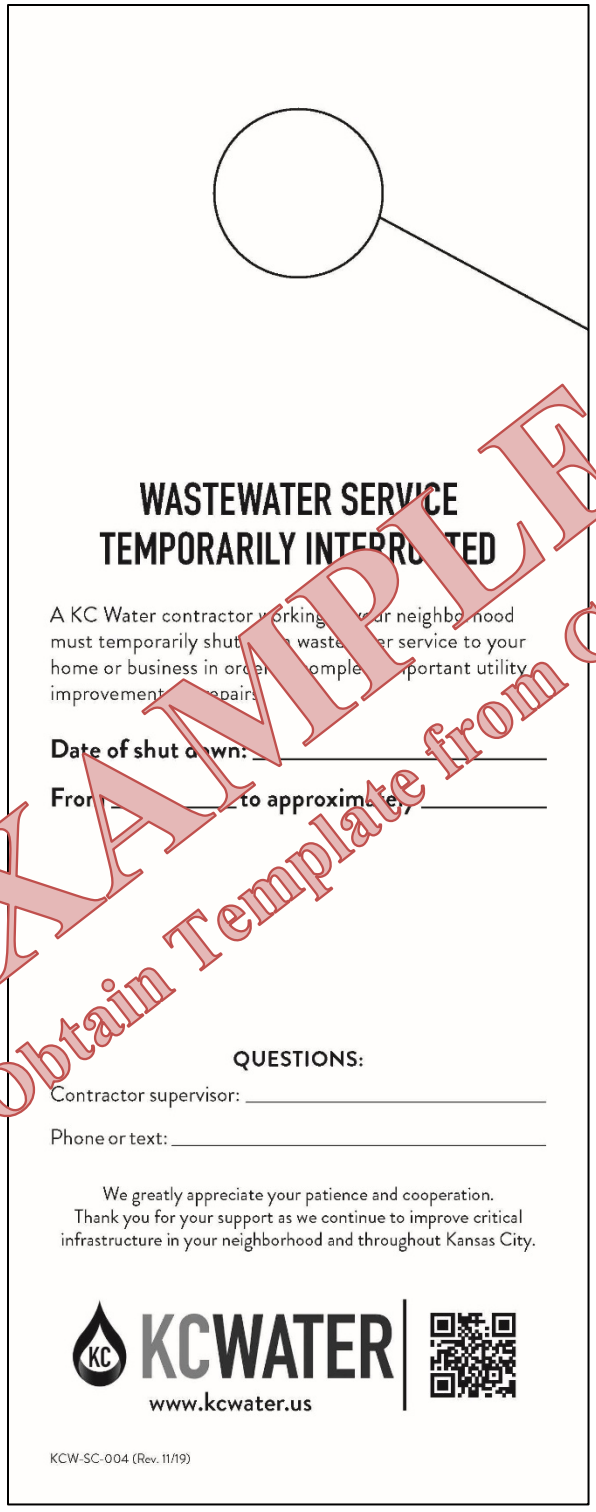
EXAMPLE
Obtain Template from City

Figure 2 – Smoke Testing Door Hanger



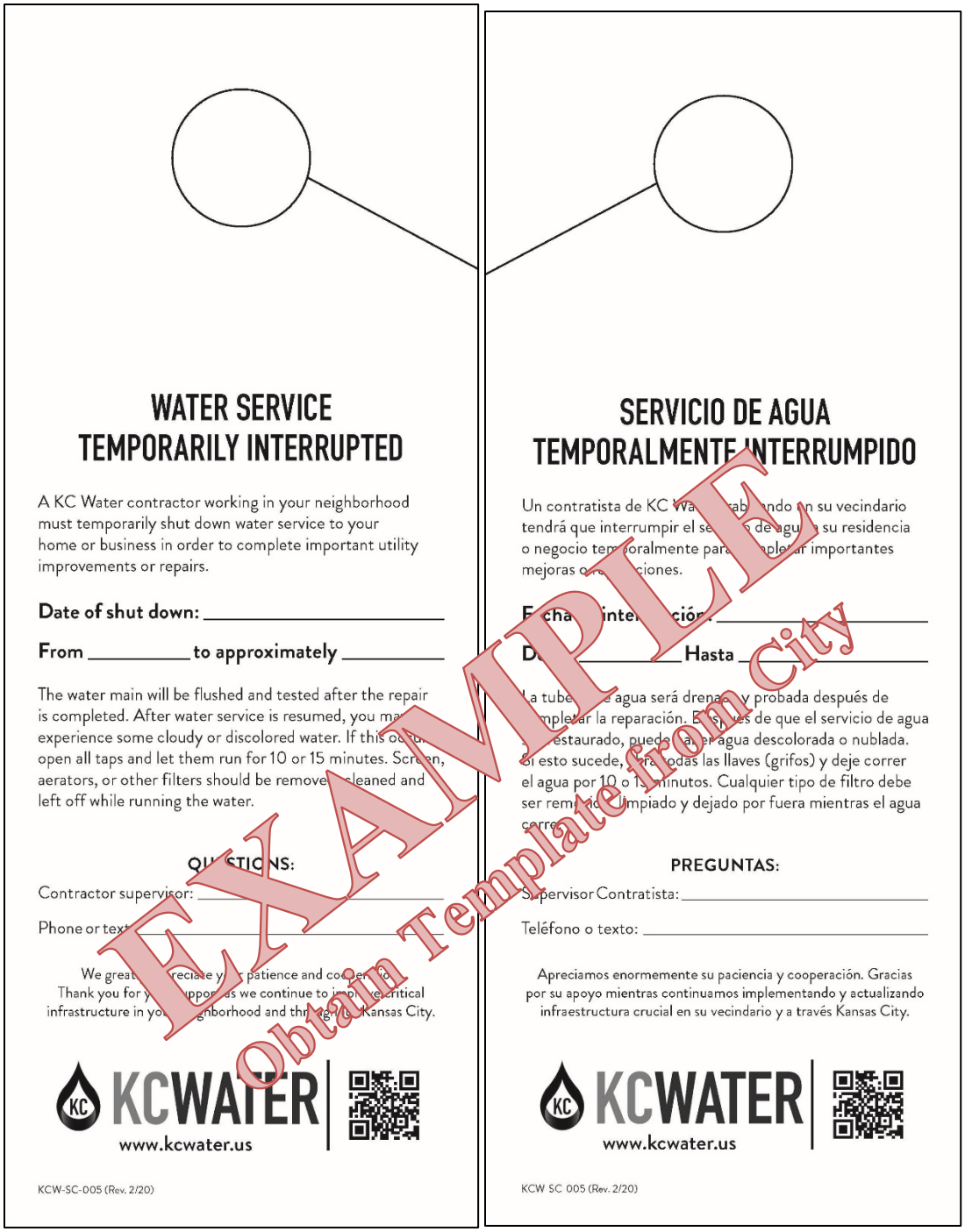
EXAMPLE
Obtain Template from City

Figure 3 -Traffic Interruption Door Hanger



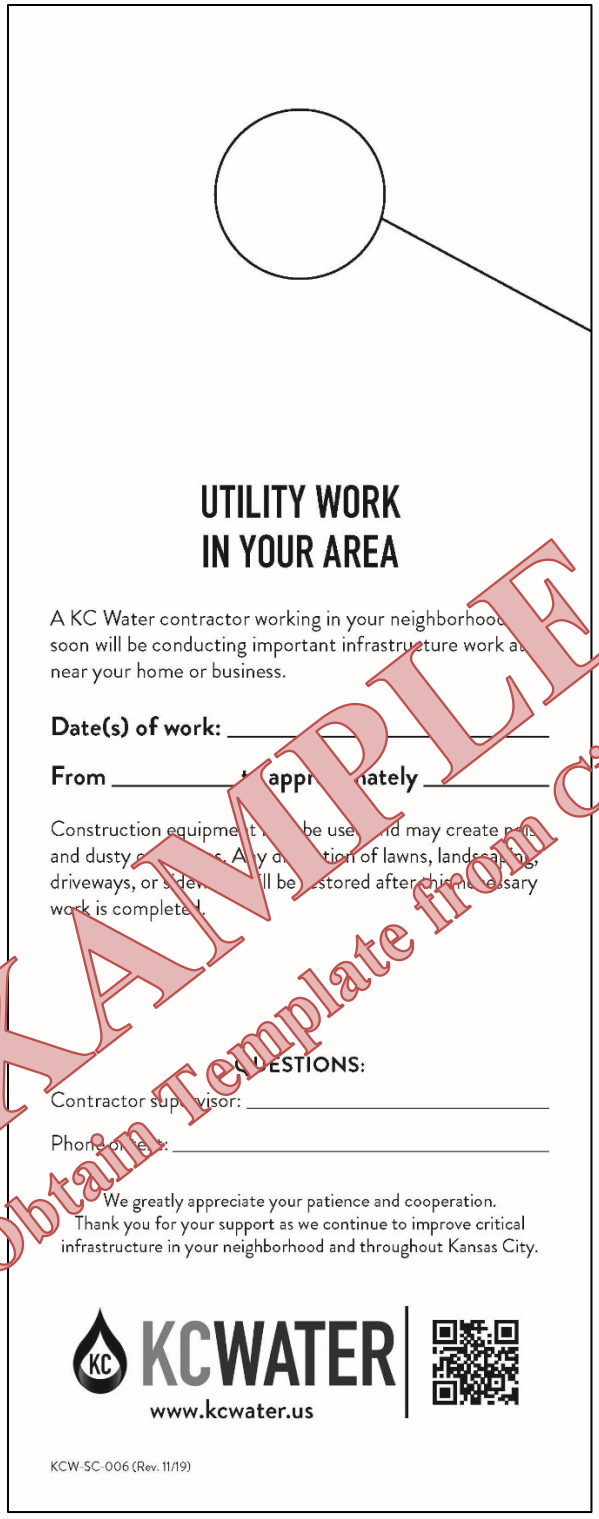
EXAMPLE
Obtain Template from City

Figure 4 – Wastewater Service Interruption Door Hanger



EXAMPLE
Obtain Template from city

Figure 5 – Water Service Interruption Door Hanger



EXAMPLE
Obtain Template from City

Figure 6 – Work Notice Door Hanger

END OF SECTION

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

SUBSTITUTION REQUEST

Project Number _____

Project Title _____

To: _____ Authorization Number: _____
_____ From: _____
Re: _____ 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 DEFINTIONS.
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

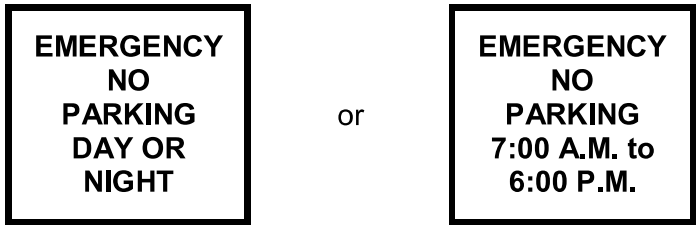
A. The Contractor shall consult with the City (Water Services Department and Public Works Department) to establish public thoroughfares to be used for haul routes and site access.
B. Residential streets shall not be used as part of the proposed haul routes.

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-feet 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 SEWERS

SECTION 2000 GENERAL

APPROVED AND ADOPTED THIS 21st DAY OF October 1981

KANSAS CITY METROPOLITAN CHAPTER
OF THE AMERICAN PUBLIC WORKS ASSOCIATION

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SECTION 2001 PUPROSE

These specifications shall govern the character of materials and procedures for improvements constructed under City or County inspection and jurisdiction.

SECTION 2002 CONSTRUCTION MATERIALS VERIFICATION

Certification of weight, measure and quality of any material used in the construction, covered by these specifications, shall be furnished when requested by the Engineer. The Contractor should be prepared to submit copies of such certifications, indicating that the materials conform to these specifications or the requirements of the plans and special provisions, prior to those materials being incorporated into the project. The Engineer or his authorized representative will at all times have access to all portions of any processing plant being used for material processing for the project. Sampling and testing of processed and unprocessed material shall be under the control and direction of the Engineer and shall be accomplished in accordance with the provisions set forth in these specifications.

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 THEAMERICAN PUBLIC WORKS ASSOCIATION

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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 of 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.

1

   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 stamps 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.

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 ¼ 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.

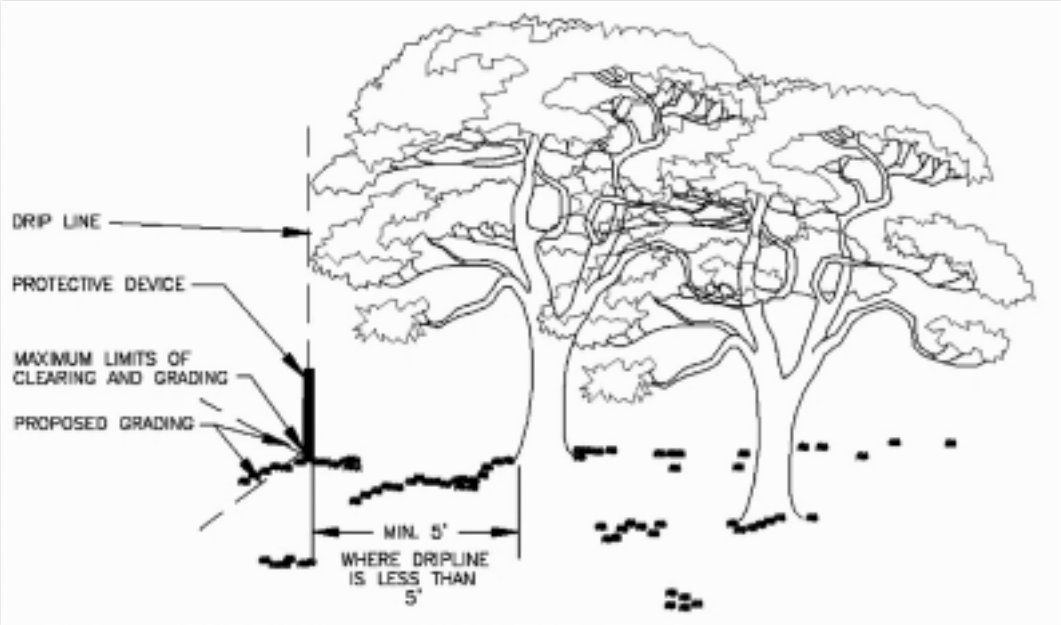
   Groups of trees and individual trees selected to remain will be accurately located on the plan and designated as "tree(s) to remain." Individual specimen that are not part of a tree group will also have their species and diameter noted on the plan.

   At a minimum the limits of clearing must be located outside the drip line of any tree to remain and in no case closer then 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 general 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 ¼-inch or thicker at least 2 feet apart shall run between posts with surveyor's ribbon tired 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" pots 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)

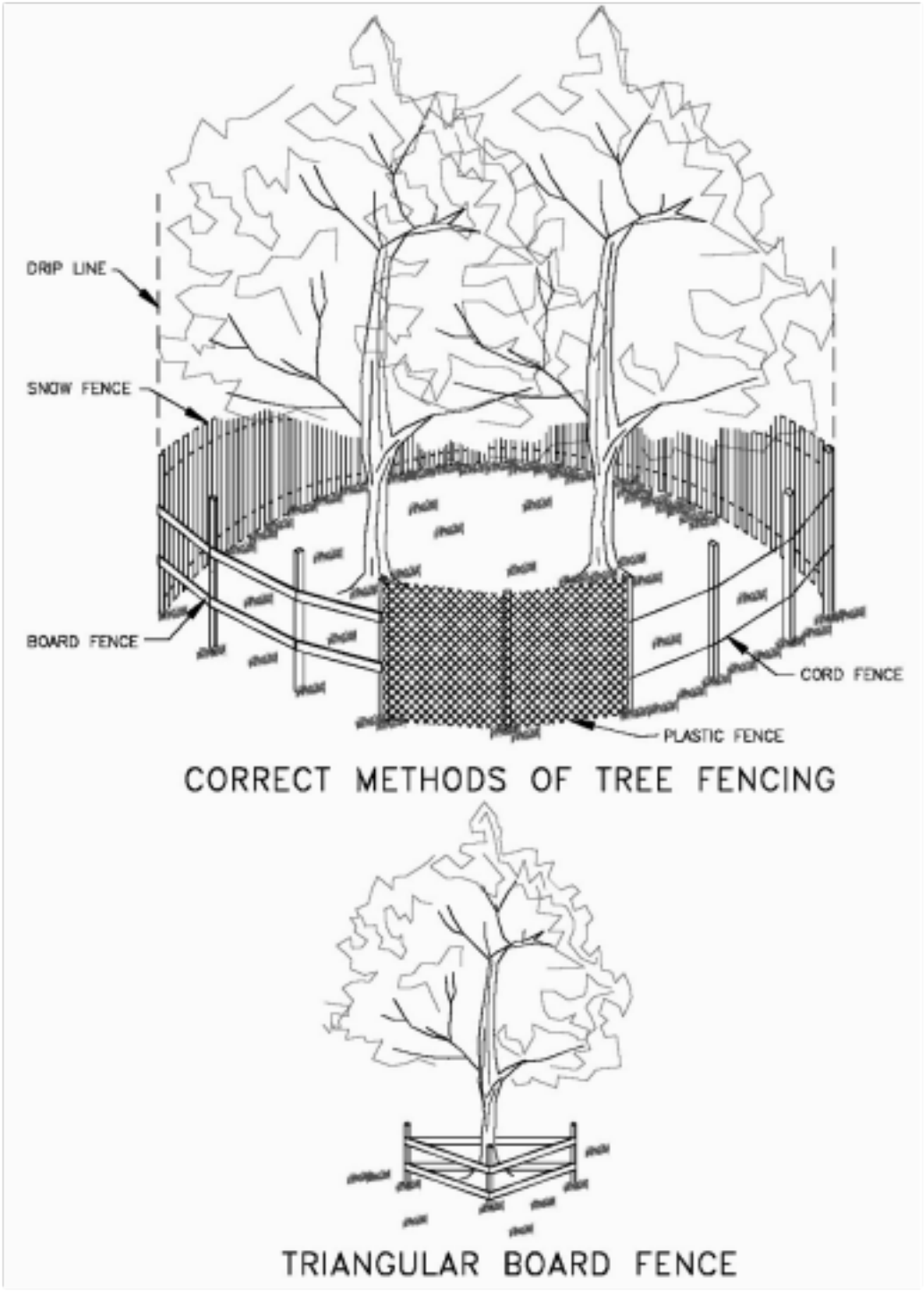
Elongation at break (%): Greater than 1000% (ASTM D638)

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

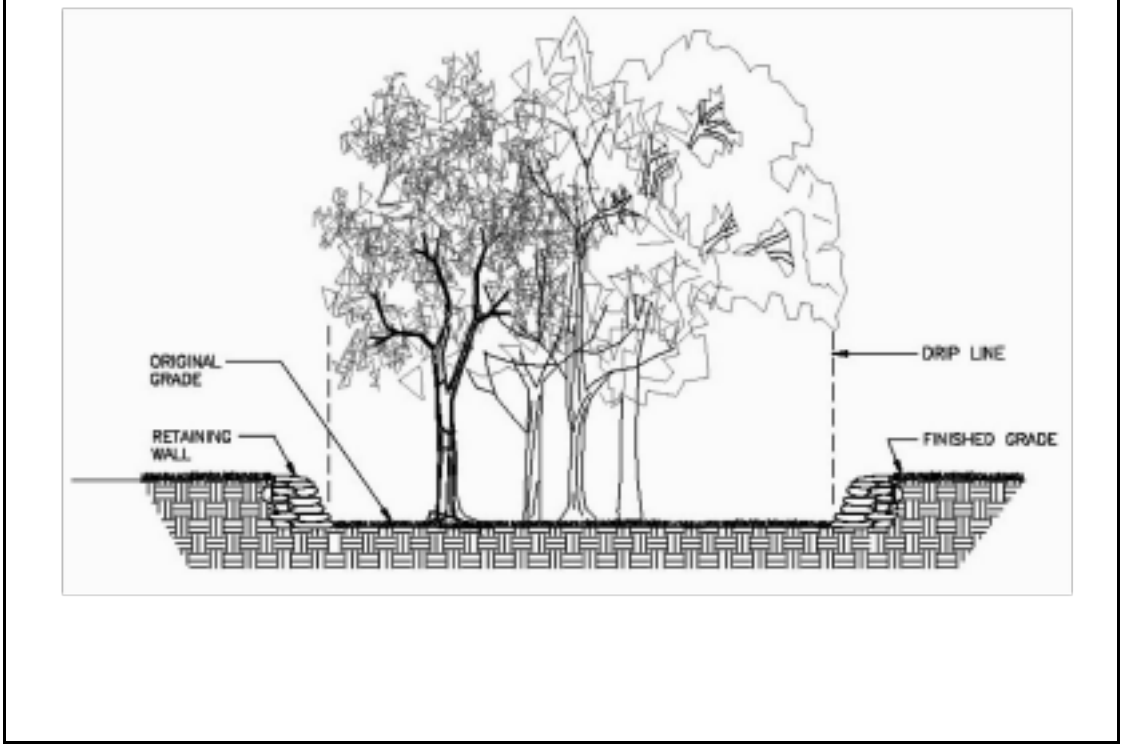


Source: VA. DCR, 1992.

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.

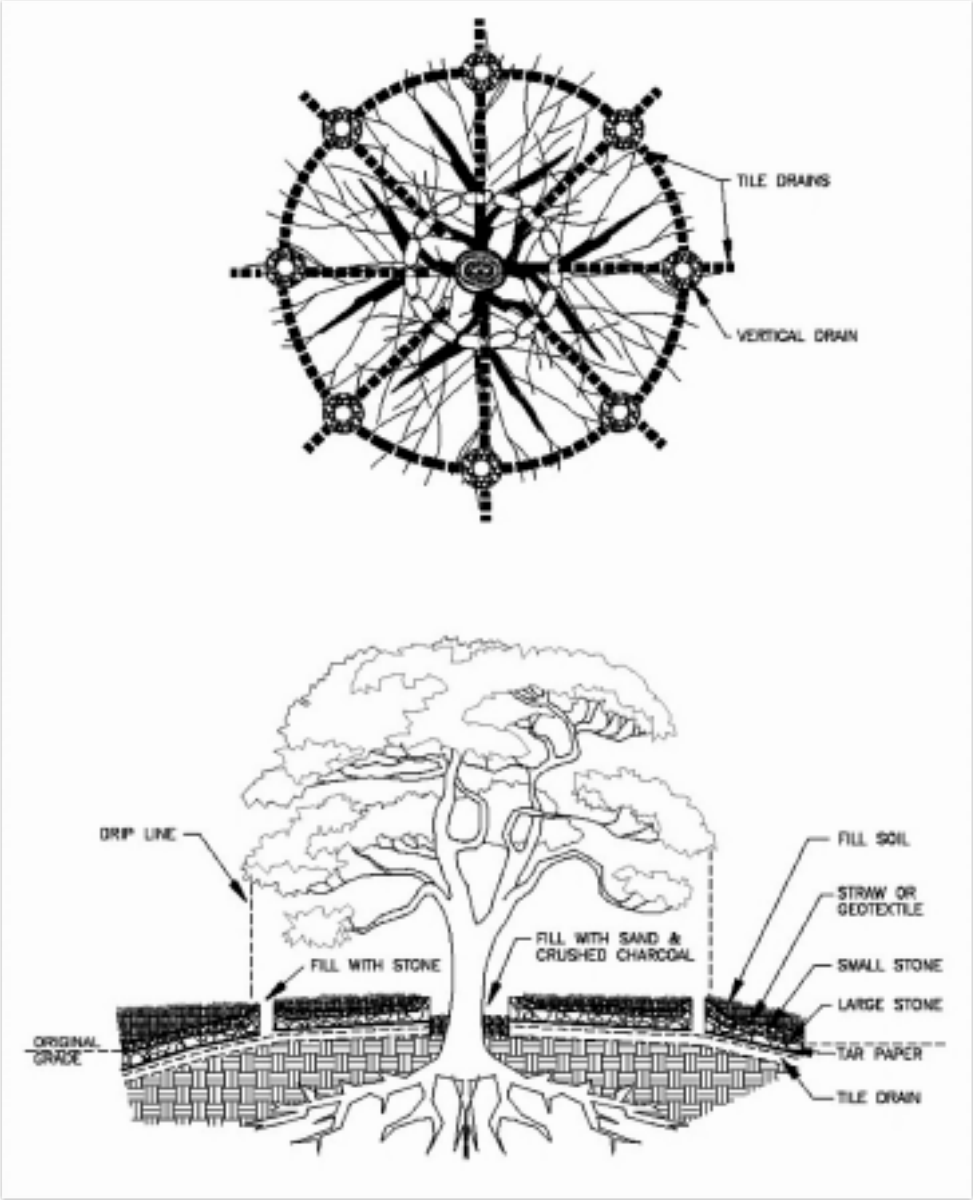
5) The well wall shall be constructed of large stones, brick, building tile, concrete blocks, or cinder blocks with care being taken to ensure that ample openings are left through the wall of the well to allow for free movement of air and water. Mortar shall only be used near the top of the well and 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.

10

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.

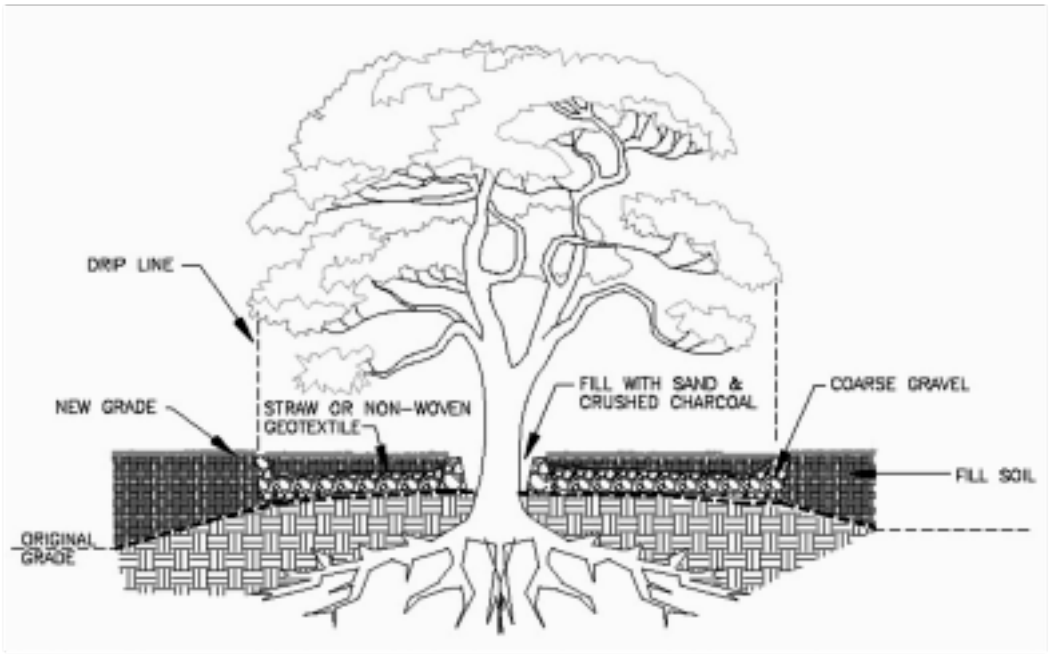
12) To prevent anyone from falling into the dry well and to prevent leaves and debris from accumulating, the dry well shall be covered by an iron grate or filled with a 50-50 mixture of crushed charcoal and sand. This will also prevent rodent infestation and mosquito breeding.

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.

11

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.

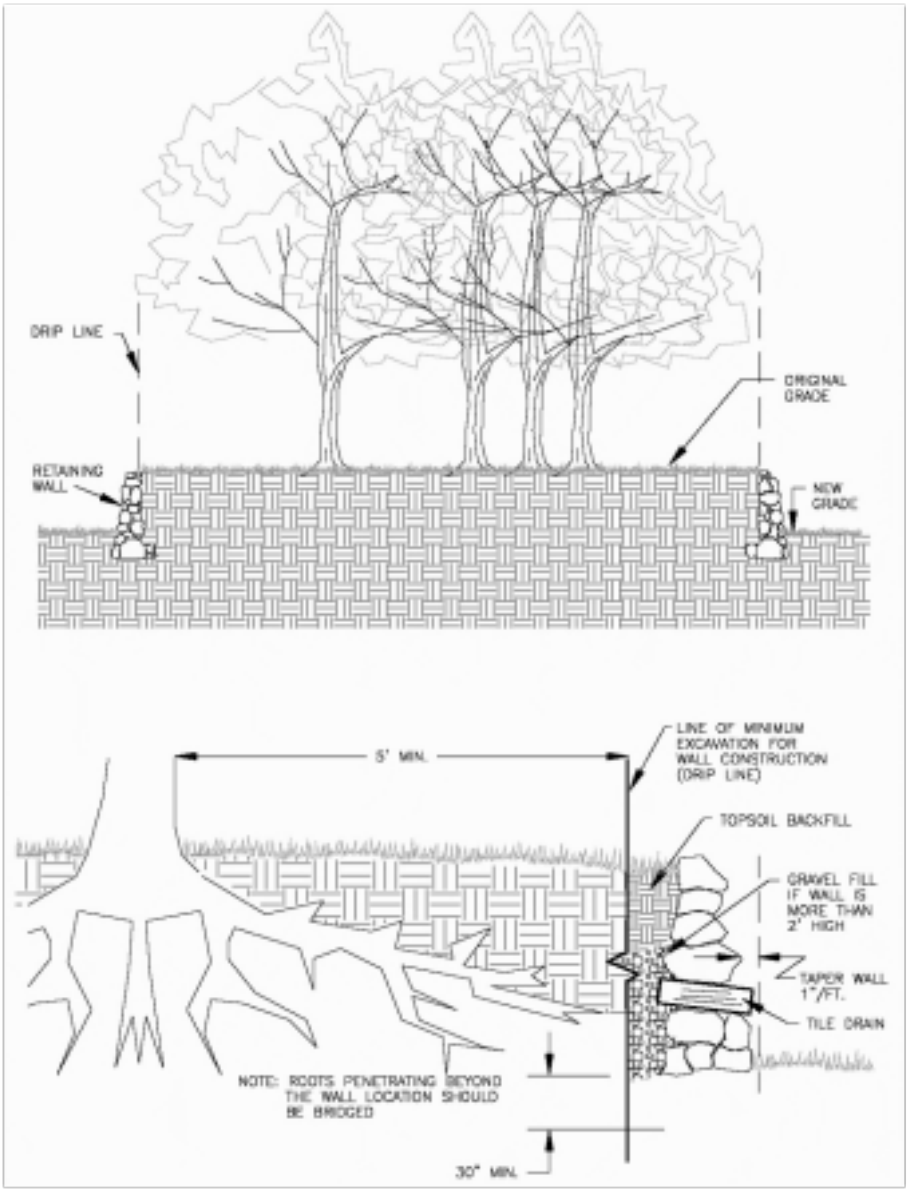
d. Apply fertilizer and water thoroughly. Fertilizer formulations and application rates and methods shall conform to the guidelines in Table 2101-1.

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:**

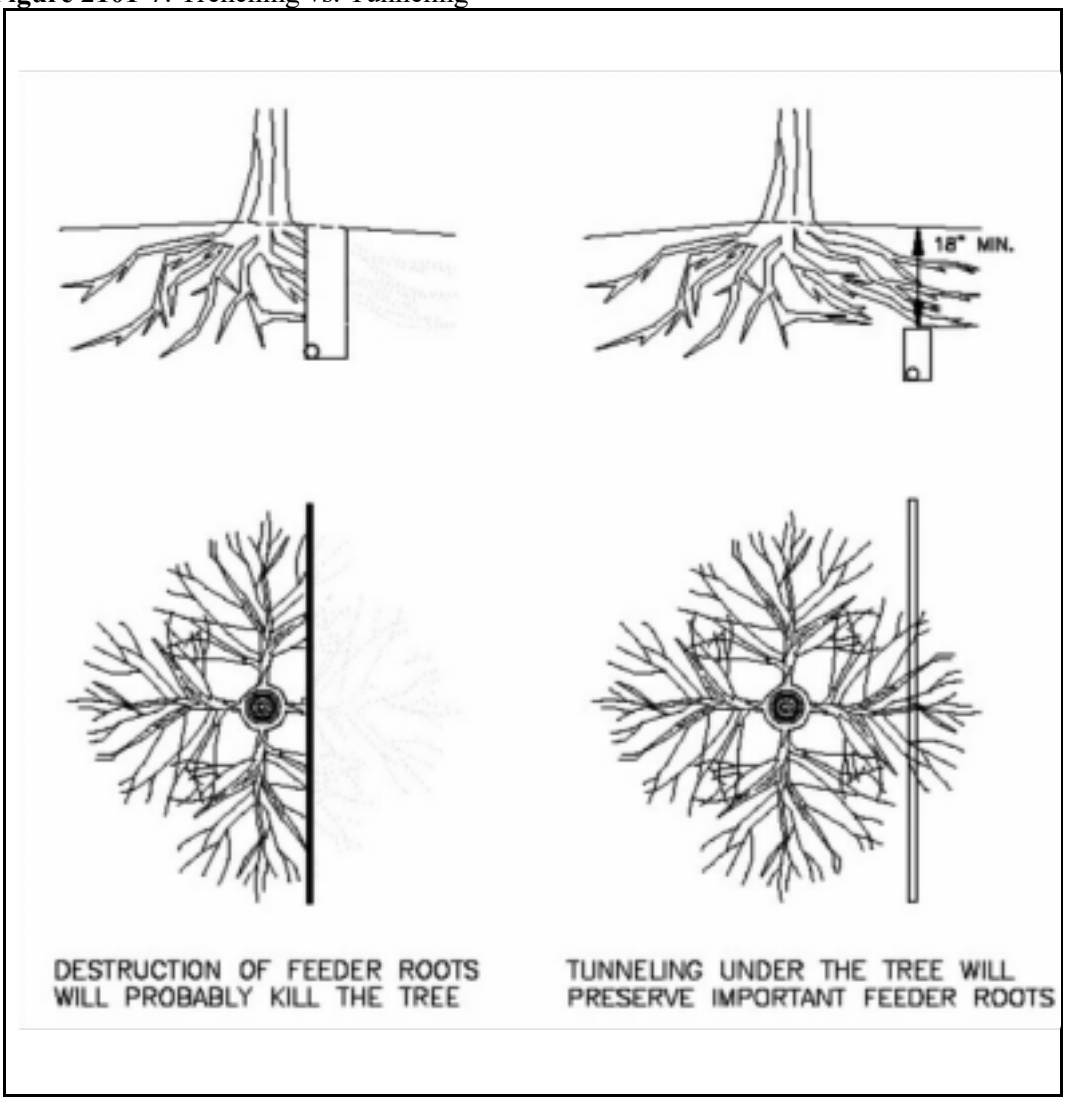
a. Trenching shall be done as far away from the trunks of trees as possible, preferably outside the crown spreads, to reduce the amount

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).

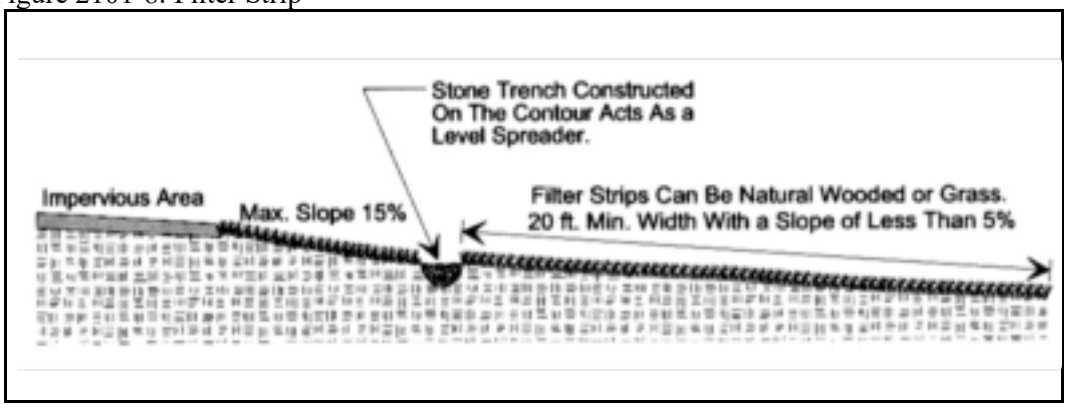
   a. Line the swale with rock, turf reinforcing mat, or other erosion resistance material.

   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 coveted 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

Sieve Size	*3/4"*	*1/2"*	*3/8"*
1"	*100*		
3/4"	*90-100*	*100*	
1/2"		*80-100*	
3/8"	*20-55*	*40-70*	*100*
No. 4	*0-10*	*0-15*	*30-40*
No. 8	*0-5*	*0-5*	*0-4*

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.

1. Backfilling under street and alley pavements where heavy compaction equipment is utilized.

Backfilling shall be placed as shown in ***Figure 1***.

PAVEMENT

D

W C *12”* B

MINIMUM

H

H

A

2

2” IN EARTH (MINIMUM)
6” IN ROCK (MINIMUM)

ALL CULVERT TYPES

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)

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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***.

PAVED AREA

C

12″ MINIMUM,

NO MAXIMUM

ALL CULVERT TYPES

2″ IN EARTH
(MINIMUM) 6″ IN ROCK
(MINIMUM)

H
B

SPRINGLINE
H

2

A

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)

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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.***

SOIL COVER, OR PAVEMENT

D

12″
MAXIMUM

H
H

SPRINGLINE

2

C

A

ALL CULVERT TYPES

B

2” IN EARTH (MINIMUM) 6” IN ROCK (MINIMUM)

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)

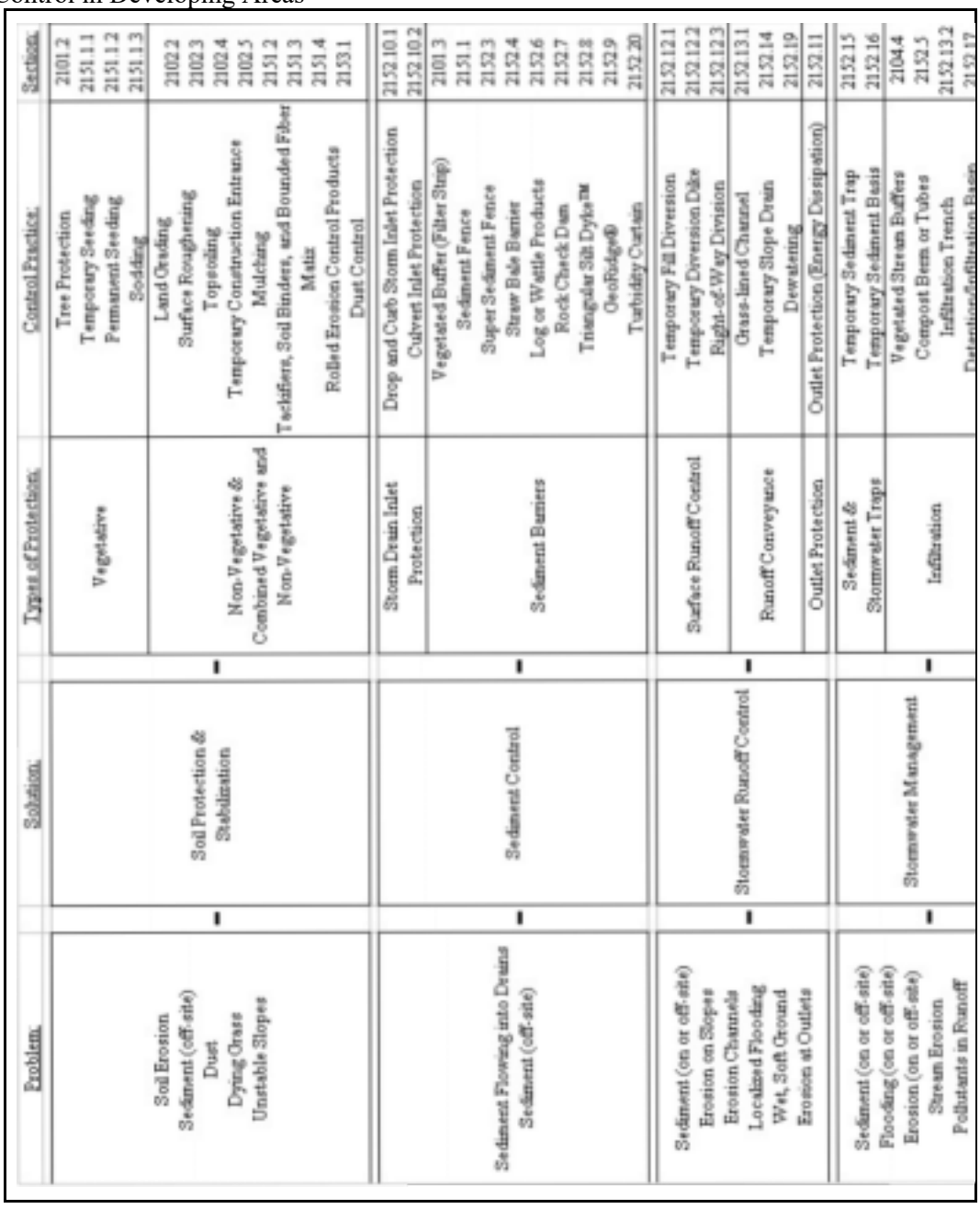
The Storm Water Pollution Prevention Plan will be developed as a requirement of the NPDES permit and local municipal ordinance and permit. Before any construction activities begin on the project, the Contractor and any Subcontractor, who will implement any measures identified in the SWPPP, must verify 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 Dying Grass Unstable Slopes	Soil Protection & Stabilization	Vegetative	Tree Protection	2101.2
			Temporary Seeding	2151.11
			Permanent Seeding	2151.12
			Sodding	2151.13
		Non-Vegetative & Combined Vegetative and Non-Vegetative	Land Grading	2102.2
			Surface Roughening	2102.3
			Topsoiling	2102.4
			Temporary Construction Entrance	2102.5
			Mulching	2151.2
			Tackifiers, Soil Binders, and Bounded Fiber Matrix	2151.3
			Rolled Erosion Control Products	2151.4
			Dust Control	2153.1
Sediment Flowing into Drains Sediment (off-site)	Sediment 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) Erosion on Slopes Erosion Channels Localized Flooding Wet, Soft Ground Erosion at Outlets	Stormwater Runoff Control	Surface Runoff Control	Temporary Fill Diversion	2152.12.1
			Temporary Diversion Dike	2152.12.2
			Right-of-Way Division	2152.12.3
		Runoff Conveyance	Grass-lined Channel	2152.13.1
			Temporary Slope Drain	2152.14
			Dewatering	2152.19
		Outlet Protection	Outlet Protection (Energy Dissipation)	2152.11
Sediment (on or off-site) Flooding (on or off-site) Erosion (on or off-site) Stream Erosion Pollutants in Runoff	Stormwater Management	Sediment & Stormwater Traps	Temporary Sediment Trap	2152.15
			Temporary Sediment Basin	2152.16
		Infiltration	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 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 uop to 2 feet
Cereals: Rye/Wheat	90 / 120	2.0 / 2.5	Cold tolerant, height up to 2 feet, low pH tolerant
Millets, Sundangrass	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** Phuse 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												
Millets, Sudangrass												
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

Table 2152-3: Plant Characteristics

Species			Kansas Adaptation[1]	Missouri Adaptation[2]	Maintenance	Fertility Needs	Establishment Ease
					L – M – H[3]	L – M – H[3]	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[7]	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 Reedgrass	E, C, W	N, S,	L	L	G
		Redtop	S1/2 E	N, S	L	L	M
Warm Season Grasses		Common Bermuda	S1/2 E, C	S	L	L – M	M
		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
Legumes[8]		Birdsfoot trefoil	E, C*, W*	N, S	L	M	P – M
		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
Companion Crops/Cereal Grains		Wheat				M	M
		Rye (cereal)				M	M
		Oats				M	M

Source: MDNR, 1998.

*Adaptation limited to areas in western Kansas which receive additional moisture enhancement by irrigation, subirrigation or overland flow.

[1]E=East, C=Central, W=West

[2]N=North, S=South (Separation is the Missouri River)

[3] L=low, M=moderate, H=high

[4] P=poor, M=moderate, G=good in a mixture.

[5] Will be high maintenance in lawn-type or low rainfall (<30") settings.

[6] Usually seeded, but can be sprigged.

[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
	Bromegrass	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
Warm Season Grasses	Common Bermuda	L	H	H	H	M
	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
Legumes'	Birdsfoot Trefoil	L	H	L	M	G
	Annual Lespedeza®	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

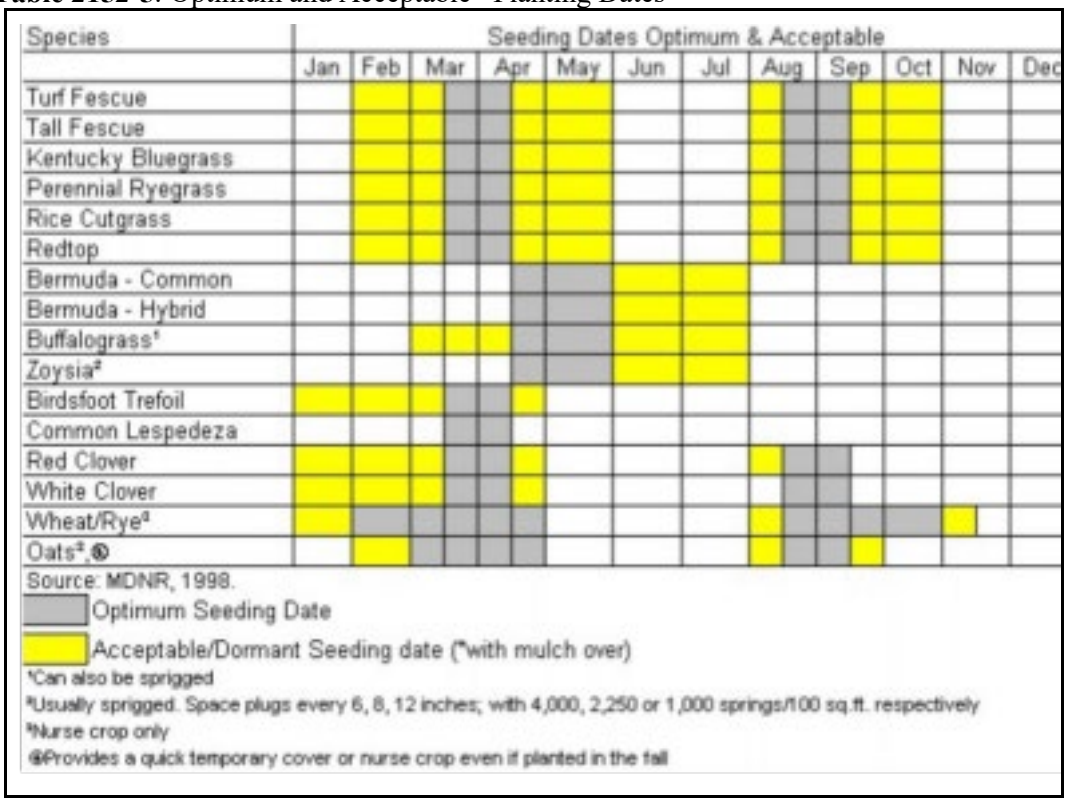
Source: MDNR, 1998.
Key: P = poor, L = low, M = moderate, G = good, H = high
'Legumes alone will not provide adequate erosion protection: use with grass in a mixture

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[3,6]												

Source: MDNR, 1998.

Optimum Seeding Date

Acceptable/Dormant Seeding date (*with mulch over)

[1]Can also be sprigged

[2]Usually sprigged. Space plugs every 6, 8, 12 inches; with 4,000, 2,250 or 1,000 springs/100 sq.ft. respectively

[3]Nurse crop only

[6]Provides 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] lbs/acre (PLS)[2]	Missouri: Full Seeding Rate[2] lbs/acre (PLS)[2]
Cool Season Grasses	Perenial 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[3]	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	1½ bu/acre	1½ bu/acre

Source: MDNR, 1998.

[1]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.

[2]PLS or Pure Live Seed = the amount of seed guaranteed to grow.

[3]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 ft²***	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 ft_2 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 seedings 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**

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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.

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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.

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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 (UTIITY 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 derivates 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.

DIVISION II
CONSTRUCTION AND MATERIAL
SPECIFICATIONS SECTION 2200 PAVING

Approved and Adopted this 23rd day of May, 2001
Amended December 20, 2018 by Ordinance 180970
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KANSAS CITY METROPOLITAN CHAPTER
OF THE AMERICAN PUBLIC WORKS ASSOCIATION

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SECTION 2201 SUBGRADE PREPARATION

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

ASTM
D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))

2201.1 Summary: This section includes subgrade preparation at locations which have been previously graded in accordance with the requirements of Section 2100 entitled "Grading and Site Preparation". All materials and placement shall be tested as outlined in the “Public Works Department Materials Testing Requirements”.

2201.2 Definitions:

A. **Subgrade:** Subgrade is defined as a well graded and compacted layer on which base and subsequent courses are placed.

B. **Subgrade Preparation:** Subgrade preparation is the repeated operation of fine grading and compacting the subgrade until the specified lines, grades, and cross section, as indicated on the plans are obtained and the materials are compacted to the specified depth and density.

2201.3 Construction:

A. **General:** The subgrade surface shall be brought to the specified lines, grades and cross-section by adding or removing material and compacting to the specified density. Tolerance allowed on all lines, grades and cross-sections shall be no more than 1/4 inch (6 mm).

B. Compacting the Subgrade: The top 6 inches (15.24 cm) of subgrade for pavements shall be compacted to 95% of the standard proctor maximum density for the material used as determined by ASTM D 698 and within a tolerance of plus 2% and minus 3% of the optimum moisture content.

C. **Protection and Maintenance of Subgrade**: The subgrade shall be protected from action of the elements or others. Any action (e.g. settlement or erosion) that damages the subgrade ***or any subgrade that has become unacceptable*** prior to placing the pavement thereon shall be repaired and the specific lines, grades, cross-section, tolerance, density, and moisture content range reestablished.

D. **Cleanup:** Subgrade cleanup shall follow the work progressively. The Contractor shall remove from the project site all rubbish, surplus or discarded material, unsuitable material, and any equipment, tools and temporary construction items used for the preparation of the subgrade.

2201.3 2201.5

E. **Roll Testing:** Once the subgrade has been brought to the final plan elevation, but prior to approval of the subgrade for paving, all lanes shall be roll tested in their entire length. The subgrade will not be acceptable if rutting, pumping, or deformation of the subgrade results from the roll test. This testing will be done by the contractor, and will be in addition to the applicable moisture and density testing.

Equipment for roll testing shall be a tandem dump truck (one front and two rear axles) ***carrying a twenty ton load.***

The truck shall proceed slowly along each traffic lane, allowing the Engineer to walk alongside and observe the results. Areas failing the roll test will be reworked and retested prior to approval of the subgrade for paving.

2201.4 Methods of Measurement: Subgrade Preparation will generally not be listed in the Proposal as a separate item.

2201.5 Basis of Payment: Subgrade Preparation will generally be included in payment for other items listed in this proposal.

2202.2 2202.4

SECTION 2202 UNTREATED COMPACTED AGGREGATE

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

ASTM
C 88 - Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
C 131 - Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C 136 - Test Method for Sieve Analysis of Fine and Course Aggregates C 142 - Test Method for Clay Lumps and Friable Particles in Aggregates D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

AASHTO
T 99 - The Moisture-Density Relations of Soils Using a 5.5-lb. (2.5 kg) Rammer and a 12-in. (305 mm) Drop

2202.1 Summary: This section includes the construction of aggregate base course as outlined in the contract special provisions and on the plans. All materials and placement shall be tested as outlined in the "Public Works Department Materials Testing Requirements".

2202.2 Material: The base course material shall consist of crushed stone aggregate with not more than 1.0% clay lumps and friable particles in accordance with ASTM C 142, and free from vegetable or other deleterious substances. The abrasion loss shall be no more than 35% when tested in accordance with ASTM C 131. That fraction passing the 1 inch (25.0 mm) sieve and retained on the No. 4 (4.75 mm) sieve shall have a loss not greater than 15% by weighted average at 5 cycles of ASTM C 88 (Magnesium Sulfate) Soundness Test. That fraction of the material passing the 1-inch (25.0 mm) Sieve and retained on the No. 4 (4.75 mm) Sieve shall contain less than 20% by weight of flat and elongated particles (flat being a ratio of 1 to 3 between thickness and least width and a ratio of 1 to 3 between the least width and length). The material shall consist of angular particles with no less than 90% of particle count having two or more fractured surfaces. The gradation in percentages by weight passing square mesh sieves shall be in accordance with ASTM C 136 and as follows:

U. S. Standard Square Mesh Sieve	Percent Passing
1-1/4" (31.5 mm)	100
1" (25.0 mm)	72-100
3/4" (19.0 mm)	60-90
3/8" (9.5 mm)	43-74
No. 4 (4.75 mm)	28-60
No. 10 (2.00 mm)	16-40
No. 40 (425 um)	3-22
No. 200 (75 um)	0-15

In addition to the above limits, the difference between the "Percent Passing Square Mesh Sieve" of successive sieve sizes shall not exceed 25 percent.That fraction of the material

passing the No. 40 (425 um) sieve shall have a plasticity index not to exceed 8 when tested in accordance with ASTM D 4318.

2202.3 Placement:

A. **Subgrade:** Prior to placement of base course material the previously prepared subgrade surface shall be cleared of all foreign substances and restored in shape, tolerance and density as specified in Section 2201 entitled "Subgrade Preparation".

B. **Material Placement:** The material shall be uniformly spread in successive layers to such depth that when compacted, the base will have the minimum thickness specified. The contractor may construct the base in any number of layers that he chooses except that in no case shall any individual layer have a compacted thickness of more than 4 inches (10.16 cm). Each layer shall be compacted as hereinafter specified before any succeeding layer is placed.

After spreading a layer of material, water in an amount sufficient to insure the desired compaction shall be added and uniformly mixed with the aggregate in a manner to prevent segregation. Excess moisture resulting in runoff shall be avoided. If for any reason, the material and subgrade become too wet to permit satisfactory work, they shall be allowed to dry to a moisture content that will permit satisfactory work.

C. The material shall meet the required specifications immediately before compaction operations are commenced. If, for any reason, segregation occurs in excess of 10% variation from the gradation required under the above paragraph "Material" or the materials become contaminated, such segregated or contaminated materials shall be removed and replaced with suitable materials at the expense of the Contractor. The limited segregation of 10% variation will be ascertained by a sieve analysis of a minimum 100 pound (45.36 Kg) sample taken from the in-place base course. However, when crushed stone is used, segregated surface areas may be corrected by adding limestone screenings of such gradation and quantity as required to fill the surface voids and firmly bind the loose material in place. Screenings so used in correcting segregated surface areas will be paid for as a part of the aggregate base material.

D. Shaping and compacting shall be carried on continuously until a true, even and uniform surface of proper grade and cross-section is obtained, and until the density of the complete base is at least 95% of maximum density as determined by AASHTO T 99. The proper moisture content shall be maintained by wetting the surface as required during shaping and compacting operations. Final rolling shall be accomplished by use of a self-propelled smooth-wheeled roller.

2202.4 Methods of Measurement: Untreated Compacted Aggregate Base will be measured by one of the following:

A. Per square yard (square meter) or tenth part thereof for the specified depth.

B. Per ton (metric ton) or tenth part thereof.

2202.5 Basis of Payment: Untreated Compacted Aggregate Base will be paid for by one of the following:

A. Contract unit bid price.

B. Contract lump sum bid price.

SECTION 2203 DRAINABLE BASE COURSE

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

ASTM
C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field C 33 - Standard Specification for Concrete Aggregates
C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
C 88 - Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
C 117 - Test Method for Materials Finer than 75- um (No. 200) Sieve in Mineral Aggregates by Washing
C 131 - Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C 136 - Test Method for Sieve Analysis of Fine and Coarse Aggregates
C 150 - Standard Specification for Portland Cement
D 75 - Practice for Sampling Aggregates
D 695 - Test Method for Compressive Properties of Rigid Plastics D 946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
D 1621 - Test Method for Compressive Properties of Rigid Cellular Plastics D 2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate D 3034 - Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
D 3381 - Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
D 3666 - Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials
D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
D 4716 - Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
D 4791 - Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
D 5821 - Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
F 758 - Standard Specification for Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage

AASHTO
M 252 Corrugated Polyethylene Drainage Tubing

T 102 Spot Test of Asphaltic Materials

2203.1 Summary: This section includes the requirements for drainable base courses.

2203.2 Materials: All drainable base materials shall have a minimum coefficient of permeability of 1000 ft/day (305 m/day) as determined by the test method described in 2203.7.

2203.3 Crushed Aggregate Base Course

A. **Materials:**

1. Aggregates shall consist of clean, sound, durable particles of crushed stone or crushed gravel and shall be free from coatings of clay, silt, vegetable matter, and other objectionable materials and shall contain no clay balls.

2. Fine aggregate (passing the No. 4 (4.75 mm) sieve) shall consist of fines from the operation of crushing the coarse aggregate. If necessary, additional fine aggregate may be added to produce the correct gradation. All fine aggregate shall be produced by crushing stone or gravel that meets the requirements for wear and soundness specified for the coarse aggregate.

3. The crushed aggregate portion which is retained on the No. 4 (4.75 mm) sieve shall contain not more than 15%, by weight, of flat and elongated pieces as defined in ASTM D 4791 (ratio = 5:1) and shall have at least 90% by weight of particles with at least two fractured faces and 100% with at least one fractured face. The area of each face shall be equal to at least 75% of the smallest midsectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

4. The percentage of wear shall not be greater than 35% when tested in accordance with ASTM C 131.

5. The magnesium sulfate soundness loss shall not exceed 15%, after 5 cycles, when tested in accordance with ASTM C 88.

6. The fraction passing the No. 40 (0.42 mm) sieve shall have a liquid limit no greater than 25 and a plasticity index of not more than 8 when tested in accordance with ASTM D 4318. The fine aggregate shall have a minimum sand equivalent value of 35 when tested in accordance with ASTM D 2419.

B. **Sampling and Testing**: Aggregates for preliminary testing shall be furnished by the Contractor prior to the start of production. All tests for initial aggregate submittal necessary to determine compliance with the specification requirements shall be made by the Contractor at no expense to the Engineer.

1. Samples of aggregates shall be furnished by the Contractor at his expense at the start of production and at intervals during production. The sampling points and intervals will be designated by the Engineer. The samples will be the basis of

approval of aggregates from the standpoint of the quality requirements of this Section.

2. Sampling may be observed by and shall be subject to the approval of the Engineer. Samples shall be large enough to provide ample material to the satisfaction of the Engineer. No aggregate shall be incorporated in the Work without prior approval by the Engineer.

3. In lieu of testing, the Engineer may accept certified test results performed by an approved independent testing laboratory indicating that the aggregate meets specification requirements. Certified test results shall be less than 6 months old.

4. Samples of the aggregate to check gradation may be taken by the Engineer at least once daily. Sampling shall be in accordance with ASTM D 75, and testing shall be in accordance with ASTM C 136 and C 117.

C. **Gradation Requirements:** The gradation (job mix) of the final mixture shall fall within the design range indicated in Table 1, when tested in accordance with ASTM C 117 and C 136.

TABLE 1. REQUIREMENTS FOR GRADATION OF AGGREGATE		
Sieve Size	Design Range Percentage by Weight Passing Sieves	Job Mix Tolerances Percent
2 in (50 mm)	100	+/- 5
1½ in (37.5 mm)	100	+/- 8
1 in (25.4 mm)	70 – 100	+/- 8
¾ in (19 mm)	55 – 100	+/- 8
½ in (12.5 mm)	40 – 80	+/- 8
3/8 in (9.5 mm)	30 – 70	+/- 8
No. 4 (4.75 mm)	10 – 45	+/- 8
No. 8 (2.36 mm)	0 – 25	+/- 5
No. 16 (1.18 mm)	0 – 5	+/- 3

The job mix tolerances in Table 1 shall be applied to the job mix gradation to establish a job control grading band. The resulting job control grading band must comply with the Design Range criteria.

2203.4 Portland Cement Concrete Drainable Base

A. **Summary:** This item shall consist of an open-graded drainable base composed of mineral aggregate, Portland cement and water mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thicknesses and typical cross sections shown on the plans.

B. **Materials:**

1. Coarse Aggregate:

a. **General:** Coarse aggregate shall be ¾ inch (19 mm) maximum size consisting of crushed gravel or crushed stone and shall meet the requirements of ASTM C 33 and quality requirements of 2203.3a.

b. Gradation shall be ASTM C 33, Size 67.

2. **Fine Aggregate:** Fine aggregate shall consist of natural sand or manufactured sand meeting the requirement of ASTM C 33.

3. **Cement:** Portland cement shall conform to the requirements of ASTM C 150, Type I or Type II. Substitution of fly ash or other pozzolan for Portland cement shall be in conformance with Section 2208.

4. **Water:** Water used in mixing or curing shall be clean and free of oil, salt, acid, alkali, sugar, vegetable or other substances injurious to the finished product as possible. Water known to be of potable quality may be used without testing.

5. **Admixtures:** The use of any material to be added to the mixture shall be approved by the Engineer.

C. The Contractor shall furnish vendor's certified test reports for the materials used in the project. The report shall be delivered to the Engineer as part of the mix design before permission to use the cement is granted.

D. **Proportions:** The Contractor shall submit a mix design containing the quantity of each material to the Engineer including certifications of materials used. The Contractor will be responsible for preparing the drainable base mix design at no cost to the Owner. The testing laboratory preparing the mix design shall comply with Section 2203.5F. The mix design shall include the following:

Cement Content.

Water-Cement Ratio. Approximately 0.36.

Coarse Aggregate.

Fine Aggregate.

All Admixtures.

Coefficient of Permeability. Tested per Section 2203.7.

Compressive Strength. Proportions will be such to produce a compressive strength of 800 psi (5.52 Mpa) in 28 days as determined by test cylinders made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. A strength of 500 psi (3.45 MPa) will be required prior to any traffic being allowed on the surface.

E. **Spreading:** The base material shall be spread to the lines and grades shown on the Plans. Any material which becomes mixed with soil or other contaminants shall be removed and replaced with fresh mixture.

F. **Compaction:** After spreading and/or trimming, the base material shall be uniformly compacted by making a minimum of 2 coverages with a steel wheeled roller meeting the requirements of Section 2205.7 B 1. The compaction process may be adjusted on the project by the Contractor with approval of the Engineer to assure uniform compaction of the drainable base material. In areas not accessible by the roller, the base material shall be compacted by mechanical hand methods. Compaction must be completed within 2 hours of the time water is introduced to the mixture.

If after spreading and compacting the base is not to the required lines and grade, the Contractor shall trim the base by means of an electronically controlled machine utilizing string line controls for grade. The Engineer reserves the right to direct the Contractor to suspend all operations if the Contractor produces excessive fines in the trimming process which are viewed by the Engineer to be detrimental to the permeability of the base. Appropriate corrections to the trimming process shall be made by the Contractor prior to beginning again.

After compaction of the drainable base, the Contractor shall protect the surface from damage and/or contamination. If the integrity of the drainable base is disturbed at any time prior to placement of the succeeding pavement course the area shall be removed and replaced with new material and compacted to conform to the original lines and grades at the Contractor's expense. Any removed material shall not be reincorporated into the drainable base or other drainage features.

G. **Curing of the Drainable Base Material:** The Contractor will be required to provide a curing plan to the Engineer.

H. **Temperature Limitations:** The air temperature must be between 50°F (10°C) and 90°F (32°C) for drainable base construction. The engineer may order operations to cease in hot windy conditions if it appears the mixture is drying out prior to achieving initial set.

I. **Construction Joints:** The formation of all joints shall be made in such a manner as to ensure a continuous bond between old and new sections of the course. All joints shall present the same texture and smoothness as other sections of the course. All contact surfaces of previously constructed courses shall be cleaned of all dirt or other objectionable materials, and thoroughly moistened with water prior to placing the new material.

2203.5 Plant Mix Bituminous Drainable Base Course

A. **Summary:** This item shall consist of an asphalt stabilized drainable base course composed of mineral aggregate and bituminous material mixed in a central mixing plant and placed on a prepared course in accordance with the specifications and shall conform to the lines, grades, thicknesses, and typical cross sections shown on the plans. Each course shall be constructed to the depth, typical section, or elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course. A prime coat will be used on the subbase prior to placement of the first course, and no tack coat will be used between courses.

2203.5 2203.5

B. **Materials:**

1. **Aggregate:** Aggregate shall consist of crushed stone or crushed gravel and be free of organic materials.

   a. **Coarse Aggregate:** Coarse aggregate shall comply with Section 2303.3a except wear may not exceed 50 % in accordance with ASTM C 131 and the magnesium sulfate soundness loss shall not exceed 15%, after five cycles, when tested in accordance with ASTM C 88.

   b. Aggregate shall contain at least 70% by weight of individual pieces having two fractured faces and 85% by weight having at least one fractured face as determined by ASTM D 5821

   c. The aggregate shall not contain more than 8%, by weight, of flat and elongated pieces, when tested in accordance with ASTM D 4791 (ratio =5:1).

   d. **Sampling:** ASTM D 75 shall be used in sampling the coarse aggregate.

2. **Bituminous Material:** The asphalt cement shall be in conformance with Section 2205.2A. The type and grade of asphalt used shall be specified in the mix design but shall not be lower than a PG 64-22.

C. **Preliminary Material Acceptance:** Prior to delivery of materials to the job site, the Contractor shall submit certified test reports to the Engineer for the following materials:

Coarse Aggregate
Percent of wear.
Soundness.
Bituminous Material

The certification(s) shall show the appropriate ASTM test(s) for each material, the test results, and a statement that the material meets the specification requirement.

D. **Job Mix Formula. (JMF):** No bituminous mixture for payment shall be produced until the Engineer has approved a JMF in writing. The method of determining the proper asphalt content is to store the mix trial batches in the laboratory overnight (15- 18 hrs) at 140°F (60°C). The proper asphalt content will then be selected visually. The asphalt content mix is selected from the batch from which a small amount of asphalt drains to the bottom of the pan and the mix still appears glossy. A heat resistant, clear glass dish may be used for better visibility of the drained asphalt. The asphalt content may be varied as necessary during construction to meet this requirement.

The aggregate shall be of such size that the percentage composition by weight will conform to the gradation of gradations specified in Table 2, when tested in accordance with ASTM Standards C 117 and C 136. The gradation shall be on the coarse side of the Master Band.

TABLE 2. PLANT MIX BITUMINOUS DRAINAGE BASE MASTER GRADATION	
Sieve Designation (Square Opening)	Percentage by Weight Passing Sieve
1½" (37.5 mm)	100
1" (25.4 mm)	90 – 100
¾" (19 mm)	75 – 100
½" (12.5 mm)	70 – 90
3/8" (9.5 mm)	50 – 70
No. 4 (4.75 mm)	20 – 40
No. 8 (2.36 mm)	15 – 25
No. 30 (637 um)	5 – 15
No. 200 (75 um)	0 – 3

Recommended Asphalt Cement Content 2.0 – 3.5%

The gradations in Table 2 represent the limits that shall determine the suitability of aggregate for use from the supply source.

The job mix tolerance shown in Table 3 shall be applied to the JMF to establish a job control-grading band. The resulting job control grading band must comply with the Master Gradation criteria.

TABLE 3. JOB MIX FORMULA TOLERANCES (Based on a Single Test)	
Material	**Tolerance Plus or Minus**
Aggregate passing No. 4 (4.75 mm) sieve or larger	5%
Bitumen*	0.40%
Temperature*	20 degrees F. (-7 degrees C.)

*Unless otherwise approved by the Engineer.

The aggregate gradation may be adjusted within the limits of Table 2 as directed, without adjustments in the contract unit prices.

Should a change in sources of materials be made, a new JMF shall be established before the new material is used.

Dry aggregate gradations will be made at least twice daily. The aggregate gradation shall be tested by the Contractor in accordance with ASTM C 117 and C 136.

The JMF shall be submitted in writing by the Contractor and approved by the Engineer prior to the start of paving operations. The job mix shall have been prepared no more than 12 months prior to submittal and shall include as a minimum:

Percent passing each sieve.
Percent of asphalt cement.
Asphalt designation and certifications
Mixing temperature.
Compaction temperature.
Temperature of mix when discharged from the mixer.

Percent fractured faces.
Percent elongated particles.

The Contractor shall submit samples to the Engineer, upon request, for job mix formula verification testing.

E. **Test Section:** Prior to full production, the Contractor shall prepare and place a section of drainable base according to the JMF. The amount of mixture should be 80 tons (72.6 metric tons) and may be placed as part of the project. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section.

Two random samples of mixture may be taken at the plant and tested for aggregate gradation and asphalt content. The test section shall be considered acceptable if the gradation and asphalt content are within the limits specified in Tables 2 and 3.

If the initial test section should prove to be unsatisfactory to the Engineer, the necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. If the second test section also does not meet specification requirements, both sections shall be removed at the Contractor's expense. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Any additional sections that do not conform to specification requirements shall be removed at the Contractor's expense. Full production shall not begin until a satisfactory section has been constructed and accepted by the Engineer. The test sections that meet the specification requirements shall be paid for in accordance with project quantities.

The Contractor shall perform Job mix control testing at the start of plant production and in conjunction with the calibration of the plant for the JMF. It should be recognized that the aggregates produced by the plant may not satisfy the gradation requirements or produce a mix that exactly meets the JMF. In those instances, it will be necessary to reevaluate and redesign the mix using plant-produced aggregates. Specimens should be prepared and the optimum bitumen content determined in the

same manner as for the original design tests.

F. **Testing Laboratory:** The laboratory used to develop the JMF formula shall meet the requirements of ASTM D 3666.

G. **Construction Methods**:

1. **Weather Limitations:** The bituminous mixture shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than 40 degrees F (4.4 degrees C) or the wind chill factor is less than 35 degrees F (1.7 degrees C). The temperature requirements may be waived by the Engineer; however, all other requirements including compaction shall be met.

2. These materials will be placed, handled, hauled and accepted based on requirements of Section 2205.

2203.6 Underdrains:

A. **Summary:** Underdrain construction shall consist of furnishing of all labor, equipment and materials necessary for the complete installation of underdrains, including pipe, geotextiles and granular filter material in accordance with these specifications, standard drawings, the contract special provisions, and as shown on the Plans or established by the Engineer.

B. **Materials:**

1. **Aggregate:** Blanket Underdrain Aggregate and Pipe Underdrain Aggregate shall conform to requirements of Section 2203.3.a with the following gradations:

TABLE 2. BLANKET UNDERDRAIN AGGREGATE	
Sieve Size	Percent Passing by Weight
1½" (38.1 mm)	100
1" (25.4 mm)	90 – 100
¾" (19 mm)	60 – 90
3/8" (9.5 mm)	-
No. 4 (4.75 mm)	0 – 20
No. 8 (2.4 mm)	-
No. 16 (1.2 mm)	0 – 10
No.30 (0.6 mm)	-
No. 50 (0.3 mm)	0 – 7

No. 100 (150 um)	0 – 2

TABLE 2. PIPE UNDERDRAIN AGGREGATE	
Sieve Size	Percent Passing by Weight
1½" (38.1 mm)	-
1" (25.4 mm)	-
¾" (19 mm)	100
3/8" (9.5 mm)	85 – 100
No. 4 (4.75 mm)	-
No. 8 (2.4 mm)	40 – 60
No. 16 (1.2 mm)	-
No.30 (0.6 mm)	5 - 30
No. 50 (0.3 mm)	-
No. 100 (150 um)	0 – 2

2. **Underdrain Pipe:**

a. Polyvinyl chloride pipe shall meet the requirements of ASTM F758/D3034.

b. Corrugated Polyethylene Tubing. may be used only outside of traffic areas and driving surfaces. The tubing shall be the heavy duty type and shall meet the requirements of AASHTO M 252. In addition, the tubing shall have a minimum pipe stiffness of 30 psi (210 kPa) at 10% deflection.

c. All underdrain pipes shall have a nominal minimum inside diameter of six inches (150 mm) unless shown otherwise on the Plans.

d. Perforations shall be approximately circular and cleanly cut; shall have nominal diameters not less than 3/16-inch (5 mm) nor more than 3/8-inch (10 mm); and shall be arranged in at least two rows parallel to the axis of the pipe.

e. Fittings shall be of the same composition and have the same physical properties as the pipe and shall not restrict flow.

3. **Geocomposite Edge Drain:**

a. Edge drain shall consist of a plastic core completely surrounded by geotextile. The core shall provide a minimum of 10 percent open area to facilitate water entry or cross flow and shall be composed of plastic which is physically and chemically stable under a normal range of conditions.

b. The edge drain shall have nominal dimensions of 1 to 1-1/2 inches (25 to 40 mm) in thickness and 12 inches (305 mm) in height.

c. The edge drain shall have a minimum flow capacity of 15 gallons per minute per foot of width (1.9 liters/cm) as determined by ASTM D4716 when tested under a confining stress of 10 psi (70 kPa) or more at a gradient of 0.1 or less.

d. The edge drain shall have a minimum compressive strength of either 7,000 psf (335 kPa) at a maximum deformation of 10 percent of the original thickness when tested in accordance with ASTM D1621, or 8,000 psf (385 kPa) at a maximum deformation of 20 percent when tested in accordance with ASTM D695.

e. Geotextile shall have an apparent opening size (AOS) corresponding to a U.S. sieve number greater than 50 (0.3 mm) but not exceeding 100 (150 μm).

4. **Geotextile:** Geotextile for use with pipe and edge underdrains shall be a nonwoven geotextile and shall meet the requirements of Section 2605.2.C.2.

C. **Construction:**

1. **General:** The exact location and layout of underdrains and/or edge drains as shown on the Plans shall be subject to revision by the Engineer as determined during construction.

2. **Excavation:**

a. Trenches for all lateral and longitudinal underdrains shall be excavated to the dimensions, depths and elevations or as ordered by the Engineer. In case of a conflict, where the actual elevation of the strata or stratum to be intercepted is found to vary from Plan elevation, the stratigraphy shall govern in the installation of underdrains.

b. Trench bottoms for perforated pipe underdrain and edge drain shall be in firm material (no mucky or soupy condition existing) and constructed to permit the placing of three inches (75 mm) of aggregate underneath the pipe. If unstable material is encountered in the bottom of the trench, the trench shall be over excavated to firm material.

c. Minimum width of trench shall be as shown on the Standard Plan.

3. **Laying Pipe:**

a. All underdrain pipe shall be laid carefully to line and grade.

b. All pipe shall be laid on a minimum grade of one percent unless otherwise shown on the Plans.

c. All dead ends of pipe underdrains shall be completely closed with a cap of the same material as the pipe.

d. All junctions and turns shall be made with wyes, tees, and bends as supplied by the manufacturer of the pipe.

e. Perforations shall be laid down unless otherwise indicated on the

Plans. 4. **Installing Edge Drain:**

a. Installation shall be in accordance with manufacturer's instructions.

b. Each length of drain shall be joined to the adjacent length prior to installation. Splices shall keep adjoining lengths in proper alignment, shall not separate during installation, shall have the same or greater compressive strength than the geocomposite drain, and shall be sealed against infiltration of backfill material.

c. Drain shall be placed in the center of the trench and held in place with a temporary support while blanket underdrain aggregate backfill is placed.

d. The placement of the edge drain and the first lift of backfill shall be accomplished in a single continuous operation.

5. **Backfilling:**

a. Backfilling the trenches of lateral and longitudinal underdrains shall not be started until approved by the Engineer.

b. The trenches shall be backfilled to the elevations shown on the Plans, in accordance with the Standard Plan.

c. The backfill material shall be placed in such a manner as to prevent formation of large cavities in the backfill and walls of the trench.

d. Overbreakage due to blasting of rock in trench excavation and widening due to caving of trench walls or overbreakage at construction outcrops shall be

backfilled with aggregate.

2203.7 Permeability Test Procedure:

A. **Summary:** This test method is used to determine the permeability of unbound and bound aggregate base material. Bound base material will use Portland Cement, Fly Ash or Asphaltic Cement as a cementing agent.

B. **Unbound Base and Base Bound with Fly Ash or Portland Cement:**

1. Apparatus:

a. **Mold:** A cylindrical metal mold with an approximate inside diameter of 152 mm (6") and a minimum height of 152 mm (6"). The mold shall be equipped with a removable collar at least 51 mm (2") in height and a removable base plate. The base plate may be used as part of the permeability test equipment. If so, the base plate must exceed the permeability of the material being tested. A #40 screen shall be placed on top of the base plate to prevent test material from being lost through the base plate during compaction and permeability testing.

b. **Standpipe:** A standpipe with the same diameter as the removable collar for the mold with a minimum height of 216 mm (8.5"). The standpipe shall be equipped with an overflow outlet.

c. **Rammer:** A mechanically operated metal rammer equipped to control the height of drop to 305 mm (12") plus or minus 2 mm (1/16") above the elevation of the sample. The rammer shall be equipped to distribute the blow uniformly over the sample surface. The rammer shall have a rigid flat faced "pie shaped" foot and a nominal weight of 25 kg (5.50 lbs.). The "pie shaped" foot shall be a sector of 152 mm (6") diameter circle and shall have an area equal to that of 51 mm (2") circular foot.

d. **Straight edge**: A rigid steel straight edge with one edge beveled, at least 203 mm (8") in length.

2. Sample preparation:

a. Obtain a 22.7 kg (50 lb.) to 27.2 kg (60 lb.) sample, dry if necessary.

b. Mix a sufficient amount of aggregate and cementing agent, if required, to fill the mold 1 and 1/2 times.

c. Add the appropriate amount of water and thoroughly mix.

d. Place the assembled mold on the rigid base and fill approximately ½ full of the loose moist material. Compact the layer with 25 blows of the rammer with the blows being distributed uniformly over the surface of the layer. Place three additional approximately equal layers of material in the mold and compact each layer in a similar manner (four layers total).

e. After the fourth layer has been compacted, remove the collar and trim excess material level with top of the mold.

f. Cure Portland Cement and Fly Ash treated specimens by covering with plastic, to prevent drying for 3 days at room temperature.

g. Unbound specimens do not need to be cured before testing.

C. Asphalt Bound Aggregates:

1. **Apparatus:**

a. **Mold:** A cylindrical mold with an inside diameter of approximately 152 mm (6") and a minimum length of 114 mm (4.5"). The mold is open at each end and is equipped with a removable collar and a base plate about 13 mm (0.5") thick.

b. **Specimen Mold Holder:** The specimen mold holder has a semi circular base and a flanged top to hold the specimen mold in place during the compaction process. Any equivalent hold down device that performs the same function is satisfactory.

c. **Compaction Hammer:** The compaction hammer consists of a hammer having a flat circular tamping face 149 mm (5.88") in diameter and appropriate extension rod with handle which acts as guide for a free falling weight. The weight shall weigh 10 kg (22.5 lbs.) and have a free fall of 547 mm (18") plus or minus 2 mm (0.1"). The hammer may be operated manually or be driven with a motor.

d. **Compaction Pedestal:** The compaction pedestal is a wood block approximately 305 mm x 305 mm x 457 mm (12" x 12" x 18"). A 305 mm x 305 mm x 25 mm (12" x 12" x 1") steel plate is securely fastened to the top of the block. The pedestal is set on and securely fastened to a solid concrete slab with the vertical axis plumb and the top level.

e. **Heating Equipment:** Ovens or hot plates for heating aggregates, bituminous material, specimen molds, compaction hammers and other associated items required for mixing and molding. It is recommended that, when possible all heating units be thermostatically controlled to maintain the required temperature within ± 2.8°C (5°F). Suitable shields, thick steel plates or pans of sand shall be used on the surfaces of hot plates to minimize locally overheating.

f. **Mixing Apparatus:** Mechanical mixing is recommended. Any type of mechanical mixer may be used provided it will produce a well coated, homogeneous mixture of the required amount in the allowable time and further that the mixing paddle or whip does not fracture or pulverize aggregate fractions during the mixing process. The bowl employed with the mixer shall be such a nature that essentially all of the batch can be removed. More than one mixing bowl is recommended unless the mixer is equipped with a heating jacket to keep the bowl heated during the mixing process.

2. **Determination of Mixing and Compacting Temperature:**

a. The temperature to which the asphalt cement must be heated to produce a viscosity of 85 ± 10 SFS shall be the mixing temperature.

b. The temperature to which the asphalt cement must be heated to produce a viscosity of 130 ± 15 SFS shall be the compacting temperature.

3. Sample Preparation for Laboratory Prepared Mix:

a. Combine the dry individual aggregates to produce desired combined aggregate with a batch weight of approximately 4050 grams (8.9 lbs.). This should be sufficient to produce a compacted specimen 95 ± 3 mm (3.75 ± 0.125 inches) thick. Adjust the weight of the batch as needed to produce a compacted specimen of 95 ± 3 mm (3.75 ± 0.125 inches) thick.

b. Prepare a minimum of two aggregate and asphalt specimens. The first specimen shall be mixed and thrown away. This sample is to "butter" the mixing bowl and paddle and thus reduce material loss when mixing the test specimen.

c. Heat the aggregate and asphalt within the limits of mixing temperature determined in paragraph 2203.7 C2a. Charge the mixing bowl with the heated aggregate and form a crater in the top. Add the required amount asphalt and mix the aggregate and asphalt until coated at least 2 minutes. Care should be taken to keep all of the sample in the mixing bowl during this process.

4. Compaction of Specimen:

a. Prior to the addition of the asphalt to the batches, thoroughly clean the specimen mold assembly and the face of the compaction hammer and heat the mold assembly and hammer to a temperature between 93.3°C (200°F) and 176.7°C (350°F). Assemble the mold, base plate and collar and place a paper disc cut to size in the bottom of the mold.

b. Place the hot batch of aggregate-asphalt mixture in the mold, spade vigorously with a heated spatula or trowel 15 times around the perimeter and 10 times over the interior of the mold. Smooth the surface of the mix to a slightly rounded shape. The temperature of the mix prior to compaction shall be within the limits in 2203.7 C2b. Place a paper disc on top of the mix.

c. Place the mold assembly, including the collar, on the pedestal, fasten securely with the mold holder and apply 20 blows with the compactionhammer. Each low must have the prescribed free fall of 457 mm (18") with the axis of the compaction hammer held perpendicular to the base of the mold assembly during the compaction process. Remove the base plate and collar, and reverse and reassemble the mold. Apply the specified number of blows to the reversed specimen. After compaction remove the mold assembly from the pedestal, remove the collar and base plate and cool the specimen in the mold until the mold can be handled comfortable with bare hands. Asphalt treated samples do not need to be cured before testing, only cool to the touch.

D. Test Procedure:

1. Assemble test equipment, base plate, mold with specimen, and standpipe.

2. Prior to conducting the test, allow a sufficient amount of water to pass through the specimen to cause all air to be expelled from the specimen. (Establish reservoir around the base with water open to atmospheric pressure.)

3. Conduct Constant-Head Permeability test and report coefficient of permeability "k" in meters (feet) per day. Repeat a minimum of two additional times until two runs agree reasonably well.

4. Constant-Head Permeability:

$$K = \frac{QL}{Aht}$$

Q = quantity of water discharged (volume)
L = length of specimen
A = cross-sectional area of specimen
h = hydraulic head (height column of water above discharge)
t = elapsed time of test
K= coefficient of permeability (length/time)

Note: For very permeable material, maintain elevation of water above the sample for 3 minutes then measure Q (flow).

2203.8 Methods of Measurement:

A. Crushed Aggregate Drainable Base will be measured by one of the following:

1. Per square yard (square meter) or tenth part thereof for the specified depth.

2. Per ton (metric ton) or tenth part thereof.

B. Portland Cement Concrete Drainable Base may be included in the Proposal as a single item or as separate items (Portland Cement and Base Aggregate) and measured by one of the following:

1. Per square yard (square meter) or tenth part thereof for the specified depth.

2. Per ton (metric ton) or tenth part thereof.

C. Plant Mix Bituminous Drainable Base may be included in the Proposal as a single item or as separate items (Asphaltic Cement and Base Aggregate) and measured

by one of the following:

1. Per square yard (square meter) or tenth part thereof for the specified depth.

2. Per ton (metric ton) or tenth part thereof.

D. Pipe Underdrains will be measured per lineal foot (meter) or tenth part thereof. Drainable Base Aggregate shall be subsidiary to the Pipe Underdrain.

E. Blanket Underdrains will be measured by the actual quantities used as follows: 1.

Pipe Underdrain will be measured per lineal foot (meter) or tenth part thereof. 2.

Drainable Base Aggregate will be measured by one of the following:

a. Per square yard (square meter) or tenth part thereof for the specified depth.

b. Per ton (metric ton) or tenth part thereof.

2203.9 Basis of Payment:

A. Crushed Aggregate Drainable Base will be paid for by one of the following:

1. Contract unit bid price.

2. Contract lump sum bid price.

B. Portland Cement Concrete Drainable Base will be paid for by one of the following:

1. Contract unit bid price.

2. Contract lump sum bid price.

C. Plant Mix Bituminous Drainable Base will be paid for by one of the following:

1. Contract unit bid price.

2. Contract lump sum bid price.

D. Pipe Underdrains will be paid for by one of the following:

1. Contract unit bid price.

2. Contract lump sum bid price.

E. Blanket Underdrains will be paid for by one of the following:

1. Contract unit bid price.

2. Contract lump sum bid price.

SECTION 2204 PRIME AND TACK COAT

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

ASTM
D 140 - Practice for Sampling Bituminous Materials

2204.1 Summary: This section includes the application of liquid asphalt to a prepared pavement (concrete, asphaltic concrete), or granular base. The type and grade of asphalt material to be used as prime or tack coat, is as specified in the Special Provisions or as indicated by the plans.

2204.2 Liquid Asphalt Material: The liquid asphalt material to be used for surface preparation shall be as listed in the following table:

Material to be used	Application Usage	Type of Emulsion or Grade of Cutback	Application Rate Gal/SY (L/SM)	Application Temperature *F (*C)	Cure Time at 70ºF (21ºC)
Existing Asphalt or Concrete Surface	Tack	RC-70	0.05-0.10 Gal/SY (0.23-0.46 L/SM)	150-225 (65-107)	1-6 hrs
	Tack	SS-1 SS-1h CSS-1 CSS-1h	0.05-0.10 Gal/SY (0.23-0.69 L/SM)	70-160 (22.5-42)	1-3 hrs
Treated Base; i.e., lime, fly/ash, cement	Prime	MC-30 MC-70	0.1-0.3 Gal/SY (0.46-1.38 L/SM)	85-120 (29-49)	12-24 hrs
	Prime	SS-1 SS-1h CSS-1 CSS-1h	0.1-0.3 Gal/SY/in (0.46-1.38 L/SM/mm)	70-160 (20-70)	24-48 hrs
Untreated Aggregate Base w/Fines	Prime	MC-30, MC-70	0.1-0.3 Gal/SY (0.46-1.38 L/SM)	85-120 (29-49)	12-24 hrs
W/O Fines	Prime	MC-250	0.2-0.5 Gal/SY (0.92-2.30 L/SM)	85-120 (29-49)	12-24 hrs
Untreated Aggregate Base	Prime	SS-1 SS-1h CSS-1 CSS-1h	0.1-0.3 Gal/SY/in (0.46-1.38 L/SM/mm)	70-160 (20-70)	24-48 hrs
	Prime	EAP PAE, or PEP	0.1-0.3 Gal/SY (0.46-1.38 L/SM)	70-160 (20-70)	24-48 hrs

The asphalt material shall conform to the latest ASTM specifications for "Asphalt Cements and Liquid Asphalts." Sampling shall be in accordance with ASTM D 140.

2204.3 Sand Cover: Sand Cover, if used, shall be any clean granular mineral meeting the following grading requirements. When tested with laboratory sieves 100% shall pass the No. 4 (4.75 mm) sieve and not more than 2% shall pass the No. 200 (75 um) sieve. The moisture content of the sand shall not exceed 3% by weight.

2204.4 Approval of Materials: Asphalt materials shall be approved by the Engineer prior to use in the work. The Engineer may accept a certified analysis by the material supplier laboratory when a copy of the certified analysis accompanies each shipment of asphalt to the project. The Engineer reserves the right to perform tests of the asphalt received on the job.

2204.5 Pressure Distributor: The distributor shall be so designed, equipped, maintained and operated that liquid asphalt at even heat may be applied uniformly on variable widths of surface up to 15 feet (4.5 m) at readily determined and controlled rates from 0.02 to 1.00 gallon per square yard (100 to 5000 milliliters per square meter), with uniform pressure, and with an allowable variation from any specified rate not to exceed 0.02 gallons per square yard (100 milliliters per square meter). Distributor equipment shall include a tachometer, pressure gauges, a calibrated tank and a thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump, and full circulation spray bars adjustable laterally and vertically. The calibration of all distributors must be approved by the engineer, and the contractor shall furnish all equipment, material and assistance necessary if calibration is required.

2204.6 Preparation of Existing Surface:

A. **For tack coats:** The existing surface shall be free of all dust, loose material, grease or other foreign material at the time the tack is applied. Any excess surface oil on the roadway or bituminous joint material will be removed by others without cost to the contractor before the tack is applied.

B. **For prime coats:** the surface to be primed shall be shaped to the required grade and cross section, shall be free from all ruts, corrugations, segregated material or other irregularities, and shall be uniformly compacted by rolling. The surface shall be firm and slightly damp when primer is applied. Delays in priming may necessitate reprocessing or reshaping to provide a smooth compacted surface.

2204.7 Application of Asphalt Material:

A. **For Tack Coats:** Asphalt emulsion shall be applied uniformly with a pressure distributor at the rate specified in the contract, or as revised by the engineer to be within a minimum of 0.05 and a maximum of 0.15 gallons per square yard (minimum of 230 and a maximum of 690 milliliters per square meter). Water may be added to

the asphalt emulsion and mixed therewith in such proportion that the resulting mixture will contain not more than 50% of added water, the quantity of added water to be approved by the engineer. The application of the resulting mixture shall be such that the original emulsion will be spread at the specified rate. The asphalt emulsion shall be heated at the time of application to a temperature in accordance with the limits provided in Sec 2204.2, or as specified in the contract. The tack shall be properly cured and the tacked surface shall be cleaned of all dirt and surplus sand before the next course is placed.

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

B. **For Prime Coats:** Bituminous material shall be applied to the width of the section to be primed by means of a pressure distributor in a uniform, continuous spread. The subgrade shall be moistened before the prime is applied. The application rate shall be as specified in the contract or as approved by the engineer between 0.1 and 0.5 gallons per square yard (0.46 and 2.30 liters per square meter). The primer shall be heated at the time of application to a temperature in accordance with the limits provided in Sec 2204.2, or as specified in the contract.

Care shall be taken that the application of bituminous material at the junctions of spreads is not in excess of the specified quantity. Building paper shall be placed over the end of the previous applications and the joining application shall start on the building paper. Building paper used shall be removed and satisfactorily disposed of. Pools of primer material remaining on the surface after the application shall be removed.

When traffic is maintained, not more than one half of the width of the section shall be treated in one application and one-way traffic will be permitted on the untreated portion of the roadbed. As soon as the bituminous material has been absorbed by the surface and will not pick up, traffic shall be routed to the treated portion and the remaining width of the section will be primed. The primer shall be properly cured, and the primed surface shall be cleaned of all dirt and surplus sand before the next course is placed.

2204.8 Application of Sand Cover: If the asphalt material is not completely cured within the maximum specified curing time, sufficient sand shall be spread over the surface with a mechanical spreader to blot up the excess asphalt. The rate of application shall be specified or approved by the Engineer. Prior to placing an asphalt paving course, all loose sand shall be swept from the primed or tacked surface.

2204.9 Methods of Measurement: Asphalt Prime and Tack Coat will be measured per gallon (liter).

2204.10 Basis of Payment: Asphalt Prime and Tack Coat will be paid for at the contract unit bid price.

2205 2205

SECTION 2205 ASPHALTIC CONCRETE SURFACE AND BASE

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

ASTM
C 88 - Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
C 117 - Test Method for Materials Finer than 75- um (No. 200) Sieve in Mineral Aggregates by Washing
C 127 - Test Method for Specific Gravity and Absorption of Coarse Aggregate C 128 - Test Method for Specific Gravity and Absorption of Fine Aggregate C 131 - Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C 136 - Test Method for Sieve Analysis of Fine and Coarse Aggregates C
142 - Test Method for Clay Lumps and Friable Particles in Aggregates D
75 - Practice for Sampling Aggregates
D 140 - Practice for Sampling Bituminous Materials
D 290 - Practice for Bituminous Mixing Plant Inspection
D 979 - Practice for Sampling Bituminous Paving Mixtures
D 1188 - Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
D 2041 - Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
D 2172 - Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
D 2726 - Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
D 2950 - Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
D 3666 - Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials
D 4552 - Practice for Classifying Hot-Mix Recycling Agents
D 5444 - Test Method for Mechanical Size Analysis of Extracted Aggregate D
6307 - Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method D
6373 - Specification for Performance Graded Asphalt Binder

AASHTO
PP 26 Practice for Certifying Suppliers of Performance Graded Asphalt Binders T 245 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus T 283 Resistance of Compacted Bituminous Mixture to Moisture Induced Damage

Asphalt Institute
"Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types", MS-2, Sixth Edition
"Superpave Performance Graded Asphalt Binder Specification and Testing", SP-1 "Superpave Mix Design", SP-2

National Bureau of Standards
Handbook #44, "Specifications, Tolerance and other Technical Requirements for Commercial Weighing and Measuring Devices"

2205.1 Summary: This section includes the construction of asphalt concrete base and/or asphalt concrete surface. All materials and placement shall be tested as outlined in the "Public Works Department Materials Testing Requirements".

2205.2 Materials: No material shall be used until approved by the engineer. All costs associated with material testing, certification and the preparation of trial mixes to determine the job mix formula shall be the responsibility of the contractor. Representative KCMO (Feb 15, 2002) 2 samples of all materials proposed for use under these specifications shall be submitted to ***a City approved private*** testing laboratory by the contractor, at the contractor's expense, for testing and the preparation of trial mixes to determine the job-mix formula. Additional tests necessary for determining conformance with the requirements specified herein will be performed under the supervision of the engineer without cost to the contractor, unless testing is the responsibility of the contractor.

A. **Asphalt:** Asphalt cement used in the manufacture of asphalt paving mixtures shall conform to the Performance Graded system. The PG graded material used shall conform to the provincial grade used by the local DOT or as designated by the Engineer. In the Kansas City Metropolitan area, the provincial grade is a PG64-22.

These general usage guidelines may not address all project conditions. APWA strongly recommends that the engineer apply sound pavement design principles when designating mix type and selecting asphalt cement grade based upon individual project conditions. The Federal Highway Administration makes available LTPPBIND software that will assist with asphalt grade selection for specific projects.

The asphalt cement shall conform to ASTM D 6373. Sampling shall be in accordance with ASTM D 140.

The contractor or asphalt supplier shall submit a quality assurance plan for the asphaltic cement to the engineer that conforms to AASHTO PP 26. He shall also submit a temperature-viscosity chart showing the recommended mix and compaction temperatures for non-modified asphalts, and shall provide the specific gravity of the asphalt.

B. **Aggregate:** The quality of aggregates used in Asphaltic Concrete shall conform to the following:

Coarse Aggregate (Retained on the No. 4 Sieve)
LA Abrasion (ASTM C 131) 35% loss (maximum) Soundness using Mag. Sulfate (ASTM C 88 5 cycles) 15% loss (maximum) Total shale, clay, coal and lignite content ASTM C 142 1.0% by weight (max) Fine Aggregate (Passing the No. 4 Sieve)
Organic content 1% maximum 1.0 maximum The parent material of manufactured sand must also meet the requirements for coarse aggregate shown above.

Sampling shall be in accordance with ASTM D 75. Gradation analysis shall be in accordance with Standard Method of Test for Material Finer than No. 200 (75 um) Sieve

in Mineral Aggregates by Washing, ASTM C 117 and Standard Method Test for Sieve Analysis of Fine and Coarse Aggregate, ASTM C 136.

2205.3 Mixing and Proportioning:

A. **Composition of the Mix:** Asphaltic concrete mixtures shall consist of Mineral Aggregates and Asphalt Cement within the following limits for the type specified.

ASPHALTIC CONCRETE-TYPE

1-01 2-01 3-01 4-01 5-01 6-01

Percent by Weight of Total Mixture
Asphalt Cement 4-6 4-7 4-7 5-7.5
Aggregate - U. S. Standard
Square Sieve Size Total Percent Passing by Weight
1 ½" (37.5 mm) 100 -- -- -- -- -- 1" (25.0 mm) 75-100 100 -- -- 100 -- ¾" (19.0 mm) 60-85 80-100 100 -- 95-100 100 ½" (12.5 mm) -- -- 85-100 100 -- 86-100 3/8" (9.0 mm) 40-65 60-80 70-90 85-100 -- 75-100 No. 4 (4.75 mm) 30-50 48-65 50-70 55-75 -- -- No. 8 (2.4 mm) 19-36 35-47 37-47 39-50 28 min 28 min No. 16 (1.2 mm) 13-26 25-36 26-36 27-38 -- -- No. 30 (0.6 mm) -- 18-30 18-30 19-30 -- -- No. 50 (0.3 mm) -- 12-22 12-22 11-23 -- -- No. 100 (150 µm) 4-12 6-14 6-15 6-16 -- -- No. 200 (75 m) 2-10 3-10 4-10 4-10 2-6 2-6

In addition to the above limits, the difference between the "Percent Passing Square Mesh Sieve" of successive sieve sizes shall not exceed 25 for types 1-01, 2-01, 3-01, and 4-01.

That fraction of material retained on the No. 4 (4.75-mm) Sieve-shall be composed of particles with not less than 75% having two or more fractured faces for asphalt types 1-01, 2-01, 3-01, and 4-01, and not more than 20% by weight of that fraction shall be composed of flat or elongated particles as described in Section 2202.2. For Asphalt Types 5-01 and 6-01 only, the total aggregate (coarse aggregate, fine aggregate, and the material passing the No. 200 sieve (75um) shall contain not less than 85% crushed material for intermediate course and surface course. The Coarse Aggregate Angularity for all coarse aggregates, including RAP, for asphalt types 5-01 and 6-01 shall be 85% or higher.

It shall be noted that when the gradation varies appreciably from the single point gradation used in the mix-design, the test properties of the mix will be out of specifications. This condition can occur even though the gradation meets the tolerances below.

The job-mix formula shall be within the limits specified above. The maximum permissible variation from the job-mix formula, within the specification limits, shall be as followed:

Permissible Gradation Variation from Mix Design Percent by Wt. of Total Mix U. S. Standard Sieve Size Type 1-01, 5-01 & 6-01 Type 2-01, 3-01, & 4-01

No. 4 (4.75 mm) and larger 5.0 4.0
No. 8, 16, 30 and 50 4.0 3.0 (2.4, 1.2, 0.6, 0.3 mm)
No. 200 (75 um) 2.0 1.0
Asphalt Cement 0.5 (1-01 only) 0.3

B. **Asphalt Mix General Usage**

	Surface	Base
Arterial	5-01, 6-01	1-01, 5-01
Collector ,	5-01, 6-01	1-01, , 5-01
Local/Access ,	3-01, 5-01	1-01, 2-01 , 5-01
Paved Trail	2-01, 3-01, 4-01, 5-01	1-01. 2-01, 5-01
Recreational Surface	4-01	1-01, 2-01, 5-01
Parking Lot	2-01, 3-01, 5-01	1-01. 2-01. 5-01

C. **Asphalt Hot-Mix Recycling:**

1. **General:** Except as modified herein, Recycled Asphaltic Concrete (RAC) shall be equal to that produced as new material. Reclaimed Asphalt Pavement (RAP) and/or Reclaimed Aggregate Materials (RAM) shall represent no more than 30% of the composition for all surface mixtures and no more than 50% of the composition for all base mixtures except type 5-01 and 6-01 (no more than 30%). Only virgin materials shall be used in the surface course for new construction projects. Recycled or virgin materials may be used on restoration projects. Recycled Asphaltic Concrete may contain combinations of RAP, RAM, coarse aggregate, fine aggregate, mineral filler, asphalt cement, recycling agent, anti stripping agent and approved additives to produce an acceptable mixture. Recycled Asphaltic Concretes shall be designated by prefacing the type with "RC," such as "RC Type 1-01". Fractionated RAP (FRAP) shall be recognized as fine aggregate that passes the ¼ inch screen, and coarse aggregate as that material retained on the ¼ inch screen and passing the ¾ inch screen.

2. **Materials Evaluation**: All recycled materials shall have the following ***tests performed in addition to those required in 2205.3.D.:***

   a. A sieve analysis shall be performed on RAP and/or RAM in accordance with ASTM C 117, "Standard Test Method for Material Finer than No. 200 Sieve (75 um) in Mineral Aggregates by Washing" and ASTM C 136, "Standard Method for Sieve Analysis of Fine and Coarse Aggregates" after extraction of asphalt.

   b. Asphalt content analysis shall be performed for RAP in accordance with Method "A" of ASTM D 2172 , "Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures" where the RAP content exceeds 30%. For mixtures with RAP contents less than 30%, asphalt content may be determined using ASTM D6307.

   c. The asphalt cement used shall be determined as follows:

For all hot mix asphalt containing RAC, the asphalt grade of the post production mix shall be tested in accordance with procedures outlined in the Apshalt Institute SP-1 to ensure that the asphalt grade meets or exceeds PG64-22.

d. All sources of material for use in RAC must be approved by the Engineer prior to use.

3. **Material Requirements**:

a. New asphalt cements added to the aged asphalt shall meet the requirements of Section 2205.2A

b. Recycling Agents, if used, shall meet the requirements of ASTM D 4552, "Standard Practice for Classifying HOT MIX Recycling Agents."

c. The RAP and/or RAM stockpiled at the plant site shall be maintained in stockpiles separated into surface and base. The RAP and/or RAM shall be processed such that 100% will pass the 1-1/2 inch (38 mm) sieve and 90% will pass the 1-inch (25.4 mm) sieve.

d. The final product shall be free of foreign matter (e.g., old planer teeth, ice, wood, soil, broken sewer castings, loop detector wire, protective membranes, rubberized joint filler materials and foil turn lane markers, trash, debris, etc.)

4. **Mix Design Requirements:** The necessary steps for a final mix design for recycled mixtures, shall be done in accordance with the Asphalt Institute's Manual MS-2 Sixth Edition in the appendix entitled "Mix Design Using RAP When a change in the RAP and/or RAM percentage exceeds 15% of the original amount of RAP and/or RAM in the mix design, a new mix design must be submitted.

5. **Asphalt Plant Requirements**: All delivery tickets shall designate the type of recycled mix, (RC-Type 1-01, RC-Type 2-01, RC-Type 3-01, or RC-Type 4-01).

D. **Mix Design Criteria**: Laboratory Test Specimen(s) of the Paving Mix, combined in proportions of the job-mix formula, shall be prepared and tested in accordance with AASHTO T 245 and the volumetric properties of the compacted paving mixtures as calculated by ASTM procedures using Chapter 4 of the Mix Design Methods for Asphalt Concrete and other Hot-Mix types (MS-2), Sixth Edition, Asphalt Institute referred hereafter as “MS-2”. The Marshall procedure and the Voids in the Mineral Aggregate (VMA) shall be as specified in Chapter 5 of the MS-2. The automatic Marshall Hammer may be used when it has been calibrated with a manual hammer.

For mix type 5-01 and/or 6-01 the procedures outlined in Asphalt Institutes SP-2 must be used to prepare the asphalt samples for design and quality control testing. The gyratory values for the Super Gyratory Compactor (SGC) to be used for this

purpose are $N_{initial} = 6$, $N_{design} = 50$, and $N_{max} = 75$. At $N_{initial}$, the specific gravity of the specimen must be 90.5% or less of G_{mm}, at N_{max} the specific gravity of the specimen must be 98% or less of G_{mm}

The material for the theoretical specific gravity, (Gmm) and the material for the Marshall specimens and Super Gyratory Compactor (pucks) shall be cured at 285+/-5ºF (140+/-3º C) for four hours in a closed oven after the mix is produced in the laboratory. Also, the plant produced mixture shall be tested when the mix is four

hours old. The mixture shall be transported to the laboratory in an insulated container and then stored in a laboratory oven at 140 +/-3°C (285 +/-5°F) for the remainder of the curing period. This procedure shall be used when the water-absorption as determined by ASTM C 127 and ASTM C 128 of any aggregate in the mixture exceeds 1.25%. The mixture shall be compacted at 140 +/-3°C (285 +/-5°F).

Test requirements and criteria for the paving mixes under these specifications shall be as follows:

Marshall Stability: 1500 lbs. (6672 N) Min (Types 1-01, 2-01, 3-01, and 4-01) No. of compaction blows: 50 (for Types 1-01, 2-01, 3-01, and 4-01),

Flow: 0.08-0.16 inches (2-4 mm) max (Types 1-01 – 4-01)
Air Voids: (Laboratory Specimen) Percent
Base 3-5
Surface 3-5

Voids filled with asphalt;
percent (VFA) Types 5-01 & 6-01 65-75 Percent

Voids in Mineral Aggregate (VMA)

(Nominal Max Size as defined in MS-2 or SP-2) Percent (min.) 1
1/2" (38 mm) 11
1" (25.4 mm) 12
¾" (19 mm) 13
½" (12.5 mm) 14
3/8" (9.5 mm) 15

The VMA properties for mixes 1-01,2-01,3-01, & 4-01 shall be measured in accordance with the procedure described herein and reported on the material data forms; however, there is no minimum criteria controlling VMA associated with these material gradations.

The VMA for Mix Types 5-01 & 6-01 shall be the minimum value allowed. For these mixes, the asphalt content should be just to the left side of the low point on the VMA

vs. Asphalt Percent curve, not to the "wet" or right (increasing) side of the curve. The VMA requirements shown represent values that may be higher than those obtained in the KC Metropolitan area using locally available materials. VMA values shown are for 4% air voids and should be used for the design of conventional roadway pavements. During production, the voids can be expected to vary plus or minus 1% of this design value of 4%. For mix types 1-01, 2-01, 3-01, and 4-01, 3% air voids may be used for design. and production may be allowed to vary plus or minus 1% of

the design value.

The ratio of minus 200 (75 um) material to % Effective asphalt cement (P_{eff}) based on the weight of the aggregate shall be between 0.6-1.2 for Types 5-01 and 6-01.

The blend of RAP and/or RAM and virgin aggregates or non recycled asphalts shall be checked for resistance to stripping using AASHTO T 283 to determine if an antistripping agent is needed for the same asphalt chosen for the project. The index of retained strength shall exceed 80% for Types 1-01 – 4-01, and 80% for types 5-01 and 6-01.

E. **Sampling and Testing of the Mixture**: Mixes shall be sampled in accordance with ASTM D 979 and tested in accordance with AASHTO T 245. The mixtures will be tested for binder content in accordance with ASTM D 2172 or D 6307. The recovered aggregate will be sieved in accordance with ASTM D 5444.

F. **Mixture Temperature Requirements**: The temperature of the completed mix at the plant and at the paver shall be set by the Contractor who shall consider hauling and placing conditions, asphalt specifications as set forth in section 2205.2, and weather limitations set forth in section 2205.8 (B). The temperature of Types 5-01 and 6-01 shall not exceed 315° F (157° C) at the point of discharge from the asphalt plant when using PG 64-22 asphaltic oil.

When the mix is produced in a batch-type plant, the aggregate shall be weighed accurately in the designated proportions to provide the specified batch weight. The temperature of the aggregate at the time of introduction into the mixer shall be determined by the contractor, with a tolerance of + or - 25º F (16º C). In no case, however, shall the temperature of the mixture exceed the maximum temperature recommended by the manufacturer or supplier of the asphaltic cement (generally 350º F (177º C).

G. **Control of Mixing Time**: The contractor shall control mixing time to produce asphaltic concrete that is uniformly and thoroughly coated with asphaltic cement. H. **Preparation of Asphalt Cement**: The asphalt shall be heated so that it can be distributed uniformly throughout the mix. For mixing applications, the specified temperature generally will be such that the asphalt viscosity is within the range of 150-190 centistokes and shall not exceed 350º F (177º C). The material shall be sufficiently fluid to produce a complete coating on every particle of aggregate within the specified mixing time.

The contractor shall maintain calibrated temperature monitoring equipment at the point of discharge from the asphalt plant and at the asphalt tank, and shall supply temperature records upon request.

I. **Preparation and Handling of Aggregate**: Coarse and fine aggregate shall be stored at the plant in such a manner that the separate sizes will not become intermixed. Cold aggregates shall be carefully fed to the plant in such proportions that surpluses and shortages in the bins will not cause breaks in the continuous operation. When loading aggregate into stockpiles, and into cars, barges, and trucks, the material shall be placed in such a manner as to prevent segregation of aggregate sizes. Stockpiles shall be built in uniform layers not exceeding 5 feet (1.52 m) in depth.

1. Samples of coarse and fine aggregate shall be submitted to the Engineer for testing upon request. The contractor shall be responsible for the preparation and handling of aggregates to insure that the cold-feed gradations fall within the mix design limits. Cold-feed gradation tests shall be taken as requested by the Engineer.

2. **Drying**: The aggregate shall be thoroughly dried and heated to provide a paving mix temperature within a tolerance of + or – 25º F. (4º C), of that specified by the approved mix design. The moisture content of the heated and dried aggregate shall not exceed 0.5%. The quantity of material fed through the dryer shall in all cases, be held to an amount which can be thoroughly dried and heated.

J. **Inspection and Control of Asphalt Mixing Plant**:

1. **Tests**: During production the ***engineer*** will have the following test performed by an approved laboratory: AC content, ***aggregate gradation after removal of AC***, marshall density, stability, voids, vma, vfa, and ***maximum*** theoretical density**.**

   a. Accredited in accordance with ASTM D3666; and/or

   b. Approved for Superpave asphalt testing by the State Highway Department in the state where the plant is located.

      1). The individual performing the test must carry a state certification for Superpave testing.

      2). The laboratory must have an annual certification by an independent testing agency of all testing equipment used for Superpave mix designs, and must also have the Marshall hammer weight and height of drop certified by that same agency.

2. **Availability of Test Reports**: The results of the latest current test report shall be furnished to the engineer upon request. If the mix is found to be outside of tolerance, or outside the specification limits as specified in 2205.3., correction shall be made. Test reports shall be furnished on the following “Asphalt Concrete Test” form ***or a similar form containing equivalent information.***

3. **Frequency of Testing**: For mixes 1-01 through 4-01, the tests listed in paragraph 2205.3.J.1. shall be performed ***a minimum of once for*** every 3000 tons (2700 metric tons) of asphalt production KCMO (Feb 15, 2002) 3 except during initial startup, or whenever the production asphalt fails one of the following conditions at which time they will be tested every 1000 tons (900 metric tons) until four consecutive tests show compliance with the specifications::

   a. Production void content measured at the plant discharge is 1% below

laboratory mix design void content, or more than 5% total void content.

b. Extracted gradation of the production asphalt exceeds the permissible gradation variation for the mix type being produced.

c. Asphalt cement exceeds the content variation for the mix type being produced.

4. **Frequency of testing:** For mixes 5-01 and 6-01, the tests listed in paragraph 1 shall be performed once per day of production, or every 1000 tons (900 metric tons), whichever is less frequent except during initial startup; or whenever the production fails one of the following conditions at which time they will be tested every 500 tons (450 metric tons), or twice per day of production, whichever is less frequent until 4 consecutive tests show compliance with the specifications:

a. Production void content measured at the plant discharge is less than 3% or more than 5%

b. Extracted gradation of the production asphalt exceeds the permissible gradation variation for the mix type being produced.

c. Production vma measured at the plant discharge is below the design minimum vma.

d. Production vfa measured at the plant discharge is outside the allowable range.

5. **Redesign of Asphalt mixes:** If four consecutive tests performed as described in paragraph 3 or 4 above show noncompliance with the specifications as enumerated in the subparagraphs of paragraph 3 or 4 above, production of that type of asphalt will immediately cease, and may not be resumed until a new mix design is submitted and approved, or the plant can demonstrate to the engineer an ability to meet specifications. Resumption of asphalt production after a mix redesign or failure of four consecutive tests to meet specifications will be treated as a initial startup for testing purposes.

ASPLATIC CONCRETE TEST (Verified Mix Design)

2205.3 2205.3

Description: APWA Type: LAB I.D.:
Sample Date: Sample I.D.: Supplier:

	LOT		
	Belt		Tons
	Hot Mix		Tons

Sieve Size	Belt Sample	Hot-Mix Sample*	Single Point Job Mix Formula	Job-Mix Formula Tolerances
25 mm (1”)				
19 mm (3/4”)				
12.5 mm (1/2”)				
9.5 mm (3/8”)				
4.75 mm (No.4)				
2.36 mm (No.8)				
1.18 mm (No.16)				
600 um (No.30)				
300 um (No.50)				
150 um (No.100)				
75 um (No.200)				

ASTM C 136, C 117, D 544

*Uncompacted Behind paver
**total mix basis
***total aggregate basis

EXTRACTION DATA-ASTM D6307		Plant Setting**	Sample*
	%***		

Aggregate Type	%***	Aggregate Type	%***

MARSHALL CHARACTERISTICS (ACCEPTANCE (CRITERIA)

Compaction Blows (average of 3 specimens), Circle one (50 Types A-D, 75 Types E-F)

	Sample*	Specifications	
Stability, lbs (kg)		Min	AASHTO T 245
Flow, 1/100 in (mm)		Max	AASHTO T 245
% Voids		3-5	
%VMA		___ min	
% VFA			
Density, pcf (kg/cu.m)		___	ASTM D 2726
Ratio (-) 75 um (No. 200) to % Eff. Binder			
Max Theoretical Specific Gravity Gmm		___	ASTM D 2041
Bulk Spec. Gr. Of total Agg. Gsb		___	ASTC C 127 & 128
COMMENTS:			

LOT DENSITY SHALL BE TIED TO THE LOT AND DATE (Laboratories shall conform to ASTM D 3666)

2205.4 Asphalt Mixing Plant: Plants used by the Contractor for preparation of the asphalt paving mix shall be approved by the KCMO Public Works Department according to the Hot Mix Asphalt Quality Management Plan and conform to the following requirements:

A. **Field Testing Laboratory**: The Contractor shall provide a laboratory building or room at the plant site, for the exclusive use of the Engineer for performing tests, keeping records, and making reports at such times as the Engineer is performing those actions.

The Contractor shall also furnish necessary laboratory sieves and a powered shaker device for sieve analysis, scales, ***ignition oven*** and supplementary equipment to make aggregate sieve analysis, asphaltic concrete paving mixture analysis, and paving mixture density tests.

B. The asphalt producer shall establish a quality control plan and shall maintain records. The quality control plan ***will be reviewed and approved by the City***.

2205.5 Transportation of Mix: The mix shall be transported to the job site in vehicles with tight metal bottoms, clean of all foreign material which may affect the mix. If a release agent is used, it must comply with State and Federal environmental regulations. The dispatching of the vehicles shall be so scheduled that all materials delivered may be placed in daylight unless the Engineer approves artificial light. Delivery of the material to the paver shall be at a uniform rate and in an amount within the capacity of the paving and compacting equipment.

Haul trucks shall be provided with covers of sufficient size and weight to completely cover the truck bed to protect the load and to prevent cooling of the upper surface. Failure to have the load completely covered shall be sufficient cause for rejection of the entire load. The load shall remain covered until the truck is next in line to be unloaded. In no case shall a load remain uncovered for more than 10 minutes before starting to use the load. If for any reason there is a delay in completely using a load, the remaining part of the load shall be recovered until it can be used. It shall be the responsibility of the Contractor to inform all truck drivers of these provisions before starting work.

2205.6 Scales and Weighing of Vehicles: The vehicle's tare and gross weight shall be established by actually weighing the vehicle on a certified scale. The tare weight will be established at least twice each day. The vehicle, when establishing tare, shall be clean, bed empty, fuel tanks filled and shall have all side and back boards in place.

A. **Measurement by weight:** Measurement will be made by weighing each truck load on scales conforming to the requirements of 2205.6 B “Vehicle Scales.”

B. **Vehicle Scales**: Vehicle scales shall be approved by the engineer and shall conform to the requirements specified herein. The specifications, tolerances, and other technical requirements for weighing and measuring devices as recommended by the National Conference on Weights and Measures and published in the National Institute of Standards and Technology Handbook 44, Specifications, Tolerances, and

Other Technical Requirements for Weighing and Measuring Devices, and supplements thereto or revisions thereof, shall apply to all vehicles scales used.

C. Scale acceptance shall be based on one of the following:

1. A valid certification or seal of approval by the Division of Weights and Measures from the state.

2. A certification of calibration from a commercial scale service company showing that the scale meets the requirements of these specifications. The contractor shall furnish the certification of calibration to the Engineer.

D. **Scale Calibration:** Scales shall have been calibrated within the nine month period prior to any material being delivered, or at any time the Engineer has cause to question the accuracy of the scale. Scales shall meet the requirements of Accuracy Class III L as defined in Handbook 44 (above).

Verification of a vehicle scale may be required by weighing a hauling unit on another recently calibrated and certified scale.

If equipment to be weighed is of such length that all axles cannot be weighed simultaneously, a level paved surface shall be provided permitting those axles not on the scale platform to be supported by the paved surface. The approach shall be at least as wide as the platform and of sufficient length to insure the level positioning of vehicles during weight determinations. The weighing shall be performed with all brakes released. If equipment to be weighed is equipped with an air bag suspension unit on any axle, the equipment including semi-trailers or pup trailers shall be weighed on vehicle scales of sufficient size to weigh all axles of the combination simultaneously.

All cost incurred in obtaining a certification of calibration or verification shall be borne by the contractor.

2205.7 Requirements for Asphalt Paving Equipment: All asphalt paving equipment used by the Contractor shall meet the requirements of this section and shall be maintained in acceptable mechanical condition. Equipment shall be serviced and lubricated away from the paving site. Units that drip fuel, oil, grease or other fluids shall be removed from the project until such leakage is corrected.

A. **Pavers and Laydown Machines**: Mechanical self-powered pavers shall be capable of spreading the mix within the specified tolerances, true to the line, grade and crown indicated on the plans.

Pavers shall be ***in good working condition***, equipped with quick and efficient steering devices and shall be capable of traveling both forward and in reverse. They shall be equipped with hoppers and distributing screws that place the mix evenly in front of the adjustable screeds. They shall be equipped with either a vibrating screed or a tamping bar immediately preceding a static screed. ***The paver shall be equipped with a shoe that will produce a joint between laying strips having its face inclined at an angle of thirty degrees (30°) from the vertical. This type joint shall be used with all asphaltic***

concrete mixes. The shoe shall be designed in such manner that it will be capable of beveling depths up to 4 inches (10.16 cm).

There shall be sufficient auxiliary attachments for the paving machine so that it may be operated to lay the necessary width as determined in the field by the engineer. Vibrating screed or tamp bars shall be provided for the full width of all paving operations.

The screed shall include a strike-off device which is effective on mixes at workable temperatures without tearing, shoving or gouging them, and which produces a finished surface of an even and uniform texture. The screed shall be adjustable as to the height and crown and shall be equipped with a controlled heating device for use when required. However, for irregular width paving, hydraulic extensions without tamping bars or a vibrating screed may be used only along the curb or outer edge of pavement.

1. **Automatic Screed Controls**: The paver shall be equipped with and use an approved system capable of automatically controlling the elevation and transverse slope of the paver screed unless otherwise directed by the engineer. An erected stringline, traveling stringline or other approved device operating on the roadbed being paved or the surface of the previously placed la ne shall be used to establish the grade reference. The grade reference device shall operate on either or both sides of the paver as required and shall be capable of maintaining the desired transverse slope regardless of changes in the screed elevation***. In the event of failure of the automatic screed control system, the contractor will be permitted to continue placing the asphaltic concrete mix for the rest of the day in which the failure occurred. The contractor will not be permitted to continue operations without using automatic screed controls unless permission has been granted by the engineer on each succeeding day following the failure.***

2. The traveling stringline shall be constructed in such a manner that it does not vibrate or cause the sensor to make erroneous readings during the laydown operation. The length of the beam to be used shall be approved by the Engineer and shall be between 20 feet and 40 feet (6.1 and 12.2 m).

3. The use of the automatic screed control devices on asphalt pavers will not be required for paving small irregular areas, entrances, approaches, or side street connections.

4. Automatic screed control devices will be required for matching the joint with all previously laid strips, except for those areas noted above.

B. **Rollers**: Compaction equipment shall consist of vibratory steel wheel, static steel wheel and pneumatic-tired rollers unless otherwise directed by the engineer. They shall be self-propelled and equipped with such controls that starting, stopping and reversing direction can be accomplished without displacing the hot asphaltic concrete pavement. ***Compaction equipment shall be in good working condition.***

Rollers shall be equipped with adjustable scrapers to keep the wheel surfaces clean and with efficient means of keeping them wet to prevent mixes from sticking. The roller surfaces shall have no flat areas, openings or projections that will mar the surface of the pavement.

1. **Steel-Wheeled Rollers**: Steel-Wheeled Rollers shall be vibratory ***or static*** two axle tandem rollers. ***Vibratory*** rollers shall develop contact pressure of 250 to 350 pounds per inch of width (45 to 62.5 kg per cm of width) (vibratory mode) or 150 to 180 pounds per inch of width (26.8 to 32 kg per cm of width) (static mode). ***Static rollers shall be an 8 to 12 ton roller. The weight of the roller will be varied, by order of the engineer, to obtain contact pressures that will result in the required density.***

2. **Pneumatic-Tired Rollers:** ***Pneumatic-tired rollers shall consist of two axles on which are mounted an odd number of pneumatic tired wheels of equal size and diameter.*** The roller shall have at least nine pneumatic tired wheels mounted in such a manner that the rear group of wheels will not follow in the t racks of the forward group, but shall be spaced to give essentially uniform coverage with each pass. ***There shall be a minimum of ¼ inch (0.636cm) overlap in the tracking between the forward and rear wheels.*** Axles shall be mounted in a rigid frame provided with a loading platform or body suitable for ballast loading. Tires shall be smooth and inflated to 90 p.s.i. (620 kPa). Construction of the roller shall be such that each wheel is loaded to a minimum of 2,300 pounds (1043 kg). ***Wheel loadings may be varied by order of the engineer to obtain contact pressures that will result in the required density.***

3. **Trench Rollers**: Trench rollers shall have an auxiliary wheel that operates outside the area to be compacted at such a distance from the pavement edge as to cause no damage thereto. It shall be mounted upon an axle that is adjustable in height. The auxiliary wheel shall be kept in adjustment so that the compression wheels will develop a smooth, compacted surface true to crown and grade.

   The contact pressure of the compression wheels shall be from 250 to 350 pounds per inch of width (45 to 62.5 kg per cm of width).

4. In lieu of the above requirements pertaining to non-vibratory compaction equipment, consideration will be given to use other types of equipment that are capable of producing equivalent results consistent with the requirements of the specifications.

C. **Pressure Distributor**: The pressure distributor shall meet the requirements of Section 2204.5 entitled "Pressure Distributor."

D. **Hand Tools**: The Contractor shall provide sufficient lutes, rakes, shovels, tamping tools and other equipment as required to produce results consistent with the specifications.

2205.8 Construction Requirements:

A. **Preparation of the Area to be Paved**: The area to be paved shall be true to line and grade, and shall have a properly prepared surface prior to the start of the paving operations. It shall be free from all loose or foreign material.

Where a base is rough or uneven, a leveling course shall be placed and properly compacted before the placing of subsequent courses.

When leveling course is not required, all depressions and other irregularities shall be patched or corrected, and the work approved by the Engineer before the paving operation begins.

The area to be paved shall be primed or tacked uniformly in accordance with the provisions of Section 2204 entitled "Prime and Tack Coat".

The surfaces of curbs, gutters, vertical faces of existing pavements and all structures in actual contact with asphalt mixes shall be painted with a thin, complete coating of asphaltic material to provide a closely bonded, watertight joint.

B. **Weather Limitations**: When the moisture of the aggregate in the stockpile or from the dryer interferes with the quality of mix production, or with normal plant operations, or when pools of water are observed on the surface to be paved, the mixing and placing of hot-mix asphalt will not be permitted without the permission of the Engineer.

Hot Mix asphalt paving shall not be mixed or placed when the ambient air or base temperature is below 40º F (4.4º C), or when there is frost in the subgrade or any other time when weather conditions are unsuitable for the type of material being placed without expressed approval of the Engineer.

Asphalt mix laydown temperatures and rolling times shall conform to the following table:

Minimum Laydown Temperature
Base Temp. 1-1/2" 2" 3" and Greater 40-50º F (4.4-10º C) 300º F (149º C) 285º F (141º C) 275º F (135º C) 50-60º F (10-16º C) 295º F (146º C) 280º F (138º C) 270º F (132º C) 60-70º F (16-21º C) 285º F (141º C) 275º F (135º C) 265º F (129º C) 70-80º F (21-27º C) 280º F (138º C) 270º F (132º C) 265º F (129º C) 80-90º F (27-32º C) 270º F (132º C) 265º F (129º C) 260º F (127º C) 90º+ F (32º+ C) 265º F (129º C) 260º F (127º C) 255º F (124º C) **Rolling Time** 12 minutes 15 minutes 15 minutes

Regardless of the temperature, final acceptance of the asphalt mat shall be based on density determined in accordance with section 2205.8 (E). Rolling times shown are maximum times during which target density must be achieved.

C. **Spreading and Finishing**: The spreading and finishing of each course shall be to the thickness and width indicated on the plans or Special Provisions. The thickness of individual layers shall not exceed the following for the respective type of mixture.

The suggested minimum lift thickness shall be three times the nominal maximum size of the mix. Nominal maximum is defined as the first sieve size larger than the sieve which retains at least 10% of the aggregate by weight.

Asphalt Type Max. Compacted Lift Thickness

Type 1-01 6" (150 mm)
Type 2-01 4" (100 mm)
Type 3-01 3" (76 mm)
Type 4-01 2" (50 mm)
Type 5-01 4” (100 mm)
Type 6-01 3” (76 mm)

Spreading and finishing shall be conducted in the following manner:

1. **Mechanical Pavers**: The base and surface courses shall be spread and struck-off with a mechanical paving machine meeting the requirements of Section 2205.7A entitled "Pavers and Laydown Machines." The paving machine shall be operated so that the material does not accumulate and remain along the sides of the receiving hopper. The wings of the spreader hopper shall not be emptied (flipped) between truck loads.

   a. Equipment which leaves tracks or indented areas which cannot be corrected in normal operation, or which produces other permanent blemishes or fails to produce a satisfactory surface, shall not be used. The screed auger shall be operated approximately ¾ full and the hopper conveyor shall not be allowed to run out of material during the paving operation.

   b. Longitudinal joints and edges shall be constructed to true lines. Lines for the paver to follow in placing individual lanes will be established parallel to the centerline of the proposed roadway. The paver shall be positioned; and operated to follow closely the established line.

   c. Sufficient trucks shall be used to continuously supply asphalt to the paver. Delays in the paving operation shall be kept to a minimum.

   d. The Contractor shall make every effort to minimize the number of passes heavy equipment makes over uncompleted roadway sections.

   e. When using pavers in echelon, the second paver shall follow the edge of the material placed by the first paver. The length of each laydown pass shall be limited, depending on weather conditions, to assure a hot joint and obtain proper compaction.

   f. As soon as the first load of material has been spread, the texture of the unrolled surface shall be checked to determine its uniformity. Segregation of materials shall not be permitted. If segregation occurs, the spreading operation shall be immediately suspended until the cause is determined and corrected.

   g. Transverse joints in succeeding courses shall be offset at least 2 feet (0.6 m). Longitudinal Joints shall be offset at least 6 inches (150 mm). The longitudinal joints shall be laid out so that the surface joint is under the lane markings where possible. The longitudinal joints on the surface lift shall not fall within the wheel path. Extra attention to joint placement is needed when the roadway section include bicycle facilities.

h. Any irregularities in alignment left by the paver shall be corrected ***directly behind the machine. Immediately after the correction, the edge of the course shall be thouroughly compacted by tamping.*** Distortion of the pavement during this operation shall be avoided.

i. Edges against which additional pavement is to be placed shall be placed on a 30º (2:1) bevel, or as specified by the engineer. Any irregularities in the surface of the pavement course shall be corrected directly behind the paver. Excess material forming high spots shall be removed by a shovel or lute. Indented areas shall be filled with hot mix and smoothed. Broadcasting of material shall not be permitted.

2. **Hand Spreading**: In small areas where the use of mechanical finishing equipment is not practical, the mix may be spread and finished by hand. The material shall be distributed uniformly to avoid segregation of the coarse and fine aggregate. Broadcasting of material shall not be permitted. During the spreading operation, all material shall be thoroughly and uniformly distributed by lutes or rakes. Material that has formed into lumps and does not break down readily shall be removed. Following placing and before rolling, the surface shall be checked with templates and straightedges and all irregularities corrected.

D. **Compaction**:

1. **General**: A minimum of three rollers shall be used for compacting mixes unless otherwise approved by the engineer. These rollers shall meet the requirements of Section 2205.7B entitled "Rollers." Additional rollers shall be used as necessary to provide specified pavement density.

Immediately after spreading, each course of the pavement mixture shall be compacted by rolling. The initial or “breakdown” rolling shall be accomplished with a steel-wheeled roller ***meeting the requirements of 2205.7.B.1. and shall take place as closely behind the laydown machine as the temperature and condition of the mat will allow.*** The pneumatic tired roller shall be used to knead and compact the pavement mixture following the initial rolling and preceding the final rolling. Care shall be exercised in the use of the pneumatic-tired roller to ensure that the pavement mixture is sufficiently cooled to avoid “picking up” of the mixture on the tires of the roller, and also to ensure that the pneumatic tired rolling is completed before the mixture becomes too cool to allow satisfactory finish rolling. Final, or finish rolling shall be done with a steel- wheeled roller. The sequence of rolling operations may be changed with the approval of the engineer. All rolling shall be longitudinal, starting

near the edge of the pavement ***and progressing toward the center, overlapping on successive trips by not less than one-third (1/3) and no more than one-half (1/2) the width of the roller. Alternate trips of the roller shall be of slightly different lengths.***

The motion of the roller shall be slow enough at all times to avoid displacement of the hot mixture. The initial compaction roll shall be accomplished with the roller drive wheel leading the tiller wheel. Any displacement occurring as a result

of reversing the direction of the roller, or from any other cause, shall be corrected immediately by the use of rakes and fresh mixture when required. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened, but excess water will not be permitted.

The surface of the mixture after compaction shall be smooth and true to established section and grade. Any surface which is segregated, or is in any way defective, shall be removed and replaced with fresh hot mixture at the Contractor's expense, and shall be immediately compacted to conform with the surrounding area.

2. **Rolling Procedure**:

a. **Thin Layers (Lifts)**: When placing a thin lift (less than 2 in.[50 mm] compacted thickness) in single-lane width or full width, the mixture should be rolled in the following sequence:

1). Transverse joint.

2). Outside edge.

3). Breakdown rolling, beginning on the low side.

4). Intermediate rolling; same procedure as Step 3.

5). Finish rolling.

b. When paving a thin lift in echelon, or when abutting a previously placed lane or other lateral restraint, the mixture should be rolled in the following sequence:

1). Transverse joint.

2). Longitudinal joint.

3). Outside edge.

4). Breakdown rolling, beginning on the low side.

5). Intermediate rolling; same procedure as Step 4.

6). Finish rolling.

c. **Thick Layers (Lifts)**: When placing a thick lift (2 in. [50 mm] or more compacted thickness) in single-lane width or full width, the mixture should be rolled in the following sequence:

1). Transverse joint.

2). Breakdown rolling, beginning 12 to 15 in.(300 to 380 mm) interior to the lower unsupported edge. The return pass shall be made with the edge of

the roller 3 inches (76 mm) exterior to the unsupported edge of the pavement.

3). Breakdown rolling of outside edge. Repeat the process described in Step 2 above on the other longitudinal edge.

4). Intermediate rolling, beginning on the low side.

5). Finish rolling.

d. When paving a thick lift in echelon, or when abutting a previously placed lane or other lateral restraint, the mixture should be rolled in the following sequence:

1). Transverse joint.

2). Longitudinal joint.

3). Breakdown rolling, beginning at the longitudinal joint.

4). Intermediate rolling, beginning on the low side.

5). Finish rolling.

e. When paving in echelon, 2-3 inches (5.08-7.62 cm) of the first mat shall be left unrolled, and rolled when the joint between the lanes is rolled and after the 2nd mat is placed. Edges shall not be exposed more than fifteen minutes without being rolled. Particular attention shall be given to the construction of transverse and longitudinal joints in all courses.

f. In laying a surface mix adjacent to any finished area, it shall be placed sufficiently high so that, when compacted, the finished surface will be true and uniform. Where the grade is slight a level will be used to insure drainage to the desired outlet.

3. **Transverse joints**: When the transverse joint is next to an adjoining lane, the first pass shall be made with a static steel-wheeled roller moving along the longitudinal joint for a few feet. The surface will then be checked with a straightedge and corrections shall be made if necessary. The joint then shall be rolled transversely, with 6 in.(150 mm) of the drum width on the newly laid material. This operation shall be repeated with successive passes, each covering

an additional 6 to 8 in.(150 to 200 mm) of the new mat, until the entire width of a drive roll is on the new mixture. During transverse rolling, wooden boards of the proper thickness should be placed at the edge of the pavement to give the roller a surface to drive on once it passes the edge of tile Mat. if boards are not used, transverse rolling must stop 6 to 8 in. (150 to 200 mm) short of the outside edge to prevent damaging it, and the edge must be compacted later during longitudinal rolling. Transverse joints shall be carefully constructed and thoroughly compacted to provide a smooth riding surface. If the joint has been distorted, it shall be trimmed to a line. The joint face shall be tacked before the fresh material is placed against it.

4. **Longitudinal joints**: Longitudinal joints shall be rolled directly behind the paving operation. The edge to be joined shall be tack coated. The paver screed shall be set to overlap the first mat by 1-2 inches (25-50 mm). The elevation of the screed above the surface of the first mat should be equal to the amount of roll-down expected during compaction of the new mat. For large aggregate mixes, the coarse aggregate in the material overlapping the cold joint should be carefully removed and wasted, leaving only the finer portion of the mixture to be pressed into the compacted lane at the time the joint is rolled. For mixes with smaller coarse aggregate, such as surface courses, the overlapping material should be pushed with a lute into a hump over the joint area prior to compaction.

5. **Edges**: The edges of the pavement shall be rolled concurrently with or immediately after rolling the longitudinal joint. ***Care shall be exercised in consolidating the material along the entire length of the edges. Before compaction, the materials along the unsupported edges shall be slightly elevated with a tamping tool or lute. This will permit the full weight of the roller wheel to bear on the material to the extreme edges of the mat. In rolling pavement edges, roller wheels shall extend approximately two inches (5cm) beyond the pavement edge, provided lateral displacement is not excessive.***

6. **Breakdown Rolling**: Breakdown rolling shall immediately follow the rolling of the longitudinal joint and edges. Rollers shall be operated as close to the paver as necessary to obtain adequate density without causing undue displacement. The breakdown roller shall be operated with the drive wheel nearest the laydown machine. Exceptions may be made by the Engineer when working on steep slopes or super-elevated curves.

7. **Intermediate Rolling**: Pneumatic-tired rollers as specified in Section 2205.7B entitled "Rollers" shall be used for intermediate rolling. The intermediate rolling shall follow the breakdown rolling as closely as possible and while the paving mix is still of a temperature that will result in maximum density from this operation. Pneumatic-tired rolling shall be continuous after the initial rolling until all of the mix placed has been compacted to the required density. Turning of pneumatic-tired rollers on the hot paving mix which causes displacement shall not be permitted.

8. **Finish Rolling**: The finish rolling shall be accomplished while the material is still warm enough for the removal of roller marks. All roller marks shall be

removed by the finish rolling operation. All rolling operations shall be conducted in close sequence.

9. In places inaccessible for the operation of standard rollers as specified, compaction shall be performed by trench rollers or others meeting the requirements of Section 2205.7B entitled "Rollers." The trench roller shall be operated until the lift is thoroughly compacted. Hand tamping, manual or mechanical, may be used in such areas, if such operations will give the required density.

E. **Density and Surface Requirements**: The completed asphalt concrete paving shall have a density equal to or greater than 95% for Type 1-01 and 5-01 Asphalt Concrete Base and 96% for Types 2-01, 3-01, 4-01, 5-01 and 6-01 Asphalt Concrete Surface. Density is based on laboratory specimens prepared as specified in Section 2205.3B entitled "Mix Design Criteria" and made from plant mix conforming to the job mix formula. Density testing shall conform to ASTM D 2950 or ASTM D 2726 or D 1188.

If cores are used to determine density, one or more tests (one test equals three cores) will be taken for each tonnage lot and averaged to determine acceptance. Two cores will be taken from the lane being paved, and one core centered on the longitudinal joint with the adjoining lane. The Engineer will mark the locations of all cores. The compacted surface shall be 0-1/4 in. (0-6 mm) above the edge of curb. All unsatisfactory work shall be repaired, replaced or corrected. The surface of the final course shall be of a uniform texture and conform to line and grade shown on the plans.

The field control density will be based on the density of plant produced mix compacted in a laboratory in accordance with Section 2205.3 (C).

2205.9 Method of Measurement: Asphaltic concrete base, asphaltic concrete surface, or asphaltic concrete base and surface may be included in the proposal as separate items, or as a single item, and may be measured by one of the following:

A. Per square yard (square meter) or tenth part thereof for the specified depth.

B. Per ton (metric ton) or tenth part thereof.

C. If pavement smoothness is required in the proposal, pay adjustments will apply to the traffic lane design driving width only in accordance with Section 2211.

2205.10 Basis of Payment: Asphaltic Concrete Surface, Asphaltic Concrete Base, or Asphaltic Concrete Base and Surface whether used for paving, patching, or leveling courses will be paid for by one of the following:

A. Contract unit bid price.
B. Contract lump sum bid price.
C. Testing described in Section 2205.3 paragraph I is subsidiary to the price bid for asphalt unless otherwise provided for in the contract.

SECTION 2206 ASPHALT CRACK SEALING, ASPHALT CRACK FILLING, CHIP SEALING, SLURRY SEALING, AND MICROSURFACING

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

ASTM
C 88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
C 117 Test Method for Materials Finer than 75- um (No. 200) Sieve in Mineral Aggregates by Washing
C 131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates D 36 Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
D 140 Practice for Sampling Bituminous Materials
D 242 Standard Specification for Mineral Filler For Bituminous Paving Mixtures D 244 Standard Test Methods for Emulsified Asphalts
D 946 Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
D 977 Standard Specification for Emulsified Asphalt
D 1073 Standard Specification for Fine Aggregate for Bituminous Paving Mixtures
D 1190 Standard Specification for Concrete Joint Sealer, Hot-Applied Elastic Type
D 2027 Standard Specification for Cutback Asphalt (Medium-Curing Type) D 2028 Standard Specification for Cutback Asphalt (Rapid-Curing Type) D 2397 Standard Specification for Cationic Emulsified Asphalt
D 2419 Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
D 3381 Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
D 3405 Standard Specification for Joint Sealants, Hot-Applied, for Concrete and Asphalt Pavements
D 3910 Standard Practices for Design, Testing, and Construction of Slurry Seal D 5078 Standard Specification for Crack Filler, Hot-Applied, for Asphalt Concrete and Portland Cement Concrete Pavements
D 6372 Standard Practice for Design, Testing, and Construction of Micro-Surfacing

ISSA
Bulletin #139 “Test Method to Classify Emulsified Asphalt/Aggregate Mixture Systems by Modified Cohesion Tester Measurement of Set and Cure Characteristics”

AASHTO
T 53 Softening Point of Bitumen (Ring-and-Ball Apparatus)
T 59 Testing Emulsified Asphalts
T 104 Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate T 112 Clay Lumps and Friable Particles in Aggregate
MP 1 Specification for Performance Graded Asphalt Binder
M 208 Cationic Emulsified Asphalt

Manual of Uniform Traffic Control Devices, latest Edition (MUTCD)

2206.1 Summary: This section includes minor pavement patching and crack cleaning and sealing, construction of asphalt seal-coat, microsurfacing and slurry seal, complete, in place, at the locations specified in the Special Provisions and as directed by the Engineer.

2206.2 Crack Sealing/Filling:

A. **Crack Sealant Application:** Material used for crack sealing shall be a modified asphalt product selected to be compatible with the environment of application and found to meet the criteria of one of the following specifications, ASTM D 1190 or ASTM D3405 with a modified resilience value between 30 and 60 percent, or material meeting the requirements of ASTM D 5078. Crack Sealing shall be understood to be the process of placing an asphaltic material into and/or above working cracks to prevent the intrusion of surface water and/or incompressibles into the crack. A working crack shall be understood to correspond to cracks that sustain more than 0.1 inches (2.5 mm) movement during the course of the year.

B. **Crack Filling Application:** Material used for crack filling shall be an viscositygraded AC-20 asphalt product meeting the criteria of ASTM D 3381 Table 1, a penetration-graded asphalt product having a penetration number in the range of 85-100 measured in accordance with ASTM D 946, or material meeting the criteria of ASTM D-5078. Crack filling material may contain polyester or polypropylene fibers. Material satisfying the criteria of a crack sealant may also be used as a crack filling material. Crack filling shall be understood to be the process of placing an asphaltic material into non-working cracks to substantially reduce water infiltration and reinforce adjacent cracks. Crack filling materials shall not be used for sealing pavements in preparation for an overlay.

C. Equipment:

1. **Router:** This machine shall be an impact cutterhead with a minimum of 6 tungsten-carbide cutters. The router blades shall be driven with a minimum 25-hp gasoline engine.

2. Compressor: The compressor shall be a two-stage compressor rated as a minimum 40 CFM unit capable of delivering compressed air to the nozzle at a minimum pressure of 100 psi. The compressor shall be equipped with a filter trap to eliminate oil and moisture from the air line.

3. **Hot-Air Lance (HCA):** The hot air lance shall be capable of delivering super heated air at an exit temperature in excess of 1500$_{o}$F and at a velocity in excess of 1000 ft/sec against the side walls of the crack. The hose shall be wrapped with reflective tape to keep hoses together and to protect worker in low light situations.

4. Melter/Applicator:

a. The melting pot shall consist of double-boiler type jacket and shall be

equipped with a full sweep agitator that promotes proper mixing and maintains uniform heat distribution throughout the melting pot. The melting pot shall have sufficient capacity of the heat transfer oil reservoir that heat transfer oil is able to come in contact with 100 percent of the outside area of the jacket. The melting pot shall be equipped with a drain plug to permit 100 % of the heat transfer oil to drain from the boiler. The heat transfer oil shall consist of ISO grade 68.

b. The heat transfer oil shall be heated with a properly sized vapor fuel LP or diesel fuel burner. The heat shall be applied directly to the bottom of the heat transfer tank. The burner shall be lit by an electric spark igniter controlled by a sensor, which detects a lack of burn or ignition and subsequently shuts down the fuel supply. The unit must be capable of starting at ambient temperature and bringing the sealant up to the required applications temperature within the period of approximately one hour while continuously agitating and recirculation the sealant. The unit shall have the capability of independently monitoring both the transfer oil and melting pot temperatures. The unit shall be capable of heating a variety of application materials within a range of temperatures between 200°F (93.3°C) and 425°F (218.3°C). The sealant should not be heated to a temperature in excess of that specified by the manufacturer.

c. The agitator and material pump shall be actuated by hydraulic motors driven by a single, pressure-compensated hydraulic pump. Hydraulic fluid should only be pumped to the agitator or material pump motor on demand.

d. The sealant shall be applied to the pavement through an application system consisting of a pressure feed hose and wand. The hose shall be specially manufactured to handle liquid asphalt products up to 450°F (218°F) at 350 psi (2400 kPa) working pressure. The hose shall not be less than 15 feet in length. The hand wand shall be constructed of steel of sufficient strength to withstand normal day-to-day operations. Material flow through the ward shall be controlled with a toggle switch. A squeegee shall be used to distribute the asphalt evenly and uniformly in the recommended configuration.

e. All equipment shall be in good working order, as determined by the Engineer, on a day-to-day basis. The Engineer shall not be responsible for payment of labor or rental charges on days when the equipment is not in good working order.

D. **Preparation:**

1. Crack sealing shall be limited to working, transverse cracks that are more than 1/4-inch (6mm) in width. Cracks 1/4- to 5/8-inches (6mm to 16 mm) in width requiring sealing shall be routed to 5/8-inches (16 mm) in width. Cracks 5/8- to 1-inch (16mm to 25 mm) in width requiring sealing do not require routing but

shall be thoroughly cleaned and sealed. Cracks shall be sealed using either the Standard Reservoir and Flush or Standard Recessed Band-Aid configurations. Cracks greater than 1-inch (25 mm) in width shall be filled with either an emulsion slurry and sand, widened and backfilled with Hot-Mix Asphalt (HMA),

or repaired in a manner approved by the Engineer. Cracks requiring filling do not require any routing but simply thorough cleaning. Cracks shall be filled using either the Simple Band-Aid, Simple Flush Fill, or Capped Configurations.

2. Cracks shall be cleaned free of all deleterious materials, including any old sealant; incompressibles; and organic material. The crack shall be free of any standing water and any moisture along the sidewalls of the crack as evidenced by a darker color than the adjacent pavement. This shall be accomplished in one of three manners: **wire-brushing** – where the crack channels are cleaned with a mechanical wire brush followed by high-pressure compressed air; hot **air blasting** – where the crack channels are cleaned, heated, dried with hot compressed air (HCA) lance connected to a high pressure air compressor; or **high-pressure air blasting** – where the crack channels are cleaned with high pressure compressed air. Pavement cracks to be sealed or filled shall be cleaned and dried using one of the methods described previously within 10 minutes of the application of the sealer/filler. Equipment for the two operations should be kept in a compact configuration such that not more than 50 feet separates equipment required by the two operations. Additionally, not more than 10 minutes time shall passed between the cleaning of a crack and the filling of the crack with the appropriate sealing/filling material.

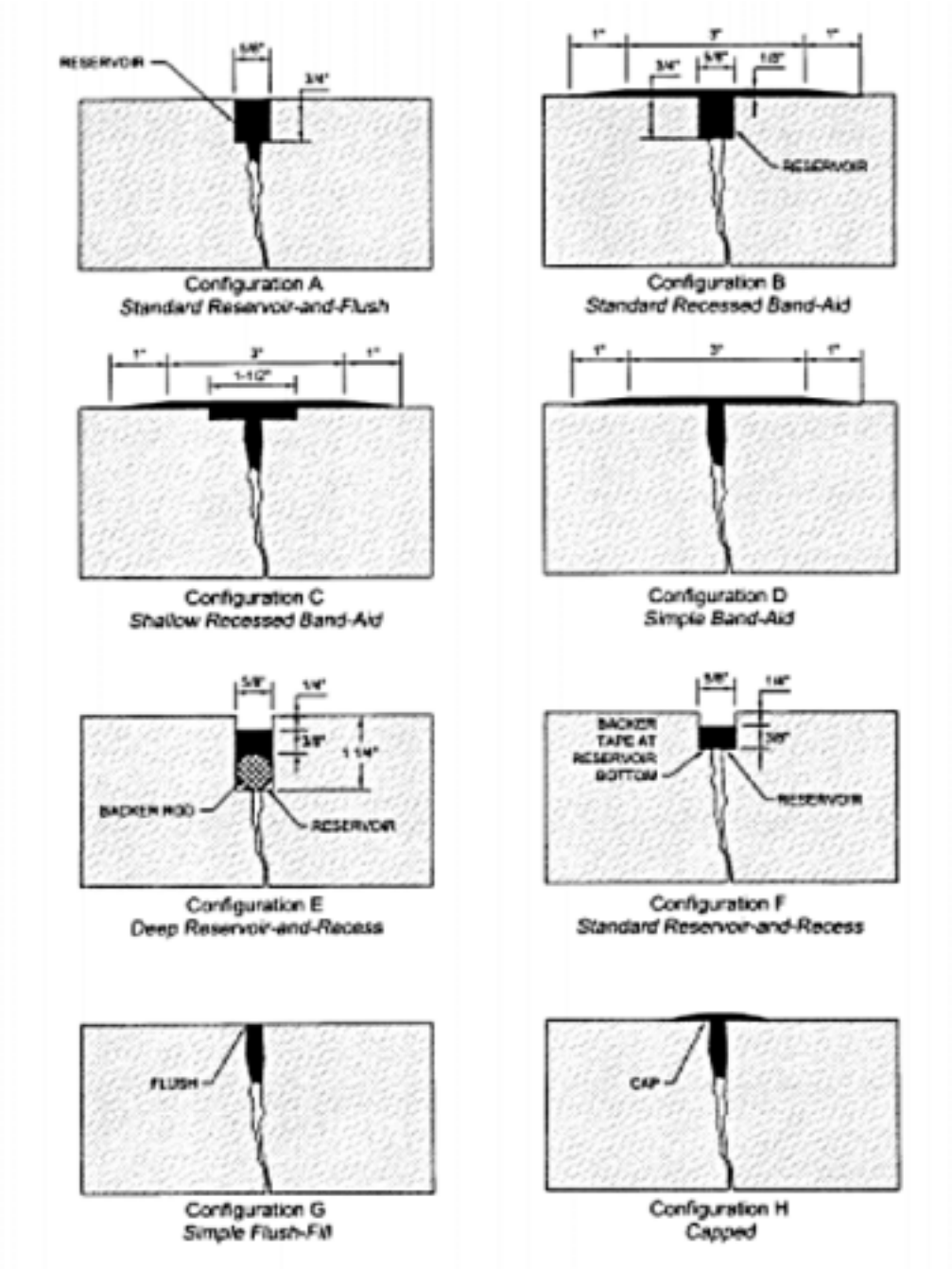
E. **Installation:**

1. Sealer/filler materials should not be applied when the pavement surface is wet or when the pavement temperature is less than 40°F (4.5°C) without the use of hot air blasting or the approval of the Engineer.

2. Sealant/Crack filler should be applied to fill the crack from the bottom to the top in order to prevent air bubbles from forming and creating a point of weakness in the sealant. Upon application, hot sealant/filler material should not make a hissing or popping noise indicative of moisture in the crack. Noises of this kind should indicate that additional drying of the crack is necessary in order to facilitate proper bonding of the material to the sidewalls of the crack. Application of the sealant/filler material shall be made in such a way as to completely fill the crack and provide enough excess to facilitate completion of the seal/fill consistent with the configuration selected. The use of a squeegee or applicator disk to shape the application material to conform with one of the material placement configurations shown on Figure 1 is required. Care shall be taken not to place any sealant/filler material on top of any pavement markings, manholes, or drainage castings. The Contractor shall be responsible to prevent tracking of the sealant/filler material onto the adjacent pavement surfaces to the satisfaction of the Engineer.

3. The manufacturer's technical representative shall be notified by the Contractor and shall be present during the initial installation. Prior to beginning the work, the Contractor will be required to demonstrate to the satisfaction of the Engineer

and the manufacture's representative his ability to apply the material in accordance with the manufacture's specifications. Operations and procedures which are considered by the Engineer as detrimental to the effectiveness of the material will not be permitted.



Material placement configurations for AC crack treatments.
Figure 1

2206.2 2206.3

2206.3 Improved Street Chip Seal:

A. **Description**: This work shall consist of the application of a thin, uniform layer of emulsified asphalt to the existing pavement surface in order to universally seal cracks from the intrusion of surface water. Cover aggregate shall then be uniformly

distributed upon the asphalt layer and seated in place with the use of a rubber-tired roller. Any excess aggregate material shall be removed, leaving a durable wearing surface.

B. **Material Requirements:**

1. **Emulsified Asphalt:**

a. The asphaltic sealant material applied to the roadway surface shall consists of a rapid-setting emulsified asphalt either an anionic RS-2 meeting the criteria of ASTM D-977 or a cationic CRS-2 meeting the criteria of ASTM D-2397. These materials may be modified with rubber products in the form of liquid latex, styrene-butidane-rubber, or styrenebutidane-styrene to enhance performance of the material as approved by the Engineer. If a polymer modified material is used, the emulsified asphalt shall meet the additional specification criteria required by the Engineer.

b. A sample of the emulsified asphalt may be taken from any of the distributors or delivery tankers on the job site. Failure of the emulsified asphalt to meet the material specification criteria at the time of application shall require the Contractor, at his own expense, to correct all unsatisfactory areas. No additional areas shall be sealed until correction has been make to the satisfaction or the Engineer.

2. **Cover Aggregate – Precoated Chips:**

a. **Materials:** Aggregate materials shall consist of an approximately cubic and uniformly-graded, hard, durable 100 percent crushed and washed limestone, sandstone, lightweight aggregate, basalt/porphyry, granitic material, steel slag, gravel, or chat. Chat is a by-product from the production of lead and zinc from the area located in southwestern Missouri, northeastern Oklahoma, and southeastern Kansas. Lightweight aggregate shall consist of expanded shale. The application rates reported in these specifications is for the Bethany Falls Limestone in the Kansas City area. The specific gravity of this material is approximately 2.58

b. **Physical properties required of the aggregate materials:**

Los Angeles Abrasion (ASTM C 131) 35% loss (maximum)
Soundness using Mag. Sulfate (ASTM C88) 15% loss (maximum)
Total Shale, clay, coal, and lignite content 0.5% by weight (max)
Absorption 4.0% (max)

c. **Gradation:** Gradation of cover aggregates shall conform to the following percentages:

Sieve Size Percent Passing
¾” (19mm) 100
½” (12.5mm) 90-95
3/8” (9.5mm) 30-50
No. 4 (4.75mm) 0-5

No. 8 (2.36mm) 0

d. **Precoating of Chips:** Aggregate chips shall be uniformly heated in a dryer until surface dry. All material shall be free of moisture, dust, and lumps and shall be approved by the Engineer prior to use. The aggregate chips shall then be pre coated with 0.9%+ 0.025% a liquid asphalt cement having a viscosity of 2000 poise, +20%. The asphaltic material and hot aggregate shall be measured separately and accurately immediately before introduction into the mixer. Mixing shall be accomplished at a temperature between 275$_{o}$F (135$_{o}$C) and 325$_{o}$F (163$_{0}$C), sufficient to produce a thoroughly and uniformly coated aggregate. The pre-coated chips shall be stockpiled at least 3 days prior to use.

3. **Weighing:** Weighing of cover aggregate shall be accomplished by the Contractor on scales that he furnishes for the purpose of weighing the cover aggregate as required in Section 2205.6 entitled "Scales and Weighing of Vehicles." All loads of cover aggregate will be weighed and evidenced by approved delivery tickets showing the net weight in pounds (kilograms) for each load. Two copies of each ticket shall accompany the load to the work site. Upon the load being incorporated in the work, the Engineer will sign both copies and one of these copies will be returned to the Contractor.

C. **Spot Patching**: Areas where base failure of the roadway has occurred, or where the surface is broken out shall be repaired prior to the sealing operation. The failed sections will be marked by the engineer, and shall be removed by sawing a neat rectangular hole into the pavement. The failed material shall be removed without damage to the adjacent pavement. Where base failures have occurred, the pavement shall be removed to the subgrade which shall be corrected to the satisfaction of the engineer prior to patching. Unstable material shall be overexcavated and replaced with base materials meeting the requirements of Section 2202. All surfaces shall be properly primed and tacked in accordance to Section 2204.

The prepared hole shall be patched with hot-mix asphaltic patching material by placing in layers not to exceed 2 inches (5.08 cm); each layer being thoroughly compacted before the next layer is placed. After the patching material is placed and raked to a uniform surface, it shall be thoroughly compacted by rolling with a roller meeting the requirements of Section 2205.7. The edges shall be well bonded with the old surface. The completed patch shall be in the same plane as the existing pavement.

The asphaltic concrete used for patching at the different locations shall be as directed by the Engineer and shall conform to one of the mixes as set out-in Section 2205.3.

D. **Sealing**:

1. **Cleaning**: After all holes and cracks have been repaired to the satisfaction of the Engineer, and immediately before sealing the Contractor shall thoroughly clean the area to be sealed with a mechanical pickup type sweeper to insure proper adhesion of the new seal coat to the existing pavement. The street shall be dry before applying the seal coat.

2. **Sealing**: After the street has been prepared as set forth above the Contractor shall apply the emulsified asphalt by means of an approved distributor meeting the requirements of Section 2204.5. Provisions shall be made by the Contractor to properly protect the curbs and gutters from the asphaltic spray. Emulsified asphalt shall be applied at a rate between 0.28 and 0.35 gallons per square yard (1.27 and 1.58 Liters per square meter). The specific rate for each job will be determined by the Engineer in the field. Immediately after the application of the asphalt, the Contractor shall, by means of a self-propelled mechanical spreader, apply a uniform layer of cover aggregate. This material shall be spread at the rate specified by the Engineer. This rate shall be between 18 and 25 pounds per square yard (9.7and 13.6 kg per square meter) of pre-coated limestone chips. The application rate shall be set to prevent bleeding of the asphaltic material through the cover aggregate. If material is spread on any area in excess of the amount specified by the Engineer, the surplus shall be immediately removed and placed elsewhere as directed. No payment will be made to the Contractor for the picking up and redistribution of such excess. Hand spreading will be permitted only in those areas not accessible to the mechanical spreader.

   Immediately after spreading the cover aggregate, the entire surface shall be rolled with multiple-wheel, pneumatic-type rollers meeting the requirements of Section 2205.7. Rolling shall be continued until a thoroughly compacted surface with a uniform aggregate coverage has been obtained, a minimum of 6 passes. The Engineer may require additional rollers if one roller cannot keep up with the operations. The first pass of the rollers over the cover aggregate shall not exceed 3 miles per hour (5 km per hour). The rollers shall not exceed 5 miles per hour (8 km per hour) during any rolling operation.

   Forty-eight hours after spreading the cover aggregate, the entire surface shall be swept with a mechanical pickup type sweeper to remove any loose or excess cover aggregate.

   During the sealing operation as described above, the Contractor shall cooperate with the Engineer in arranging a program and schedule of work so traffic may be handled or routed around or through the section being sealed. Whenever possible, the street will be closed; but when this is not possible, the sealing will be done in strips while traffic is diverted to the balance of the street. No traffic will be permitted on the sealed portion of the roadway until rolling is completed. All traffic control signage shall conform to the MUTCD handbook for traffic control in work zones.

   When bleeding occurs or more material is required, additional cover aggregate shall be spread as directed. As soon as the cover material has adhered to the surface, and the emulsion is thoroughly cured all excess cover aggregate shall be removed with a mechanical pickup type sweeper. This curing period is generally 48 hours, but may be adjusted by the engineer.

2206.4 Unimproved Street Chip Seal:

A. **Description:** This work shall consist of the application of a thin, uniform layer of liquefied asphalt to the surface of the existing roadway which may either consist of an existing surface of asphaltic concrete or a gravel-surfaced road. Cover aggregate shall then be distributed uniformly upon the liquefied asphalt and seated in place with the use of a rubber-tired roller leaving a durable wearing surface..

B. Requirements for Liquefied Asphalt Materials: Asphaltic materials used for the sealing of unimproved streets shall be liquefied either by the introduction of a diluent (cutback) or by emulsification. The particular grade of cutback material for use on a particular roadway shall be determined by the Engineer. Cutback asphaltic materials shall comply with the requirements of either ASTM D-2027 or ASTM D-2028. The particular grade of emulsified asphalt material for use on a particular roadway shall be determined by the Engineer. Anionic emulsified asphaltic materials shall comply with the requirements for either a rapid or medium-setting emulsion as described in ASTM D-977 while cationic emulsified asphaltic materials shall comply with the requirements for either a medium or rapid-setting emulsion as described in ASTM D 2397.

C. Requirements for Cover Aggregate Materials:

a. Aggregate materials shall consist of an approximately cubical and uniformly sized, hard, durable 100 percent crushed and washed limestone, sandstone, lightweight aggregate, basalt/porphyry, granitic material, steel slag , gravel, or chat. Chat is a by-product from the production of lead and zinc from the area located in southwestern Missouri, northeastern Oklahoma, and southeastern Kansas. Lightweight aggregate shall consist of expanded shale. Due to the variation in specific gravities between these materials, the application rate will need to be adjusted to reflect the change in specific gravity. The application rates reported in these specifications is for the Bethany Falls Limestone in the Kansas City area. The specific gravity of this material is approximately 2.58

b. Physical properties required of the aggregate materials:

Los Angeles Abrasion (ASTM C 131) 35% loss (maximum)
Soundness using Mag. Sulfate (ASTM C88) 15% loss (maximum)
Total Shale, clay, coal, and lignite content 0. 5% by weight (max)
Absorption 4.0% (max)

Aggregate chips applied to cutback asphalt shall be shown to have moisture content less than 1 percent immediately prior to application. Aggregate chips applied to

emulsified asphalt shall be shown to have moisture content of 3 percent or less immediately prior to application.

Gradation for aggregate chips used for Single sealing:

Square Sieve Size	Percent Passing
½ "(12.5mm)	100
3/8" (9.5mm)	80-100
No. 4 (4.75 mm)	0-26
No. 10 (2.00mm)	0-2

Gradation for aggregate chips used for the first application of a Double sealing:

Square Sieve Size	Percent Passing
¾" (19mm)	100
½" (12.5mm)	90 to 100
3/8" (9.5mm)	40 to 70
No. 4 (4.75mm)	0 to 15
No. 10 (2.0mm)	0-2

Gradation for aggregate chips used for the second application of a Double sealing shall conform to the gradation for a Single sealing above.

The Contractor shall furnish scales for weighing cover aggregate as required in Section 2201.6 entitled "Scales and Weighing of Vehicles." All loads of cover aggregate will be weighed as required, and evidenced by approved delivery tickets showing the nearest weight in pounds (kilograms) for each load. Two copies of each ticket shall accompany the load to the work site. In order for the load to be received and incorporated into the work, both copies will be signed by the inspector and one of these copies returned to the Contractor.

D. Sealing:

Sealing shall be accomplished in the same manner as described in Section 2101.1.c.1 except as modified herein. Where a seal coat is applied to a gravel-surface roadway the surface shall be prepared in accordance with Section 2201.5. The surface shall then be primed in accordance with Section 2201.6 prior to the application of the seal coat.

The application rate of cutback asphalt shall be in the range 0.25 to 0.45 gallons per square yard (1.13 and 2.04 liters per square meter) as directed by the Engineer or demonstrated to result in a satisfactory seal in a test strip provided by the Contractor. Anti-Strip agent may be added to Cutback Asphalt at a rate not to exceed 1 percent of the residual asphalt volume as directed by the Engineer in order to improve adhesion of the asphalt to the moist aggregates. The cutback agent shall be thoroughly mixed and blended with the cutback asphalt. The application rate of emulsified asphalt shall be in the range of 0.28 to 0.40 gallons per square yard (1.27 to 1.81 liters per square meter) as approved or directed by the Engineer. The distributor used shall meet the requirements of Section 2204.5.

Limestone materials shall be spread at the rate specified by the Engineer with the range of 16 to 24 pounds per square yard (8.70 and 13.05 kg per square meter).

Where double sealing is indicated on the plans or required by the Engineer, the area shall be treated with two seal coats. The application rate of the asphaltic material for the first application shall be approximately one-half of that used for a single seal with the remainder applied during the second seal application. The application rate of the first application of cover aggregate shall be within the range specified for a single seal. The application rate of the second application shall be approximately one-half the application rate of the first layer.

2206.5 Improved Street Slurry Seal:

A. **Description**: This work shall consist of the application of Slurry Seal Material to an existing surface. The Slurry Seal shall consist of a mixture of emulsified asphalt, mineral aggregate and potable water, properly proportioned, mixed and spread on the surface in accordance with this specification and as directed by the Engineer.

B. **Materials**:

1. **Emulsified Asphalt**: The emulsified asphalt shall conform to Grade SS-1h of Specification ASTM D 977, for emulsified asphalt, or Grade CSS-1h of Specification ASTM D 2397, for cationic emulsified asphalt. Quick-set emulsified asphalts QS-1h and CQS-1h may also be used. They shall conform to Specifications ASTM D 977 and ASTM D 2397 respectively, except that the test requirements for cement mixing and storage stability shall not apply. Refer to the International Slurry Surfacing Association (ISSA) Bulletin NO. 139. The emulsified asphalt shall have not less than 60% residue after distillation when tested using Specification ASTM D 244 and shall have a penetration of between 40 and 90 when tested using specification ASTM D 2397 at 77° F (25° C). Each load of emulsified asphalt delivered shall have a certificate of analysis/compliance matching the material used in the mix design.

2. **Aggregate for Slurry Seal**: The mineral aggregate used for this work shall be natural or manufactured crushed granite, slag, or chat which is a byproduct of the milling of lead and zinc ores and shall conform to one of the following grading requirements when tested in accordance with Specification ASTM C136 and ASTM C117. All aggregate shall conform to the quality requirements of Specification ASTM D 1073.

GRADING REQUIRMENTS FOR AGGREGATE

	Amount Passing Sieves, Weights %		
3/8 inch (9.5 mm)	100	100	
No. 4 (4.74 mm)	100	90-100	+/- 5%
No. 8 (2.36 mm)	90-100	65-90	+/- 5%
No. 16 (1.18 mm)	65-90	45-70	+/- 5%

No. 30 (600 um)	40-65	30-50	+/- 5%
No. 50 (300 um)	25-42	18-30	+/- 4%
No. 100 (150 um)	15-30	10-21	+/- 3%
No. 200 (75 um)	10-20	5-15	+/- 2%

The percent passing the No. 200 (75 um) sieve shall be determined by Specification ASTM C 117.

3. **Mineral Filler**: Mineral Fillers are of two types, chemically active and chemically inactive. Both shall conform to Specification ASTM D 242. Chemically active mineral fillers such as Portland cement, hydrated lime, and ammonium sulfate are used to improve workability, regulate the setting time, and, in some cases, to alter the aggregate gradation. Chemically inactive mineral fillers such as limestone dust, fly ash, and rock dust are used mainly to alter aggregate gradation.

4. **Water**: All water used shall be potable and shall be free of harmful salts or contaminates.

5. **Mix Design**: The Engineer shall approve all Slurry Seal Materials and methods prior to mixing and application. The contractor shall submit a completed and tested Slurry Seal mix design for the Engineer's approval. The approved test method for Emulsified Asphalt Slurry Seal shall be found in Specification ASTM D 3910. The mix design shall be made with the same materials the contractor will be using on the project. The percentage of each material must be shown on the mix design. Proportions of the mixture shall be as follows unless variations are approved by the Engineer:

	Type 1	Type II
Aggregate for Slurry Seal	8.0 to 12.0 lbs per sq yd 3.63 to 5.44 kg/m2 (dry basis)	13.5 to 16.5 lbs per sq yd 7.32 to 8.95 kg/m2 (dry basis)
Emulsified Asphalt (Residual Asphalt Content)	10.0 to 16.0 % by weight of dry aggregate	7.5 to 13.5 % by weight of dry aggregate
Mineral Filler	1.5 to 3.0 % by weight of dry aggregate	1.5 to 3.0 % by weight of dry aggregate
Water	Minimum amount necessary to obtain a fluid and homogenous mixture	Minimum amount necessary to obtain a fluid and homogeneous mixture

Once the proper consistency is obtained, changes in proportioning of the various components of the mixture shall be held to a minimum.

6. **Application Rates**: The Slurry Seal mixture shall be of proper consistency at all times so as to provide the application rate required by the surface condition and shall be in accordance with the following:

   Type I: 8.0 to 12.0 lbs per sq yd (3.63 to 5.44 kgs per sq meter)

   Type II: 13.5 to 20 lbs per sq yd (5.44 to 9.07 kgs per sq meter)

   Application rates are affected by the unit weight of the aggregate, the gradation of the aggregate and the demand of the surface to which the slurry seal is being applied.

7. **Equipment**: The slurry mixing machine shall be a continuous flow mixing unit and shall be capable of delivering accurately a predetermined proportion of aggregate, water and asphalt emulsion to the mixing chamber and to discharge the thoroughly mixed product on a continuous basis. The equipment shall be capable of prewetting the aggregate immediately prior to mixing with the emulsion. The mixing unit of the mixing chamber shall be capable of thoroughly blending all of the components together without violent mixing. The mixing machine shall be equipped with an approved fines feeder that includes an accurate metering device or method to introduce a predetermined proportion of mineral filler into the mixer. The mineral filler shall be fed at the same time and location as the aggregate. The fines feeder shall be required whenever added mineral filler is a part of the aggregate blend. The mixing machine shall be equipped with a water pressure system and fog-type spray bar, adequate for complete fogging of the surface receiving slurry treatment. Attached to the mixer machine shall be a mechanical type squeegee distributor, equipped with flexible material in contact with the surface of the pavement to prevent loss of slurry from the distributor. It shall be maintained so as to prevent loss of slurry on varying grades and crown by adjustments to insure uniform spread. There shall be a steering device and a flexible strike-off. The spreader box shall have an adjustable width. The box shall be kept clean and build up of asphalt and aggregate on the box or in the corners shall not be permitted. Use of burlap drags or other drags shall be approved by the Engineer. Hand squeegees, shovels, and other equipment shall be provided if necessary to supplement the slurry mixing machine. Power brooms, power blowers, air compressors, and hand brooms suitable for cleaning the surface and cracks of the existing surface shall be implemented to provide a clean surface.

8. **Construction Requirements**:

   a. **Surface Preparation**: Immediately prior to applying the slurry, clean the surface of all loose material, mud spots, vegetation, and other objectionable material. Any standard cleaning method used to clean pavements will be acceptable except water flushing. A pickup sweeper must be used unless otherwise approved by the Engineer. Manholes, valve boxes, drop inlets, and other service entrances shall be protected from the slurry seal by a method approved by the Engineer.

b. **Application**: The surface shall be prewetted by fogging ahead of the slurry box unless waived by the Engineer. Water used in prewetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the slurry box. The slurry mixture shall be of the desired consistency upon deposit on the surface and no additional elements shall be added. Total time of mixing shall not exceed 4 minutes. A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that a complete coverage is obtained. Overloading of the spreader shall be avoided. No lumping, balling, or unmixed aggregate shall be permitted. No segregation of the emulsion and aggregate fines from the coarse aggregate shall be permitted. If the coarse aggregate settles to the bottom of the mix, the slurry shall be removed from the pavement. No excessive breaking of emulsion shall be allowed in the spreader box. No streaks, such as those caused by oversized aggregate will be left in the finished pavement.

c. **Hand Work**: Approved squeegees shall be used to spread slurry in areas not accessible to the slurry mixer. Care should be exercised in leaving no unsightly appearance from the hand work.

d. **Curing**: Treated areas shall be allowed to cure for four hours, or until such time as the Engineer permits their opening to traffic.

e. **Weather Limitation**: The slurry seal shall not be applied if either the pavement or air temperature is below 60° F (18° C) and falling. The mixture shall not be applied if the relative humidity exceeds 80%.

f. **Traffic Control**: Suitable methods shall be used to protect the slurry from all types of traffic until sufficiently cured to accept traffic. The length of time before traffic is permitted to use the surface depends on the type of emulsified asphalt, mixture characteristics, and weather conditions.

g. **Lines**: Care shall be taken to insure straight lines along curb and shoulders. No runoff on these areas will be permitted. Lines at intersections will be kept straight to provide good appearance.

h. **Property Owners Notification**: The Contractor shall supply and place door tags on the doors of all involved property owners. The door tag shall comply with the sample language provided by the Engineer.

i. **Provisions for Public Convenience During Sealing Operation**: The Contractor shall provide and maintain sufficient signs, barricades, warning lights, flag persons and watch persons to protect the work and public in a manner satisfactory to the Engineer. Any areas damaged prior to acceptance by the City shall be repaired at the Contractor's expense. "No Parking" signs will be furnished by the Contractor. These signs shall comply with the standards established by the MUTCD with regard to size, color, working height and placement. When "No Parking" signs are posted on the streets with parking meters, the Contractor shall cover the parking meter heads with cloth or paper bags. The Contractor shall take all necessary precautions to protect the public (pedestrian and vehicular) from flying debris. The

Contractor shall use warning signs and devices to warn motorists and pedestrians of work ahead.

2206.6 Improved Street Micro-Surfacing:

A. **Description**: This work shall consist of the application of a polymer modified asphalt emulsion, mineral aggregate, mineral filler, potable water, and other additives, properly proportioned, mixed and spread on a paved surface in accordance with this specification and as directed by the Engineer.

B. **Materials**:

1. **Emulsified Asphalt**: The emulsified asphalt shall be a quick wet polymer modified asphalt emulsion conforming to the requirements specified in Specification ASTM D 2397 or Specification AASHTO M 208 for Grade CSS 1h. The cement mixing test shall be waived for this emulsion. The polymer material shall be milled or blended into the asphalt or emulsifier solution prior to the emulsification process. The emulsified asphalt shall have not less than 62% residue after distillation when tested using specification ASTM D244. The temperature for this test shall be held below 280° F (138° C). Higher temperatures may cause the polymers to break down. In addition, the emulsified asphalt shall have a penetration of between 40 and 90 when tested using Specification ASTM D 2397 at 77° F (25° C) and shall have a minimum softening point of 135° F (57° C) when tested using Specification ASTM D 36. Each load of emulsified asphalt delivered shall have a certificate of analysis/compliance matching the material used in the mix design.

2. **Aggregate for Micro-Surfacing**: The aggregate shall be a manufactured crushed stone such as granite, or chat which is a by-product of the milling of lead and zinc ores. The aggregate shall be totally crushed with 100% of the parent aggregate being larger than the largest stone in the gradation to be used. The mineral aggregate used shall conform to one of the following grading requirements when tested in accordance with Specification ASTM C136 and ASTM C117. All aggregate shall conform to the quality requirements of Specification ASTM D 1073.

GRADING REQUIREMENTS FOR AGGREGATE

	Amount Passing Sieves, Weights %		
Sieve Size	Type II	Type III	Tolerance
3/8 inch (9.5 mm)	100	100	
No. 4 (4.74 mm)	90-100	70-100	+/- 5%
No. 8 (2.36 mm)	65-90	45-70	+/- 5%
No. 16 (1.18 mm)	45-70	28-50	+/- 5%
No. 30 (600 um)	30-50	19-34	+/- 5%
No. 50 (300 um)	18-30	12-25	+/- 4%
No. 100 (150 um)	10-21	7-18	+/- 3%

No. 200 (75 um)	5-15	5-15	+/- 2%

The combined aggregate prior to the addition of any chemically active mineral filler shall have a sand equivalent of not less than 65 when tested by Specification ASTM D 2419. The aggregate shall have a weighed average loss not greater than 25% using magnesium sulfate when tested by Specification ASTM C 88. Testing of abrasion resistance shall not exceed 30% when tested by Specification ASTM C 131.

3. **Mineral Filler**: Mineral filler shall be any recognized brand of non-irentrained Portland cement or hydrated lime. The mineral filler shall be free of lumps and accepted upon visual inspections. The type and amount of mineral filler needed shall be determined by a laboratory mix design and will be considered as part of the aggregate gradation. .

4. **Water**: All water used shall be potable and shall be free of harmful salts or contaminates.

5. **Additives**: Additives may be added to the emulsion mix or any of the component materials to provide the control of the quick-traffic properties. They must be included as part of the mix design and be compatible with the other components of the mix.

6. **Mix Design**: The Engineer shall approve all Micro-Surfacing Materials and methods prior to mixing and application. The contractor shall submit a completed and tested Micro-Surfacing mix design for the Engineer's approval. The approved test method for Micro-Surfacing shall be found in Specification ASTM D 6372. The mix design shall be made with the same materials the contractor will be using on the project. The percentage of each material must be shown on the mix design. Proportions of the mixture shall be as follows unless variations are approved by the engineer.

	Type 1I	Type III
Aggregate for Micro-Surfacing	10.0 to 20.0 lbs per sq yd 4.53 to 9.07 kg/m2 (dry basis)	15.0 to 30.0 lbs per sq yd 6.80 to 13.61 kg/m2 (dry basis)
Emulsified Asphalt (Residual Asphalt Content)	7.5 to 13.5 % by weight of dry aggregate	5.5 to 13.5 % by weight of dry aggregate
Polymer Based Modifier	Minimum of 3% solids based on asphalt weight content	Minimum of 3% solids Based on asphalt weight content
Additive	As needed	As needed
Mineral Filler	0.0 to 3.0 % by weight of dry aggregate	0.0 to 3.0 % by weight of dry aggregate

Water	Minimum amount necessary to obtain a fluid and homogenous mixture	Minimum amount necessary to obtain a fluid and homogeneous mixture

Once the proper consistency is obtained, changes in proportioning of the various components of the mixture shall be held to a minimum.

7. **Application Rates**: The Micro-Surfacing mixture shall be of proper consistency at all times so as to provide the application rate required by the surface condition and shall be in accordance with the following:

Type II: 10.0 to 20.0 lbs per sq yd (5.4 to 18.6 kgs per sq meter)

Type III: 15.0 to 30.0 lbs per sq yd (8.1 to 16.2 kgs per sq

meter)

Application rates are affected by the unit weight of the aggregate, the gradation of the aggregate, and the demand of the surface to which the micro-surfacing is being applied.

8. **Equipment**:

a. **Micro-Surfacing Mixing Equipment**: The Micro-Surfacing mixing machine shall be specifically designed and manufactured to lay microsurfacing. The machine shall be self propelled, continuous flow mixing unit able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, control setting additive, and water to a revolving multi-blade double shafted mixer and discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity for aggregate, emulsified asphalt, mineral filler, control additive, and water to maintain an adequate supply to the proportioning controls. On major highway work, the machine may be required to be a self loading machine capable of loading materials while continuing to lay microsurfacing. The self loading machine shall be equipped to allow the operator to have full control of the forward and reverse speed during application of the micro-surfacing material and be equipped with opposite side drivers stationed to assist in alignment. The self loading device, opposite side drivers stations, and forward and reverse speed controls shall be original equipment manufacturer designed.

b. **Proportioning Devices**: Individual volume or weight controls for proportioning each material, and used in material calibration, shall be provided and properly marked.

c. **Calibration**: Each mixing unit to be used in the performance of the work shall be calibrated prior to construction. Calibration documentation shall include an individual calibration of each material at various settings, which can be related to the machine metering devices. No machine will be allowed to work on the project until a calibration has been completed. Final

calibration sheets shall be provided to the Engineer for acceptance.

d. **Micro-Surfacing Spreading Equipment**: The machine shall include a surfacing box with twin shafted paddles or spiral augers fixed in a spreader box. A flexible front seal shall be provided to insure no loss of mixture at the road surface contact point. The rear flexible seal shall act as a final strike-off and shall be adjustable in width. The spreader box and rear strike-off shall be so designed and operated that a uniform consistency is achieved to produce a free flow of material to the rear strike-off box. The box shall have suitable means provided to side-shift the box to compensate for variations of pavement geometry. A secondary strike-off shall be provided to improve the surface texture. It shall have the same leveling adjustments as the spreader box.

e. **Auxiliary Equipment**: Hand squeegees, shovels, traffic control equipment, and other support and safety equipment shall be provided if necessary to perform the work.

f. **Cleaning Equipment**: Power brooms, pickup sweepers, power blowers, air compressors, and hand brooms suitable for cleaning shall be utilized to provide a clean surface.

9. **Construction Requirements**:

a. **Surface Preparation**: Immediately prior to applying the microsurfacing, the surface shall be cleaned of all loose material, silt spots, vegetation, and objectionable material as determined by the Engineer. Any standard cleaning method used to clean pavements will be acceptable except water flushing. Manholes, valve boxes, drop inlets, and other service entrances shall be protected from the micro-surfacing by a method approved by the Engineer.

b. **Application**: If the pavement area to be covered is extremely oxidized and raveled or is concrete or brick, a tack coat may be required at the discretion of the Engineer. The tack coat shall conform to Section 2204 and shall be a SS or CSS grade. The tack coat shall be allowed to cure sufficiently before the application of micro-surfacing. The surface shall be prewetted by fogging ahead of the spreader box unless waived by the Engineer. Water used in prewetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the spreader box. The micro-surfacing mixture shall be of the desired consistency upon deposit on the surface and no additional elements shall be added. A sufficient amount of material shall be carried in all parts of the spreader box at all times so that a complete coverage is obtained. Overloading of the spreader box shall be avoided. No lumping, balling, or unmixed aggregate shall be permitted. No streaks, such as those caused by oversized aggregate shall be left in the finished surface.

c. **Hand Work**: Areas which cannot be reached with the mixing machine shall be surfaced using approved hand squeegees to provide a complete and uniform coverage. If necessary, the area to be hand worked shall be lightly dampened prior to mix placement. The same type of finish as applied by the spreader box shall be required.

d. **Curing**: Micro surfacing shall be allowed to cure for one hour, or until the Engineer permits opening the street to traffic.

e. **Weather Limitation**: Micro-surfacing shall not be applied if either the pavement or air temperature is below 60° F (18° C) and falling. The mixture shall not be applied if the relative humidity exceeds 80%.

f. **Traffic Control**: Suitable methods shall be used to protect the microsurfacing from all types of traffic until sufficiently cured to accept traffic. The length of time before traffic is permitted to use the surface shall be determined by the Engineer.

g. **Lines**: Care shall be taken to insure straight lines along curb and shoulders. No runoff on these areas will be permitted. Lines at intersections will be kept straight to provide good appearance.

h. **Property Owners Notification**: The Contractor shall supply and place door tags on the doors of all involved property owners. The door tag shall comply with the sample language provided by the Engineer.

i. **Provisions for Public Convenience During Surfacing Operation**: The Contractor shall provide and maintain sufficient signs, barricades, warning lights, flag persons and watch persons to protect the work and public in a manner satisfactory to the Engineer. Any areas damaged prior to acceptance by the City shall be repaired at the Contractor's expense. "No Parking" signs will be furnished by the Contractor. These signs shall comply with the standards established by the MUTCD with regard to size, color, working height and placement. When "No Parking" signs are posted on the streets with parking meters, the Contractor shall cover the parking meter heads with cloth or paper bags. The Contractor shall take all necessary precautions to protect the public (pedestrian and vehicular) from flying debris. The Contractor shall use warning signs and devices to warn motorists and pedestrians of work ahead.

2206.7 Method of Measurement:

A. Asphaltic Crack Seal will be measured per pound (kilogram).

B. Chip seal will be measured by one of the following:

1. Per square yard (square meter) or tenth part thereof.

2. Actual quantities used:

a. Asphaltic concrete patch, per ton (metric ton) or tenth part thereof.

b. Bitumen (asphaltic cement or liquid asphalt) per gallon (liter).

c. Coated cover aggregate, per ton (metric ton) or tenth part thereof. C. Slurry seal will be measured per square yard (square meter) or tenth part thereof. D.

Microsurfacing will be measured per square yard (square meter) or tenth part thereof.

2206.8 Basis of Payment:

A. Asphaltic Crack Seal will be paid for by one of the following:

1. Contract unit bid price.

2. Contract lump sum bid price.

B. Chip Seal will be paid for by one of the following:

1. Contract unit bid price.

2. Contract lump sum bid price.

C. Slurry Seal will be paid for by one of the following:

1. Contract unit bid price.

2. Contract lump sum bid price.

D. Microsurfacing will be paid for by one of the following:

1. Contract unit bid price.

2. Contract lump sum bid price.

SECTION 2207 COLD MILLING

2207.1 Summary: This section includes cold milling pavement surfaces.

2207.2 Equipment: Milling the surface of pavements shall be completed by the use of a milling machine conforming to the following:

A. **Machine**: The cold milling machine shall be self-propelled and shall have in combination the means of milling and cutting, without softening the old surface and blading the cuttings into a single windrow, or depositing them directly into a truck.

B. **Air Pollution**: The machine shall be equipped with a dust suppression system including water storage tanks and high pressure spray bars.

C. **Operating Width**: It is desirable that the cutting width be greater than 6 feet (2 m). In the event the cutting width is less than 6 feet (2 m) a system of electronic grade control for consecutive passes will be required.

D. **Cutting Drum**: The cutting drum shall be totally enclosed to prevent discharge of any loosened material on adjacent work areas.

E. **Warning Light**: The milling machine shall be equipped with a flashing warning light visible from 360 degrees. The light shall be mounted near the rear of the machine, at least 2 feet (61 cm) above the highest part of the milling machine, and shall be used whenever the machine is being used or moved upon the City streets.

2207.3 Construction Details:

A. **Methods of Operations for Milling**:

1. **Operator**: The milling machine shall be operated by an experienced and capable operator.

2. **Utilities**: Street surfaces adjacent to manholes, water valves and other utility extensions shall be completely removed to the full depth of cut specified for the street unless otherwise specified by the Engineer.

3. **Material Disposal**: ***All material from the milling operation shall immediately be removed from the surface of the pavement and properly disposed of by the contractor at an approved disposal area.***

4. **Surface Conditions**: The drum lacing patterns shall produce a smooth surface finish after milling, with groove depths not to exceed 1/4 inch (0.64 cm) and groove spacing not to exceed 1 inch (2.54 cm) unless otherwise approved by the Engineer.

B. **Types of Cuts to be made by Milling**:

1. **Leveling**: Sufficient passes shall be made such that all irregularities or high spots are eliminated, and that 100% of the surface is milled.

2. **Average Depth**: Sufficient passes, or cuts, shall be made in order to remove a specified depth over the entire street section. These depths will be designated in the Special Provisions.

3. Curb Cut: Sufficient passes or cuts shall be made in order to remove a specified depth at the curb for a specified width. The depth at the width furthest from the curb is 0. These dimensions will be designated in the Special Provisions.

4. **Bridge Deck Milling**: Sufficient passes, or cuts, shall be made in order to remove the material as specified on-the plans or in the Special Provisions.

C. **Cleanup**: All loose asphalt and debris shall be removed from the street surface and curb and gutter. Any material and debris that adheres to the curb and gutter shall be removed.

2207.4 Method of measurement: Cold milling will be measured per square yard (square meter) or tenth part thereof for the specified depth.

2207.5 Basis of payment: Cold milling will be paid for by one of the following:

A. Contract unit bid price.

B. Contract lump sum bid price.

SECTION 2208 PORTLAND CEMENT CONCRETE PAVEMENT

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

ASTM
A 185 Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
A 615 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C 1116 Standard Specification for Fiber-Reinforced Concrete and Shotcrete C 1315 Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
C 1399 Test Method for Obtaining Average Residual-Strength of Fiber-Reinforced Concrete
D 1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) D 1752 Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
D 2628 Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
D 2835 Standard Specification for Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
D 6690 Standard Specification for Joint and Crack Sealants, Hot-Applied, for Concrete and Asphalt Pavements
D 3406 Standard Specification for Joint Sealant, Hot-Applied, Elastomeric-Type, for Portland Cement Concrete Pavements
E 965 Test Method for Measuring Surface Macrotexture Depth Using a Sand Volumetric Technique

AASHTO
M 213 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
M 220 Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
M 282 Joint Sealants, Hot-Poured, Elastomeric Type, for Portland Cement Concrete Pavements
M 324 Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements

MCIB
Section 1 Concrete Materials

2208.0 General: The term expansion join, when used in plans, standard drawings or other specifications shall be understood to mean isolation joint.

2208.1 Summary: This section includes the construction of Portland Cement Concrete pavement. All materials and placement shall be tested as outlined in the “Public Works Department Materials Testing Requirements”.

2208.2 Materials:

A. **Concrete Control and Quality**: The current editions of the "Bulletins" and Approved Sections of the "Standard Concrete Specifications" issued by the Mid West Concrete Industry Board, Inc. (MCIB) are made a part hereof by reference. However, when the provisions of this Specification differ from the provisions of such "Bulletins" and "Sections" the provisions of this Specification shall govern. 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.

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 4"X8" cylinders for every 50 cubic yards poured that day and to allow for the water to maintain a temperature between 60ºF and 80ºF after being filled with water from the ready mix delivery trucks. The contractor shall be responsible for protecting persons from entering the tanks.

B. Concrete shall conform to MCIB Section 1 and shall have a design strength of 4,500 psi or greater. All coarse aggregate shall be Iron Mountain Trap Rock, Nepheline Syenite, Sioux Quartzite (quarried in South Dakota or Minnesota) or approved equal and meet the requirements of MCIB section 1 except that it shall meet the following gradation:

Coarse Aggregate Gradation Limits, % Passing

Nominal Maximum Size
Sieve 1" ¾" ½"
Size
1½" 100
1" 90-97 100
¾" 62-82 90-97 100
½" 25-60 45-70 80-97
3/8" 16-44 20-55 40-70
No. 4 0-10 0-10 0-15
No. 8 0-5 0-5 0-5

The finess modulus 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 sulfides such as Pyrite, Marcasite and Chalcopyrite shall not exceed 0.1% of the weight of the course aggregate sample. Material finer than the No. 200 (75□m) sieve shall not exceed 1% of the weight of the special aggregate sample. Methods of sampling and testing shall conform to the applicable portions of Section 10 of ASTM Designation C33, Concrete Aggregates.

ASR potential of the mix shall be mitigated as necessary. Fly Ash shall conform

to ASTM C 618. Slag shall conform to ASTM C989, Strength Grade 120.

Concrete for ultra-thin whitetopping (UTW) projects shall also include fiber reinforcement conforming to 2208.2.C.4 and shall have a maximum nominal coarse aggregate size of 1/3 the thickness of the concrete overlay.

If supplemental cementitious materials are to be substituted for cement in the production of concrete, the effect on the setting time must be taken into consideration and the concrete shall be protected from the weather until it reaches 50% of its design strength.

C. A mix design, for all concrete mixes to be used, shall be submitted to the City for review a minimum of 14 days before use and be approved prior to placement. As a minimum the following information must be in the QM file for the plant or included with the mix design:

- *Mix design designation required by project*
- *Project name, location, project number and date*
- *Name and location of ready mix plant or plants*
- *List the source and type of all materials from each plant supplying mix*
- *CA and FA Sieve Analysis and quality checks from each plant supplying mix. CA-Ledge, quarry or mine name and location. FA Sand plant name, location and source (MO or Kaw River) (less than 6 months old)*
- *ASR test results (less than 2 years old)*
- *Durability Factor test results for CA (less than 2 years old)*
- *Cement chemical analysis*
- *Specific gravity of all materials*
- *The mix design shall be based on one cubic yard of concrete or one cubic meter if required*
- *The mix design shall contain the weight and volume of each mix component (S.S.D.)*
- *The results of 7-day and 28-day compressive strengths shall be submitted when required*
-
- *On bridge deck pours the concrete shall be supplied from only one plant*

C. **Reinforcement**:

1. **Bars**: Bars shall be epoxy coated and conform to ASTM A 775.

2. **Welded Steel Wire**: Welded steel wire fabric shall conform to ASTM A 185.

3. **Supporting Elements**: Representative samples of supporting elements shall be submitted and approved by the Engineer prior to their use in the project.

4. **Fibers**: Where required, fibers shall be applied at the rate of 3 pounds per cubic yard (1.8 kg per cubic meter) of concrete. Fibers for concrete reinforcement shall be composed of only 100% virgin homopolymer polypropylene, fibrillated and graded. Fibers shall contain no reprocessed olefin materials, and shall be specifically manufactured to an optimum gradation for use as secondary concrete reinforcement, meeting the requirements of ASTM C 1116, Type III, 4.1.3, and ASTM C 1116 Performance Level 1, and a minimum residual strength of 30 psi (210 kPa) per ASTM C 1399, average of 4 beams sampled at the point of discharge (or when appropriate, the point of placement.

D. **Isolation Joint Fillers**: Isolation joint fillers shall conform to ASTM D 1752 ***or D7174.***

E. **Joint Sealing Compounds**: Joint sealing compounds shall conform to the standards for the type of sealant specified as listed in the following table:

Joint Seals and Sealants	**AASHTO**	**ASTM**
Hot-poured, Polymeric Asphalt Based	***M 324***	***D 6690***
Hot-poured, Elastomeric - Type	M 282	D 3406
Preformed Polychloroprene Elastomeric	M 220	D 2628
Lubricant for Installation of Preformed Seal	--	D 2835
Preformed Expansion Joint Filler	M 213	D 1751

F. **Curing Membrane**: All material to be used or employed in curing Portland Cement Concrete must be approved by the Engineer prior to its use. It shall be of the liquid membrane type and shall conform to ASTM C 1315, Type II, Class A.

2208.3 Construction Details: Portland Cement Concrete pavement shall be constructed to the configuration, and to the lines and grades shown on the plans.

A. **Grading and Subgrade Preparation**: All excavation or embankment required shall be as defined in sections 2100 and 2201 entitled "Grading," and "Subgrade Preparation. "If areas of the subgrade are below the lines and grades shown on the plans, they shall be brought to the proper line and grade by one of the following:

1. Additional fill material placed in accordance with Sections 2100 and 2201.

2. Areas may be filled with Untreated Compacted Aggregate conforming to Section 2202.

3. Areas may be filled with additional thickness of Portland Cement Concrete Pavement.

B. **Asphalt Surface Preparation for Ultra-thin Whitetopping**:

1. Mill existing asphalt surface to the depth indicated on the project drawings. When measured with a straightedge or stringline, the surface should be true to the plan drawings. The milled surface shall be no more than ½ inch (12.5 mm) below or ¼ inch (6 mm) above the plan grade.

2. Remove all loose foreign material from the asphalt surface with compressed air, by brooming, or by other methods immediately prior to the placing of concrete. A pickup sweeper must be used unless otherwise directed by the Engineer.

3. The asphalt surface shall not be below 40° F (4° C), and shall be free of any standing water prior to the placement of concrete.

4. Water shall be used to cool the asphalt surface when the surface temperature is above 100° F (37.8° C), but shall be free of any standing water prior to the placement of the concrete.

C. **Concrete Surface Preparation for Portland Cement Concrete Bonded Overlay**:

1. Remove the entire surface of the existing concrete pavement (.25 in. / 5 mm nominal) by milling.

2. Clean the existing concrete pavement by shot blasting.

3. Thoroughly wet the concrete surfaces to which the overlay is to bond with clean water for not less than two hours before the placing of the concrete. Blow away all free water immediately ahead of the placing operation. Bonding surfaces should be maintained in a damp condition with no free standing water.

D. **Forms**: All forms shall be in good condition, clean, and free from imperfections. Each form shall not vary more than 1/4 inch (0.64 cm) in horizontal and vertical alignment for each 10 feet (3.05 m) of length.

1. **Material & Size**: Forms shall be made of metal and shall have a height equal to or greater than the prescribed edge thickness of the pavement slab.

2. **Strength**: Forms shall be of such cross-section and strength, and so secured as to resist the pressure of the concrete when struck off, vibrated, and finished, and the impact and vibration of any equipment which they may support.

3. **Installation**: Forms shall be set true to line and grade, supported through their length and, joined neatly in such a manner that the joints are free from movement in any direction.

4. **Preparation**: Forms shall be cleaned and lubricated prior to each use and shall be so designed to permit their removal without damage to the new concrete.

2208.4 Joints: Generally joints shall be formed at right angles to the true alignment of the pavement and to the depths and configuration specified by the appropriate standard or as modified by the plans and specifications.

A. **Isolation joints**: Isolation joints shall be placed at all locations where shown on the plans and standards or as directed by the Engineer.

1. Isolation joints shall extend the entire width of the pavement and from the subgrade to one inch (25 mm) below the surface of the pavement or the material will have a suitable tear strip provided to allow for the application of the joint sealer.

2. Under no circumstances shall any concrete be left across the isolation joint at any point.

3. **Material**: Isolation joints shall be formed by a one piece, one inch (2.54 cm) thick preformed joint filler cut to the configuration of the correct pavement section.

4. **Stability**: Isolation joints shall be secured in such a manner that they will not be disturbed during the placement, consolidation and finishing of the concrete.

5. **Dowels**: If isolation joints are to be equipped with dowels they shall be of the size and type specified, and shall be firmly supported in place, by means of a dowel basket which shall remain in place. One half of each dowel shall be lightly painted or greased with a product approved by the engineer.

B. **Contraction joints**: Contraction joints shall be placed where indicated and to the depth indicated by the plans, specifications and standards.

1. **Method**: ***Contraction joints shall be sawed.***

2. When sawing joints, the contractor shall begin as soon as the concrete hardens sufficiently to prevent excessive raveling along the saw cut and shall finish before conditions induce uncontrolled cracks, regardless of the time or weather. The longitudinal contraction joints shall be sawed immediately after sawing transverse joints. When joint sealing backup material is specified with sawed joints, the first stage, which provides a relief cut shall be approximately 1/8 inch (3 mm) wide, and shall be to plan depth. The second stage which widens the joints to allow the insertion of joint sealing backup material to plan depth shall not be performed until the concrete is at least 48 hours old, and shall be delayed longer when the sawing causes raveling of the concrete. If second stage sawing is performed prior to the completion of the curing period, the contractor shall maintain the cure by use of curing tapes, plastic devices, or other materials approved by the engineer.

3. For Portland cement concrete pavements, ***contraction joints shall be one-forth (1/4)*** the thickness of the slab (minimum).

4. Where not indicated on the plan drawings, joint spacing for ultra-thin whitetopping projects shall not exceed 12 times the thickness of the overlay, and shall be constructed such that the larger dimension of any panel does not exceed 125% of the smaller dimension. Joints of adjacent panels shall be aligned. Joints shall intersect pavement free edges at 90 degrees, and shall extend a minimum of 1 ft (300 mm) from the pavement edge. Saw joints shall be one-third the thickness of the slab, or two inches (50 mm), whichever is greater.

5. For bonded Portland cement concrete overlays, joints shall be located above existing joints, shall be sawed full depth plus one-half inch (12mm) for overlays up to 4 inches (100 mm) in two stages. The first stage provides a relief cut approximately 1/8 inch (3 mm) wide.

6. **Dowels**: If contraction joints are to be equipped with dowels they shall be of the size and type specified and shall be firmly supported in place and accurately aligned parallel to the pavement line and grade with an allowable tolerance of 1/8 inch (3 mm).

C. **Longitudinal and Construction joints**: Longitudinal joints or construction joints shall be placed as shown on the plans or where the Contractor's construction procedure may require them to be placed. Longitudinal construction joints (joints between construction lanes) shall be keyed or tied joints of the dimensions shown on the plans or standards.

SECTION 02250 – GREEN INFRASTRUCTURE DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This section describes the construction of green infrastructure stormwater quality and control best management practices, including bioretention areas, subsurface detention, inlet and outlet control structures, curb cuts, forebays, subdrains, and water control structures.

B. Related items include (but are not limited to) the following:
   1. Drawings and general provisions of the Contract, including General and Supplementary Conditions.
   2. Related Sections include:
      a. Section 02100 – Clearing and Site Preparation
      b. Section 02200 – Paving
      c. Section 02600 – Storm Sewers
      d. Section 02930 – Exterior Plants

1.2 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Bioretention Area: Garden beds graded and landscaped to collect, pond and infiltrate stormwater. Stormwater runoff enters via inlets, curb cuts and/or via sheet flow. They contain engineered soil mixes and a subdrain system which drains the garden bed to an underground system via a drainpipe. In most locations, the bioretention system contains an inline water control structure to regulate the subdrain, a riser/inlet structure to regulate ponding depth and an overflow point to handle larger storm events.

C. Finish Grade: Elevation of finished surface of soil, excluding mulch.

D. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

E. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.

F. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

G. Subdrainage: Drainage structures, pipes and related improvements intended to collect water occurring below ground.

1.3 STANDARDS AND REFERENCES

A. Contractor shall be familiar with the following standards pertaining to the work described in this Section:
   1. American Association of State Highway and Transportation Officials (AASHTO)
      a. Standard Specifications for Transportation Materials and Methods of Sampling and Testing – 24th Edition
      b. AASHTO M252 Standard Specification for Corrugated Polyethylene Drainage Pipe
      c. AASHTO M294 Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter
   2. American Society for Testing and Materials (ASTM)
      a. ASTM A536 Standard Specification for Ductile Iron Castings
      b. ASTM A588 Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance
      c. ASTM C478 Standard Specification for Circular Precast Reinforced Concrete Manhole Section.
      d. ASTM C857 Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
      e. ASTM C858 Standard Specification for Underground Precast Concrete Utility Structures
      f. ASTM D1784 Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
      g. ASTM D3212 Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
      h. ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
      i. ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
      j. ASTM F2306 Standard Specification for 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications

1.4 SUBMITTALS

A. General: Submit the following in accordance with the Conditions of the Contract and Section 01300 Submittals
   1. Substitutions for specified products shall be governed by the Conditions of the Contract and Division 1 General Requirements. All substitution requests will be evaluated by the Owner or Owner's Representative and approved or rejected as an equal product.

B. Do not proceed with the purchase or installation of material prior to receipt of approved submittals.

C. Submit product data in the form of manufacturer's drawings, product data, installation instructions, test reports, and certificates for the following:
   1. Pre-fabricated drainage structures, castings and accessories
   2. Inlet screens and filters
   3. Water barriers
   4. Reinforced concrete structures with castings (pre-cast or cast-in-place)

5. Aggregates and sands
6. Geotextiles
7. Subdrain pipe material, fittings and accessories
8. Drainage pipe material, fittings and accessories
9. Fittings for pipe connections to structures
10. Hardware including fasteners, hangers, castings
11. Check valves

D. Provide Pre-Construction samples aggregates and sand.

E. Provide Pre-Construction samples of geotextiles.

F. Provide Pre-Construction sample of subdrain pipe.

G. Provide Pre-Construction sample of water barrier.

H. Provide Layout Drawings for each green infrastructure drainage area showing detailed dimensions and materials for all pipes, curbs, water barriers, structures, and fittings.

I. Operation and Maintenance Instructions: Contractor to provide written operation and maintenance manuals to Owner for maintenance of equipment, structures, fittings, and accessories to the Owner's satisfaction prior to award of achievement of full operation.

1.5 QUALITY ASSURANCE

A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

B. Tests to determine conformance with all requirements of this specification for quality and properties of all Contractor secured materials shall be performed by an independent commercial laboratory retained and compensated by the Contractor, and approved by the Owner's representative.

1.6 PROJECT CONDITIONS

A. Contractor shall verify all existing conditions prior to any construction activities. Any additional costs incurred by the Contractor due to a failure to verify existing conditions and coordinate with other installations and Construction activities shall be borne by the Contractor at no additional cost to the Owner.

B. Contractor shall verify that the subgrade elevation has been correctly established and is complete before installation of any landscaping materials.

C. Site Information: Any reports or supplemental investigations made during the design of the Project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions. The Owner's representative and Owner assume no responsibility for interpretations or conclusions drawn from this information.

D. Do not perform any earthwork, trenching, or material installation and placement during freezing or wet conditions.

E. Interruption of existing sewer service: Do not interrupt sewer service unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
   1. Notify Owner no fewer than two days in advance of proposed interruption of service.
   2. Do not proceed with interruption of service without Owner's written permission.

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 prefabricated structures according to manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials shall be new and without flaws and defects and a quality and performance as specified. Overages at completion are the property of the Contractor, to be removed from the site.

B. All materials and equipment shall be approved according to Section 1.3, 1.4 and 1.5.

2.2 RISER/INLET STRUCTURE

A. General: The Riser/Inlet Structure consists of an 18” diameter PVC structure of the drain basin type as indicated on the contract drawings. The dome grates and frames for each of these fittings are to be considered an integral part of the structure and shall be furnished by the same manufacturer. A removable filter basket is to be provided separately, and shall be installed inside the structure directly below the dome grate to collect silt and sediment from surface storm water runoff that is able to pass through the openings in the dome grate. The filter basket is to be provided without a bypass feature. All flow must go through the filter basket material in order to enter the structure.

B. Materials: The drain basin body and pipe connection stubs shall be manufactured from PVC pipe stock conforming to ASTM D1784 cell class 12454, utilizing a thermoforming process. The pipe connection stubs shall be formed to provide a watertight connection with the specified pipe system conforming to ASTM D3212 using flexible elastomeric seals. The flexible elastomeric seals shall conform to ASTM F477. The grates and frames shall be ductile iron conforming to ASTM A536 grade 70-50-05, and shall be made specifically for each basin. Grates and covers shall be painted black and lockable. The frames shall be bolted to the PVC structure with at least two ¼” x 1- ½” stainless steel bolts with washers and nuts.

C. Acceptable Manufacturers and Model

1. Drain Basin by Nyloplast, a division of Advanced Drainage Systems, Inc. (Basis of Design).
2. Approved equal.

2.3 RISER/INLET FILTER BASKET

A. General: The Riser/Inlet Filter Basket consists of an 18" diameter inlet filter basket as indicated on the contract drawings. The removable filter basket is installed inside the structure directly below the dome grate to collect silt and sediment from surface storm water runoff that is able to pass through the openings in the dome grate. The filter basket is to be provided without a bypass feature. Provide one removal tool for every five filter bag installations.

B. Materials: The filter basket is comprised of a corrosion resistant steel frame and a replaceable geotextile sediment bag attached to the frame with a stainless steel locking band. The geotextile bag shall be comprised of woven polypropylene allowing a flow rate of 200 gpm/sqft of material. The sediment bag hangs suspended from the rigid frame at a minimum distance below the grate.

C. Acceptable Manufacturers and Model
1. 6218NY-FX by FlexStorm Inlet Filters, a division of Advanced Drainage Systems, Inc. (Basis of Design).
2. Approved equal.

2.4 OUTLET CONTROL STRUCTURE

A. General: The Outlet Control Structure consists of a 24" diameter PVC structure of the drain basin type as indicated on the contract drawings. The grates and frames for each of these fittings are to be considered an integral part of the structure and shall be furnished by the same manufacturer. The structure has a removable 6" PVC vertical pipe with a 90 degree elbow installed on the inside of the structure. There is a small orifice drilled into the 6" PVC vertical pipe to limit discharge from the structure.

B. Materials: The drain basin body and pipe connection stubs shall be manufactured from PVC pipe stock conforming to ASTM D1784 cell class 12454, utilizing a thermoforming process. The pipe connection stubs shall be formed to provide a watertight connection with the specified pipe system conforming to ASTM D3212 using flexible elastomeric seals. The flexible elastomeric seals shall conform to ASTM F477. The grates and frames shall be ductile iron conforming to ASTM A536 grade 70-50-05, and shall be made specifically for each basin. Grates and covers shall be painted black and lockable. The grates and frames shall be standard H-10 rated when located in green space, or H-20 rated when located in roadway pavement. When not located in pavement, the frames shall be bolted to the PVC structure with at least two ¼" x 1-½" stainless steel bolts with washers and nuts.

C. Acceptable Manufacturers and Model
1. Drain Basin by Nyloplast, a division of Advanced Drainage Systems, Inc. (Basis of Design).
2. Approved equal.

2.5 WATER CONTROL STRUCTURE

A. General: The Water Control Structure consists of a 12" diameter PVC structure of the drain basin type as indicated on the contract drawings. The grates and frames for each of these fittings are to be considered an integral part of the structure and shall be furnished by the same manufacturer. The structure shall have vertical stop logs installed at the middle of the structure to 12" above the flowline elevation of the subdrain pipe. Provide one removal tool for every five structure installations.

B. Materials: The drain basin body and pipe connection stubs shall be manufactured from PVC pipe stock conforming to ASTM D1784 cell class 12454, utilizing a thermoforming process. The pipe connection stubs shall be formed to provide a watertight connection with the specified pipe system conforming to ASTM D3212 using flexible elastomeric seals. The flexible elastomeric seals shall conform to ASTM F477. The grates and frames shall be ductile iron conforming to ASTM A536 grade 70-50-05, and shall be made specifically for each basin. Grates and covers shall be painted black and lockable. The frames shall be bolted to the PVC structure with at least two ¼" x 1-½" stainless steel bolts with washers and nuts.

C. Acceptable Manufacturers and Model
   1. Water Control Structure by Nyloplast, a division of Advanced Drainage Systems, Inc. (Basis of Design).
   2. Approved equal.

2.6 CONCRETE FOREBAY - TYPE 1

A. General: The Forebay - Type 1 is a reinforced concrete structure with raised concrete sediment baffles used to convey stormwater flow from the gutter to the bioretention area. The structure collects stormwater runoff, dissipates energy, and captures sediment and debris, which can be periodically removed from between the baffles.

B. Materials: Cast in place steel reinforced concrete structure (4,000 psi).

2.7 Water Control Structure by Nyloplast, a division of Advanced Drainage Systems, Inc. WATER BARRIER

A. General: Water barriers are to be mechanically fastened to the back of curbs adjacent to roadways where indicated on plans. Refer to Part 3 of this specification for a more detailed description of where this product is to be installed.

B. Materials: 20-mil, PVC (polyvinyl chloride) geomembrane consisting of 36" minimum widths of calendared polyvinyl chloride sheeting. The geomembrane shall consist of new, virgin materials and be manufactured specifically for this work.

C. Acceptable Manufacturers and Model
   1. Lange Containment Systems, Inc. (Basis of Design).
   2. Approved equal.

2.8 COARSE SAND FILTER LAYER

A. General: A Coarse Sand Filter Layer is to be installed between the BMP Soil Mix and the Drainage Gravel for the Subdrain Pipe as indicated on plans.

B. Materials: Sand shall be a finely graded, processed and washed sand conforming to the characteristics below:

Particle Definition	% Retained on Individual Screen or Size
Sand	> 88%
Silt	< 1.5%
Clay	< 1.5%
Gravel (10 mesh)	< 10%
V. Coarse (18 mesh)	10 to 20%
Coarse (35 mesh)	20 to 30 %
Medium (60 mesh)	35 to 50%
Fine (100 mesh)	< 12.5%
Very Fine (270 mesh)	< 1.5%

1. Coefficient of Uniformity (CU) shall be 1.5 to 2.3

2. D50 of 0.40 mm to 0.60 mm.

3. Bridging Requirements:
   a. Bridging: D15 Drainage Gravel ≤ 8 x D85 Coarse Sand
   b. Permeability: D15 Drainage Gravel ≥ 5 x D15 Coarse Sand
   c. Uniformity Coefficient: D90 Drainage Gravel / D15 Drainage Gravel is less than or equal to 3.0.

4. BMP Soil Bridging: D15 Coarse Sand ≤ 8 x D85 BMP Soil

2.9 DRAINAGE GRAVEL

A. General: Drainage Gravel is to be installed as indicated on plans.

B. Materials: Gravel shall be clean, washed gravel sized according to the criteria below. The parent material shall be chemically and physically stable.

Aggregate Size US Standard Sieve Mesh (mm)	Allowable Ranges % Passing Individual Sieve
½ inch (12.5 mm)	100%

10 mesh (2.0 mm)	≤ 10%
18 mesh (1.0 mm)	≤ 5%

1. Gravel size criteria shall meet the following criteria for bridging and permeability with the Approved Coarse Sand submittal (Paragraph 2.8B.3 above):
   a. Uniformity Coefficient: D90 Drainage Gravel / D15 Drainage Gravel is less than or equal to 3.0.

2. Aggregate stability testing shall be determined with a Sulfate Soundness Test, ASTM C-88 and / or an LA Abrasion Test, ASTM C-131. Acceptance shall be based upon the following criteria:

Test Method	Criteria
Sulfate Soundness	≤ 12% loss
LA Abrasion	≤ 40%

2.10 GEOTEXTILE FABRIC

A. General: Geotextile Fabric is to be installed as indicated on plans.

B. Materials: Geotextile fabric shall be comprised of non-woven polypropylene staple fibers, conforming to the following minimum characteristics:

Mechanical Properties	Minimum Average Roll Value
Grab Tensile Strength (ASTM D4632)	Strength at Ultimate - 120 lbs Elongation at Ultimate – 50%
Mullen Burst Strength (ASTM D3786)	225 lbs
Trapezoidal Tear Strength (ASTM D4355)	50 lbs
Puncture Strength (ASTM D4833)	65 lbs
UV Resistance after 500 hours (ASTM D4355)	70% strength
Apparent Opening Size (ASTM D4751) – US Sieve	70
Permittivity (ASTM D4491)	1.8 sec-1
Flow Rate (ASTM D4491)	135 gal/min/ft2

C. Acceptable Manufacturers and Model

1. MIRAFI Construction Products – 140N (Basis of Design).
2. Approved equal.

2.11 SUBDRAIN PIPE

A. Materials: High density polyethylene (HDPE) pipe shall have annual exterior corrugations, smooth interior, and an integral bell and factory installed gasket. Virgin material for pipe and fittings shall be HDPE conforming to the requirements of cell classification 424420C as defined in ASTM D3350, except carbon black content shall not exceed 4%. Pipe shall conform to the requirements of AASHTO M252, Type S.

B. Joints: Joints shall be soil tight and meet the requirements of ASTM F2306. Gaskets shall meet the requirements of ASTM F477. Natural rubber gaskets will not be accepted.

C. Perforations: AASHTO Class II perforations shall be located in the outside valleys of the corrugations, be circular and/or slotted and evenly spaced around the circumference and length of the pipe. The water inlet area shall be no less than 0.945 in^2/ft (20 cm^2/m) for pipe diameters 4" through 10" (100mm - 250mm).

D. Fittings: Fittings and pipe shall be furnished by a common manufacturer as components of a complete drainage system. Fittings shall not reduce or impair the overall integrity or function of the pipeline.

E. Acceptable Manufacturers and Model
   1. Model N-12 ST IB by Advanced Drainage Systems, Inc. (Basis of Design).
   2. Approved equal.

2.12 HIGH DENSITY POLYETHELENE PIPE

A. General: High density polyethylene (HDPE) pipe shall have annual exterior corrugations, smooth interior, and an integral bell and factory installed gasket.

B. Materials: Virgin material for pipe and fittings shall be HDPE conforming to the requirements of cell classification 424420C for pipe diameters 4" through 10", and 435400C for pipe diameters 12" through 60" as defined in ASTM D3350, except carbon black content shall not exceed 4%. Pipe shall conform to the requirements of AASHTO M252, Type S for pipe diameters 4" through 10", and M294, Type S or ASTM F2306 for pipe diameters 12" through 60". The maximum cover depth shall be 30 feet.

C. Joints: Joints shall be watertight according to the requirements of ASTM D3212. Gaskets shall meet the requirements of ASTM F477. Natural rubber gaskets will not be accepted.

D. Fittings: Fittings and pipe shall be furnished by a common manufacturer as components of a complete drainage system. Fittings shall not reduce or impair the overall integrity or function of the pipeline.

E. Refer to Specification 02630 Storm Sewer for installation requirements.

F. Acceptable Manufacturers and Model
   1. Model N-12 WT IB by Advanced Drainage Systems, Inc. (Basis of Design).
   2. Approved equal.

2.13 SCHEDULE 40 PVC PIPE

A. General: A single length of Schedule 40 PVC pipe is to be installed inside the Outlet Control Structure. The pipe is to be installed as shown on the plans in a vertical position with a small orifice drilled into it at the flowline elevation of the influent pipe.

B. Materials: Type I, Grade I Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1784. The pipe shall be manufactured in strict compliance to ASTM D1785 and D2665. The pipe shall be manufactured in the USA, using domestic materials.

C. Joints: The pipe is to be fitted into the 6" 90° elbow without using any solvent weld. The pipe must be able to be removed for maintenance and replacement.

D. Fittings: Fittings and pipe shall be furnished by a common manufacturer as components of a complete drainage system. Fittings shall not reduce or impair the overall integrity or function of the pipeline.

E. This pipe is not intended for buried gravity sewer applications. Refer to Section 02624 PVC Gravity Sewer for buried gravity sewer requirements.

2.14 CHECK VALVES (END OF PIPE)

A. General: Check Valves are to be installed as indicated on plans to prevent backflow of combined sewage into the stormwater quality system.

B. Materials: Slip on duckbill check valve of 100% rubber construction designed for end-of-pipe outfall and manhole installations. The inside diameter of the check valve cuff shall exactly match the outside diameter of the pipe. Hardware includes stainless steel mounting bands.

C. Acceptable Manufacturers and Model
   1. TF-2 by Tideflex Technologies (Basis of Design).
   2. Approved equal.

2.15 CHECK VALVES (INSIDE PIPE)

A. General: Check Valves are to be installed as indicated on plans to prevent backflow of combined sewage into the stormwater quality system.

B. Materials: Inline check valves of 100% rubber construction designed with slip-in cuff or flange connection. The entire valve shall be a one-piece unibody construction. The entire valve shall fit within the pipe I.D. Hardware includes stainless steel expansion clamps.

C. Acceptable Manufacturers and Model
   1. CheckMate Inline Check Valve by Tideflex Technologies (Basis of Design).
   2. Approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

A. Obtain approval from Owner's Representative prior to commencing Construction Activities.

B. Verify all field conditions prior to beginning Construction activities, including subgrade elevations, utilities and location of adjacent site improvements.

C. Contractor is responsible to promptly coordinate directly with all public and private utilities affected by the improvements. Scheduling of private utility relocations shall be the responsibility of the Contractor to minimize construction schedule impacts.

3.2 REMOVALS

A. Removal of street, sidewalk, curb, driveways, and ancillary structures shall be to the extent necessary to construct the improvements. All pavements shall be saw cut straight and smooth with a minimum of damage to the surrounding area.

B. The Contractor is responsible for removing, relocating and restoring any features on site as necessary to construct the improvements as shown. This work shall be considered incidental to removal work.

C. It is the Contractor's responsibility to protect or save any site features identified on the plans to be protected or saved.

D. It is the Contractor's responsibility to protect private property, and to limit the work to public right-of-way or areas indicated on the plans as temporary construction easements. All disturbed areas shall be restored to equal or better condition.

E. It is the Contractor's responsibility to limit site clearing and grubbing to only the areas needed to construct the improvements. Clearing, grubbing, turf stripping, and topsoil stockpiling shall be considered incidental to the removal work.

F. Existing sidewalk ramps are to be protected unless identified for replacement on the plans. The Contractor shall be held responsible for costs associated with design and construction of any sidewalk ramps damaged during construction that were identified on the plans as existing sidewalk pavement to be protected.

G. Refer to Specification 02600 Storm Sewers for removal of existing drainage structures.

H. Refer to Specification 02100 Cleaning & Site Preparation for additional requirements.

3.3 DRAINAGE STRUCTURE INSTALLATION

A. It is intended that the top elevations indicated on the plans for curb inlets is 6" above the existing street gutter elevation (not the existing gutter sump elevation). The adjacent existing curbs may be lower than this top elevation. Wherever possible, flare new curb inlet sumps a minimum of 5 feet beyond the inlet structure on each side.

B. Refer to Specification 02600 Storm Sewers for installation of storm sewer pipe and pipe connections to existing structures and new structures.

3.4 CURB INSTALLATION

A. Install new or replacement curbs as indicated on plans.

B. Install new or replacement curbs at 6" height above existing gutter elevation. Transition smoothly to match existing curb heights where indicated on plans.

C. Provide a smooth finish for top 12 inches back of curb at green infrastructure areas.

D. Refer to Specification 02200 Paving for removal and installation of new or replacement curbs.

3.5 TYPE 1 FOREBAY INSTALLATION

A. Install Type 1 Forebay as indicated on plans. The Contractor shall submit layout drawings for approval prior to commencing work.

B. Refer to details on plans for configuration of Type 1 Forebay. The curb cut for the Type 1 Forebay shall match the adjacent curb configuration (C-1, CG-1, CG-2, etc.).

C. Ensure that the gutter elevation at the center of the cub cut is as indicated on plans. The Contractor may slightly adjust the location of the curb cut to better match the required gutter elevation.

D. The concrete forebay shall be constructed with cross slopes as indicated on the plans such that flow is conveyed from the gutter, through the concrete sediment baffles, and to the outlet opening of the forebay.

E. Each structure to be site adapted during installation based on gutter slope, required forebay slope and outlet location.

F. The bottom elevation (finish grade) of the green infrastructure area is defined as the top of the finished surface of soil, excluding mulch.

G. Refer to Specification 02200 Paving for concrete installation requirements.

3.6 TYPE 2 or TYPE 3 FOREBAY/CURB CUT INSTALLATION

A. Install Type 2 or Type 3 Forebay/Curb Cut as indicated on plans.

B. Refer to details on plans for configuration of Type 2 or Type 3 Forebay/Curb Cut. The Forebay/Curb Cut shall match the adjacent curb configuration (C-1, CG-1, CG-2, etc.).

C. Ensure that the gutter elevation at the center of the cub cut is as indicated on plans. The Contractor may slightly adjust the location of the curb cut to better match the required gutter elevation.

D. The Type 3 Forebay/Curb Cut has a 3-inch recessed concrete gutter section, which is 3" lower than the gutter elevation indicated on the plans.

E. The bottom elevation (finish grade) of the green infrastructure area is defined as the top of the finished surface of soil, excluding mulch.

F. Refer to Specification 02200 Paving for installation requirements.

3.7 WATER BARRIER INSTALLATION

A. Install water barrier as indicated on plans. Water barrier shall be installed at back of curb adjacent to all green infrastructure areas where ponding will occur. The water barrier installation shall extend a minimum of five feet beyond the ponding areas where new or existing curb exists. The Contractor shall submit layout drawings for approval prior to commencing work.

B. Install PVC geomembrane according to manufacturer's recommended installation instructions.

C. Ensure that the PVC geomembrane is fastened to the bottom 6" of curb adjacent to roadways, and that the geomembrane extends behind and below the curb at a slope no flatter than 1:1. The PVC geomembrane shall be suitably positioned and backfilled to prevent voids under the material.

3.8 INLET/RISER STRUCTURE AND WATER CONTROL STRUCTURE INSTALLATION

A. Install Inlet/Riser Structure and Water Control Structure as indicated on plans. The Contractor shall submit layout drawings for approval prior to commencing work.

B. Install structures according to manufacturer's recommended installation instructions. The frames shall be bolted to the PVC structure with at least two ¼" x 1-½" stainless steel bolts with washers and nuts.

C. Ensure that the "Top Elevation", which represents the elevation at which ponded flow will enter the Riser/Inlet Structure through the top grate, is located as indicated on plans. The bottom elevation (finish grade) of the green infrastructure area around the inlet riser should also be located as indicated on plans. The bottom elevation (finish grade) of the green infrastructure area is defined as the top of the finished surface of soil, excluding mulch.

D. The Riser/Inlet Filter Bag shall not cause any obstruction of flow from adjacent pipes located inside the structure.

E. Install the vertical stop logs in the middle of the Water Control Structure to 12" above the flowline elevation of the subdrain pipe.

3.9 SUBDRAIN INSTALLATION

A. Install subdrain as indicated on plans. The subdrain shall be located to provide the most effective coverage within the base of each green infrastructure drainage area. The Contractor shall submit layout drawings for approval prior to commencing work.

B. Excavate soil as required for the sump volume indicated.

C. Provide trenching operations as indicated on the drawings from sump to high point of the subdrain.

D. Install Geotextile Fabric along sides of sump excavation, leaving enough extra material to fold over following backfill operations.

E. Install Geotextile Fabric in bottom and sides of trench excavation. Provide 6" extra fabric beyond sides of trench and pin in place every 36".

F. Backfill with Drainage Gravel to depths indicated for sump and pipe bedding.

G. Install Subdrain Pipe as indicated on the Drawings.
   1. Center pipe in trench excavation. Provide temporary restraints if required.
   2. Ensure pipe perforations are placed at 0°, 120° and 240° (as viewed from the end of the pipe).

H. Backfill with Drainage Gravel to depth indicated on plans.

I. Install Coarse Sand Filter Layer as indicated on plans.

J. Refer to Specification 02930 Exterior Plants for BMP Soil Mix backfill requirements.

3.10 GRAVITY STORM SEWER PIPE INSTALLATION

A. Install gravity storm sewer pipe as indicated on plans.

B. Follow manufacturer's recommendations when installing HDPE pipe to prevent pipe float. When backfilling with "flowable" fill (CLSM), ensure that pipe is properly anchored according to the manufacturer's recommendations.

C. Contractor shall install and assemble the storm sewer pipes, connections, fittings and other appurtenances in accordance to the lines, grades, and requirements of the plans.

D. Refer to Specification 02600 Storm Sewers for installation requirements.

3.11 UNDERGROUND STORAGE PIPE INSTALLATION

A. Install 4'X4' RCB underground storage pipe as indicated on plans. Refer to details on plans for typical cross sections.

B. Contractor is to ensure proper backfill and compaction between existing utilities and new pipe.

C. Contractor shall install and assemble the underground storage pipes, connections, fittings and other appurtenances in accordance to the lines, grades, and requirements of the plans.

D. Refer to Specification 02600 Storm Sewers for installation requirements.

3.12 OUTLET CONTROL STRUCTURE INSTALLATION

A. Install Outlet Control Structure as indicated on plans.

B. Install structure according to manufacturer's recommended installation instructions. When not located in pavement, the frames shall be bolted to the PVC structure with at least two ¼" x 1-½" stainless steel bolts with washers and nuts.

C. Ensure that the removable 6" PVC vertical pipe is installed as indicated on plans. Follow manufacturer's recommended installation instructions for the 6" PVC pipe penetration and seal.

D. Ensure that the bottom of the smooth drilled orifice in the 6" PVC pipe matches the invert elevation of the lowest influent pipe.

3.13 CHECK VALVE (END OF PIPE) INSTALLATION

A. Install Check Valves as indicated on plans. These check valves are to be installed in a combined sewer structure on the downstream end of the new influent pipe from an Outlet Control Structure.

B. End of pipe installations must have adequate clearance into the structure so as not to obstruct flow from adjacent pipe penetrations or within the structure channel. End of pipe applications are not allowed where vertical clearance below the host pipe is less than 6".

C. Where an end of pipe installation is not possible due to the conditions stated above, an inside pipe installation shall be utilized.

D. Install check valves according to manufacturer's recommended installation instructions.

E. In addition to the mounting hardware provided by the supplier, Contractor is to install a 1/8" braided wire cable attached to the clamp and eye bolted to the structure wall.

3.14 CHECK VALVE (INSIDE PIPE) INSTALLATION

A. Install Check Valves as indicated on plans.

B. Inside pipe installations shall be utilized in a structure where an existing pipe connection to the combined sewer system exists. The check valve shall be installed in the effluent pipe opening at that structure. The effluent pipe I.D. shall be verified by the Contractor prior to ordering the inline check valve.

C. Inside pipe installations shall also be utilized where an end of pipe installation is not possible. The check valve shall be installed in a combined sewer structure inside the new influent pipe from an Outlet Control Structure. The inline check valve must match the influent pipe I.D.

D. Install check valves according to manufacturer's recommended installation instructions.

E. Once installed, the inline check valve shall not protrude beyond the face of the structure wall or end of the pipe.

3.15 CLEANUP AND PROTECTION

A. During work, keep adjacent areas clean and work area in an orderly condition.

B. Protect private property and adjacent infrastructure from damage due to construction operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods.

C. After installation and before Substantial Completion, remove product tags, survey stakes, lifting rings, and other debris from Project site.

3.16 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Project site.

B. All materials cleared from work areas shall be disposed of in a manner specified by the responsible local government. The Contractor is responsible for complying with all local rules and regulations. All fees associated with disposals are the Contractor's responsibility.

3.17 PAYMENT

1. Payment for all work in this section shall be made on the lump sum price for "Green Infrastructure Drainage" as listed in the Proposal, and shall be full compensation for all work complete and in place including, but not limited to: removals, earthwork, curbs, structures, piping and accessories.

END OF SECTION 02250

SECTION INCLUDES

1. 02310 Grading, Measurement and Payment
2. 02315 Excavation, Measurement and Payment
3. 02330 Berm and Embankment, Measurement and Payment

02310 GRADING

A. This section governs earthwork items necessary for the construction of the storm drainage system, as indicated in the CONTRACT DOCUMENTS.

B. All the requirements of Division 1 – General Requirement of this Specification apply. All the requirements of the Kansas City Metropolitan Chapter of the American Public Works Association, Standard Specifications and Design Criteria (APWA), Section 2101.

C. “Grading”, “Excavation” “Embankment”, “Back-filling”, “Compacting”, “Finishing”, and “Earthen Berm” shall conform to APWA Section 2102. All material encountered during these operations shall be of type “Unclassified Excavation,” as defined in APWA, Paragraphs 2102.2.B.1.

MEASUREMENT AND PAYMENT

A. No measurements will be made and no price adjustment or additional compensation will be awarded for “Grading”.

B. Payment for “Grading” will be made at the contract unit price for “Grading and Embankment” as listed in the “Bid Form-Unit Prices”. Such payment and price shall constitute full compensation for all labor, materials, and equipment necessary to complete the item.

02315 ROCK EXCAVATION

A. This section covers earthwork items necessary for rock and unclassified excavation encountered during the construction of the storm drainage sewer system, as indicated in the CONTRACT DOCUMENTS.

B. All the requirements of the Kansas City Metropolitan Chapter of the American Public Works Association, “Standard Specifications and Design Criteria” (APWA) apply, unless otherwise specified.

C. Material encountered during excavation shall be of type unclassified excavation as defined in APWA, Paragraphs 2102.2.B.1. Excavation shall conform to APWA, Section 2102.

D. The Contractor shall make his own assessments and determinations as to the quantity, position, extent, depth, and hardness of rock, if any, in preparing the bid and in the performance of the work through to its final completion.

RECORDED INFORMATION

No Bores were drilled and no subsurface information is available.

MEASUREMENT AND PAYMENT

A. MEASUREMENT: All costs for breaking and removing rock, disposal of debris, disposal of otherwise unacceptable fill material, and all other items associated with earth, rock, and unclassified excavation shall be considered incidental to the cost of other items. No measurements will be made and no price adjustment for additional compensation will be awarded. In particular, the Contractor's under-estimations of the final quantity, extent, type, and location of rock and unclassified excavation material actually encountered does not constitute cause for measurements to be taken or additional compensation awarded.

B. PAYMENT: Payment for "Earthwork" will be made at the contract unit price for "Grading and Embankment" as listed in the "Bid Form-Unit Prices". Costs shall include but not be limited to breaking, hauling, earthwork, and disposal. Such payment and price shall constitute full compensation for all labor, materials, equipment, and the performance of all work necessary to complete the items.

02330 BERM AND EMBANKMENT

A. This section covers operations requiring earth fill greater than six (6) inches below finished grade, placed and compacted prior to preparation for "Planting" as further described in Section 02900 of this Project Manual. Operation and materials shall be as specified in APWA Section 2102.6.

B. Placement of the berm and fill areas shall be achieved using either "Earth" or "Rock and Earth" embankment as defined in APWA Paragraphs 2102.6.B and 2102.6.C. Compaction of embankments shall be done in accordance with APWA Paragraph 2102.6.E.

MEASUREMENT AND PAYMENT

A. No measurements will be made and no price adjustment or additional compensation will be awarded for "Berm and Embankment".

B. Payment for "Berm and Embankment" will be made at the contract unit price for "Grading and Embankment" as listed in the "Bid Form-Unit Prices". Such payment and price shall constitute full compensation for all labor, materials, and equipment necessary to complete the item.

END OF SECTION

GENERAL

1. This section governs earthwork items necessary for grading, excavation and embankment as indicated in the Contract Documents.

2. Grading, Excavation, and Embankment shall conform to APWA Section 2102. All the requirements of the Kansas City Metropolitan Chapter of the American Public Works Association, Standard Specification and Design Criteria (APWA) as amended and supplemented by the City of Kansas City Missouri Department of Public Works apply, unless otherwise specified.

3. Placement of the berm and fill areas shall be achieved using either Earth or Rock and Earth embankment as defined in APWA Paragraphs 2102.6.B and 2102.6.C. Compaction of embankments shall be done in accordance with APWA Paragraph 2102.6.E.

4. The CONTRACTOR shall make his own assessments and determinations as to the quantity, position, extent, depth, and hardness of rock, if any, in preparing the bid and in the performance of the work through to its final completion.

PAYMENT

All costs for grading, excavation, embankment, berm, and fill area shall be considered incidental to “Grading, Excavation, and Embankment”. Payment shall be made at the contract unit price for “Grading” as listed in section 00412, Bid Form-Unit Prices. Such Payment shall constitute full compensation for all labor, materials, and equipment necessary to complete these items. No separate measurement or payment will be made for rock excavation.

END OF SECTION

DIVISION II
CONSTRUCTION AND MATERIAL SPECIFICATIONS
SECTION 2300 INCIDENTAL CONSTRUCTION

Approved and Adopted this 18th day of December, 2002
Amended June 4, 2015 by Ordinance 150411
Amended September 8, 2016 by Ordinance 160616
Amended February 8, 2018 by Ordinance 180006

KANSAS CITY METROPOLITAN CHAPTER
OF THE AMERICAN PUBLIC WORKS ASSOCIATION

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SECTION 2301 STANDARD SIDEWALKS, SIDEWALK RAMPS, DRIVEWAYS, AND BICYCLE/PEDESTRIAN PATHS

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used. *If conflicting standards exist, the more stringent standard shall apply.*

Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG)
R302 – Pedestrian Access Routes
R304 – Curb Ramps and Blended Transitions
R305 – Detectable Warning Surfaces
R307 – Accessible Pedestrian Signals and Pedestrian Pushbuttons
R406 – Reach Ranges

ASTM
D1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
D1752 Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
D2805 Standard Test Method for Hiding Power or Paints by Reflectometry

MCIB

2301.1 Summary: This section includes the construction or reconstruction of sidewalks, curb ramps, driveways, and bicycle/pedestrian paths. All materials and placement shall be tested as outlined in the "Public Works Department Materials Testing Requirements".

2301.2 Materials: All materials in this section shall conform to the requirements of Section 2208.2.

A. Concrete Mix: Concrete shall conform to Section 2208 except that limestone meeting the requirements of MCIB Section 1may be used as coarse aggregate and shall have a design strength of 4,500 psi or greater. 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.

B. Contractor shall recognize the effects of temperature, wind, and humidity when placing and curing concrete. When the ambient air temperature is 90 degrees F (32 degrees C) or higher, a retarder shall be used in the concrete mix***. When the ambient air temperature is 90 degrees F (32 degrees C) or higher and the wind velocity is above 20 mph, evaporation shall also be controlled***.

C. Special aggregate concrete shall be Iron Mountain Trap Rock, Nepheline Syenite, Sioux Quartzite (quarried in South Dakota or Minnesota) and shall be used In the Central Business District (defined as being bounded by Interstate Highway I-70 on the north and east, Alt I-70 and I-670 on the south, and I-35N on the west).

1. ***The special aggregate shall conform to the requirements of 2209.2. as supplemented.***

2. ***Fly ash or slag shall be added as necessary to offset ASR potential. Fly Ash shall conform to ASTM C 618. Slag shall conform to ASTM C989, Strength Grade 120.***

3. ***Materials, submittals and testing shall conform to Section 2702.3 as supplemented.***

D. ***Reinforcement is not required under Public Works Department contracts or permits, except in the Central Business District. Reinforce with 6x6 – W2.9 x W2.9 welded steel wire fabric, or as shown on the plans.***

2301.3 Construction Details: The sidewalks curb ramps, driveways or bicycle/pedestrian paths shall be constructed or reconstructed to the configuration, and to the lines and grades shown by the plans. Generally sidewalks, driveways, and bicycle/pedestrian paths should be constructed after the curbing. Sidewalks, *ramps ramps, driveways, and bicycle/pedestrian path* construction shall comply fully with all requirements in this section and shall comply with the requirements of *PROWAG R302, R304 and R305. Where sidewalk ramps are installed at signalized locations, the sidewalks ramps shall also comply with the requirements of PROWAG R307 and R406. If pedestrian pushbuttons are not present at the time of the curb ramp installation the ramp(s) must be designed so as to provide level landing areas for future push buttons and the City Engineer must approve the ramp and landing design/layout prior to construction.*

A. **Removal:** Existing sidewalks, curb ramps, driveways, or bicycle/pedestrian paths shall be totally removed to the nearest contraction or isolation joint, unless otherwise specified by the Engineer. The section shall be sawed full depth.

B. **Grading and Subgrade Preparation:** All excavation or embankment required in the grading or subgrade preparation shall be as defined in the Sections 2100 and 2201 entitled "Grading and Site Preparation" and "Subgrade Preparation," except as follows:

   The top 6 inches (150 mm) of the subgrade shall be compacted to obtain a density of 95 percent of maximum in conformance with Section 2201.3B.

   On reconstruction projects or after roadway grading is completed on new construction, ***additional fill material needed*** beneath sidewalks or driveways shall be crushed stone conforming to Section 2202.2, placed and compacted in conformance with Section 2202.3

C. **Forms:** All forms shall be in good condition, clean, and free from imperfections. Each form shall not vary more than 1/4 inch (0.64 cm) in horizontal or vertical alignment for each 10 feet (3.05 m) in length.

   1. **Material and Size:** Forms shall be made of metal unless otherwise approved by the Engineer and shall have a height equal to or greater than the depth of the sidewalk, driveway, or bicycle/pedestrian path section.

2. **Strength:** Forms shall be of such cross–section and strength, and so secured as to resist the pressure of the concrete when struck off, vibrated, and finished, and the impact and vibration of any equipment which they may support.

3. **Installation:** The forms shall be set true to line and grade, supported through their length and joined neatly in such a manner that the joints are free from movement in any direction.

4. **Preparation:** Forms shall be cleaned and lubricated prior to each use and shall be so designed to permit their removal without damage to the new concrete.

D. **Slip–form Machine:** A slip–form machine may be used in lieu of forms. The machine must be equipped with mechanical internal vibrators and be capable of placing concrete to the correct cross section, line and grade within the allowable tolerances.

E. ***Location. All public sidewalks within Kansas City shall be constructed of PC concrete and shall be located in the public right-of-way or within a public sidewalk easement. The standard location shall be one foot from the right-of-way or easement line. Sidewalks shall be constructed to allow access to all pedestrian signal actuation devices and bus stop shelters.***

F. ***Required Dimensions. The minimum width of public sidewalks on residential streets shall be four feet. The minimum width of public sidewalks along higher class streets shall be five feet. The minimum width of public sidewalks abutting curb shall be five feet. Uninterrupted four foot wide walks shall have a five foot square passing space every 200 feet. All public sidewalks shall be a minimum of four inches thick.***

G. ***Grades and Slopes. The grade and slope along the length of the walk shall conform to the most current version of PROWAG. The cross slope shall be toward the street and this slope shall be carried thru driveways. The finish grade of the sidewalk shall allow the grass area between the curb and the sidewalk (sometimes called parkway) to slope toward the street at a maximum grade of 4%, except as shown on the plans.***

H. ***Wheelchair accessible curb ramps shall be constructed at all street crossings and shall conform to the most current version of PROWAG. The minimum allowable thickness for wheelchair accessible curb ramps shall be eight inches. Curb ramps shall be poured monolithically with the curb.***

I. ***Ramps with curbs may be used when pedestrians would not normally cross through the ramp. Surface texture shall be a coarse broom finish transverse to the slope of the ramp. If the street curb has not been constructed to receive the sidewalk ramp, the curb shall be removed and reconstructed as required.***

2301.4 Joints: Unless directed by the Engineer the joints shall be formed at right angles to the alignment of the sidewalk, driveway, or bicycle/pedestrian path and to the configuration specified by the plans or standards.

A. Joint Patterns: ***All joints shall be constructed on straight and true lines***

1. **Sidewalks:** Sidewalk surfaces shall be marked with a transverse joint spaced at a distance equal to the width of the sidewalk. Sidewalks greater than 6 feet (21.8 m) in width shall be divided by longitudinal joints spaced not less than 30 inches

(760 mm) nor more than 60 inches (1.5 m) with transverse joints spaced to form a square pattern. Edger tool marks shall remain showing unless the sidewalk is slip–formed and subsequently sawed. Curb joints should align with sidewalk joints where they abut.

2. **Driveways and bicycle/pedestrian paths:** In general, no driveway slab dimension shall exceed 10 feet (3.05 m), although widths no more than 24 times the slab thickness will be permitted to match existing joint patterns.

B. **Isolation joints.** Isolation joints shall be placed ***as shown on the standard drawings, where new concrete abuts existing, against structures, and as directed by the Engineer or as indicated on the plans. In no case shall isolation joints exceed 250' center to center.*** Isolation joints are often referred to as "expansion joints" in some documents and drawings.

1. **General:** The preformed isolation joint material shall be left 1/2 inch (13 mm) below the surface, or a suitable tear strip will be provided to allow for the application of the joint sealer.

2. **Material:** Isolation joints shall be formed by a 1 piece; 1/2 inch (13 mm) thick non–extruding preformed joint filler cut to the configuration of the abutting section. The filler material shall be full depth, and shall conform to ASTM D1751, D1752 ***or D7174***. D1752 ***or D7174*** material shall be used against curved surfaces, around utility boxes or poles, or against other irregular surfaces, and may be used for all applications.

3. **Stability:** Isolation joints shall be secured in a manner so they will not be disturbed by depositing and consolidating the concrete.

4. **Edging:** The newly poured edges of these joints shall be rounded with an edging tool of 1/4inch (6 mm) radius.

C. **Contraction joints:** Contraction joints shall be 1 inch (25 mm) deep by 1/8 inch (3 mm) wide with 1/4 inch (6 mm) radii rounded edges.

1. **Edging:** Edger marks shall remain showing unless the sidewalk, driveway or bicycle/pedestrian path is slip formed and subsequently sawed.

2. **Slip forming:** Contraction joints may be sawed 1/8 inch (3 mm) wide by 1/3rd the thickness of the slab.

3. **Joint Sealer:** joint sealer is not required.

2301.5 Concrete Work: Concrete work shall be placed in accordance with the requirements of MCIB.

A. **Concrete Placement:** Deposit and consolidate concrete as close to the final position as possible, beginning at one corner of the forms. Perform necessary hand spreading with shovels or come–alongs, not with rakes or vibrators. Do not walk in the fresh concrete with boots or shoes coated with earth or foreign substances. When concrete is placed on a sloped surface, begin concrete placement at the lowest area.

B. **Finishing**:

1. Strike off the concrete with a vibratory screed or a hand strike–off method when adequate consolidation is attained. Immediately after strike–off, the concrete may be bullfloated to remove any high or low spots. Minimize the use of the bullfloat.

2. Do not finish concrete with water standing on the surface ***or when edging tool makes a ridge on its inside edge. Resume finishing when excess moisture evaporates.*** All edges of the slab shall be finished with a ¼ inch (6mm) radius edger.

3. After finishing, the surface of the concrete shall be broomed with a fine clean broom to provide an antiskid surface, and the edges and joints retooled unless slipformed.

4. In all cases the finished sidewalk, driveway, or bicycle/pedestrian path shall have a true surface, free from sags, twists, or warps, and shall have a uniform color and appearance.

C. **Curing**: As soon as practical after the concrete is finished it shall be cured with an acceptable ***white pigmented liquid*** curing membrane applied according to manufacturers directions.

If forms are removed within a period of 72 hours of placement those formed surfaces shall also be cured.

Wet burlap, cotton mats, waterproof paper, polyethylene sheeting or earth backfill shall not be acceptable as curing methods.

D. **Protection:** The Contractor shall protect the concrete work against damage or defacement of any kind until it has been accepted by the City. Concrete which is damaged or defaced shall be removed and replaced or repaired to the satisfaction of the Engineer, at the expense of the Contractor.

2301.5 E **Temperature Limitations**: Concrete shall be placed in accordance with the requirement of MCIB, as modified. ***Concrete with temperature above 90 degrees F may be placed provided sufficient labor and equipment is furnished to pour, finish and cure the concrete to meet city standards before it sets.***

F. Repairing Defects: Defects in the concrete shall be repaired in accordance with 2208.10.

2301.6 Backfill: A minimum of 24 hours shall elapse before forms are removed and 5 days shall elapse or the concrete must have attained 75% of its 28 day compressive strength before pavement is backfilled unless otherwise approved by the Engineer. Backfill shall be accomplished in accordance with Sections 2100 and 2201 entitled "Grading and Site Preparation" and "Subgrade Preparation."

The Contractor shall be responsible for the repair of any street pavement disturbed by the construction.

2301.7 Joint Sealing and Clean-Up: All isolation joints shall be sealed with an approved ***one-component, moisture-curing, non-priming, gun-grade, elastomeric polyurethane joint sealant that meets the requirements of ASTM C920, Type S, Grade NS, Class 25, Use NT and M. It shall be applied in accordance with the manufacturer's instructions*** within 7 days of the placement of the concrete.

The Contractor shall be responsible for the removal of excess dirt, rock, broken concrete, splatters and overspray from the construction area within 10 days unless otherwise directed by the Engineer.

2301.8 Surface Tolerances: Sidewalks, driveways, or bicycle/pedestrian paths shall have a surface tolerance of 1/4 inch (6 mm) in 10 feet (3.05 m) when checked with a 10 foot (3.05m) straightedge. Vertical deflections at sidewalk joints shall not exceed ¼ inch (6 mm).

2301.9 Detectable Warnings: Detectable warnings *shall be installed and meet the requirements of the most current version of PROWAG R305*. ***Detectable warnings shall be installed whenever sidewalk curb ramps are constructed or altered.***

A. **Material**: The material used to provide contrast shall be an integral part of the walking surface.

B. Submittals shall include*.*

1. ***Manufacturer product data and application instructions.***

2. ***Samples to visually demonstrate color contrast.***

3. ***Details of product composition, tests performed, product service experience, limitations to coating, application procedures, and Material Safety Data Sheets (MSDS).***

4. ***Manufacturers certification that the product(s) meets or exceeds these specifications.***

2301.10 Method of Measurement

A. **Sidewalks:** Sidewalks will be measured per square foot (square meter or tenth part thereof).

B. **Sidewalk Ramps:** Sidewalk ramps including detectable warning will be measured by one of the following:

1. per square foot (square meter or tenth part thereof). Street curbing adjoining sidewalk ramps will be measured in accordance with Section 2209.9 and paid for separately.

2. per each

C. **Driveways:** Driveways will be measured per square foot (square meter or tenth part thereof).

D. **Bicycle Pedestrian Paths:** Bicycle/Pedestrian paths will be measured per square foot (square meter or tenth part thereof).

2301.11 Basis of Payment: All items in this section will be paid for by the contract unit bid price.

SECTION 2302 ASPHALT SIDEWALKS, DRIVEWAYS, AND BICYCLE/PEDESTRIAN PATHS

2302.1 Summary: This section governs the placement of asphalt sidewalks, driveways, and bicycle/pedestrian paths

2302.2 Asphalt Sidewalks: Asphalt shall not be used in the construction of any approved permanent sidewalk. Asphalt may be used as material for temporary sidewalks if approved in advance by the Engineer.

2302.3 Asphalt Driveways: Asphalt driveways may be constructed with prior approval of the Engineer in accordance with the provisions of Section 2205 "Asphalt Paving" and Section 2209 "Curbing" as applicable.

2302.4 Bicycle/Pedestrian Paths: Asphalt *shall not be used in the construction of any bicycle/pedestrian paths. Asphalt may be used as material for temporary bicycle/pedestrian paths if approved in advance by the Engineer. Construct paths to the requirements of the KCMO Trail Standards.*

2302.5 Method of Measurement

A. **Sidewalks:** Sidewalks will be measured per square foot (square meter or tenth part thereof).

B. **Temporary Sidewalks:** Temporary sidewalks will be measured by one of the following:

1. per ton (metric ton) or tenth part thereof.

2. per square foot (square meter or tenth part thereof).

C. **Driveways:** Driveways will be measured by one of the following:

1. per ton (metric ton) or tenth part thereof.

2. per square foot (square meter or tenth part thereof).

D. **Bicycle Pedestrian Paths:** Bicycle/Pedestrian paths will be measured by one of the following:

1. per ton (metric ton) or tenth part thereof.

2. per square foot (square meter or tenth part thereof).

2302.6 Basis of Payment: All items in this section will be paid for at the contract unit bid price.

SECTION 2303 ROCK BLANKET

2303.1 Summary: This section governs the construction of a protecting blanket of rock or broken concrete on slopes, channel bank or stream banks.

2303.2 Materials: The material for rock blanket shall be durable stone or broken concrete containing a combined total of not more than 10 percent of earth, sand, shale, and non–durablc rock. It is preferable that the material contain a large percentage of pieces as large as the thickness of the blanket will permit, with enough smaller pieces of various sizes to fill the larger voids. Acceptance of quality and size of material may be made by visual inspection at the job site.

Rock Blanket shall be specified by class as shown in the following tables:

	Percent Heavier Than									
Class	1 Ton	½ Ton	¼ Ton	250 lbs	200 lbs	180 lbs	75 lbs	60 lbs	10 lbs	5 lbs
1 Ton	50+	95+								
½ Ton	0	50+	95+							
¼ Ton		0	50+				90+			
Facing					0		50+			90+
Light 24”			0		50+					90+
Light 18”				0		5-15		50-70	85-100	

	Percent Heavier Than									
Class	1.75 MT	1 MT	½ MT	¼ MT	90 kg	80 kg	35 kg	25 kg	5 kg	2 kg
1 Ton	50+	95+								
½ Ton	0	50+	95+							
¼ Ton		0	50+				90+			
Facing					0		50+			90+
Light 600			0		50+					90+
Light 450				0		5-15		50-70	85-100	

When broken concrete is accepted, reinforcing shall be neatly clipped from all faces and shall not protrude from an in-place exposed face.

2303.3 Construction Requirements: A trench at the toe of the slope shall be excavated to the elevation as shown on the plans or to a minimum of 2 feet (600 mm) when not shown. The slopes shall conform to the proper cross section and be compacted to a uniform density as required for adjacent material. The rock or broken concrete shall be placed on the slope, to the prescribed thickness, elevation and extent, and shall be manipulated so that the flat sides are in contact, thereby eliminating large voids. The outside of the blanket shall present an appearance free from segregation and with a proportionate amount of the larger pieces showing.

2303.4 Method of Measurement: Rock blanket will me measured by one of the following:

A. Per square yard (square meter) or tenth part thereof.

B. Per ton (metric ton) or tenth part thereof.

2303.5 Basis of Payment: Rock blanket will be paid for by the contract unit bid price.

SECTION 2304 CONCRETE PAVER STONES (FOR MEDIAN TREATMENT)

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

ASTM
C33 Standard Specification for Concrete Aggregates
C67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
C140 Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
C150 Standard Specification for Portland Cement
C207 Standard Specification for Hydrated Lime for Masonry Purposes
C418 Standard Test Method for Abrasion Resistance of Concrete by Sandblasting
C595 Standard Specification for Blended Hydraulic Cements
C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
C936 Standard Specification for Solid Concrete Interlocking Paving Units

MCIB
Mix No.WA610–1–4

2304.1 Summary: This section governs the furnishing of all labor, equipment and tools, and for the performance of all work necessary to construct concrete paver stone paving ***and alternate median treatment.***

2304.2 Materials:

A. Interlocking Concrete Paver Stones (ASTM Designation C936):

1. Paver stones shall be cobblestone style consisting of full stones, 4 5/8" by 7" by 2 3/8" (117 mm by 178 mm by 60 mm); two thirds stones, 4 5/8" by 4 5/8" by 2 3/8" (117 mm by 117 mm by 60 mm); and one third stones, 4 5/8" by 2 5/16" by 2 3/8" (117 mm by 59 mm by 60 mm). The mix of stones sizes shall be approximately 28% full size, 57% two thirds size and 15% one third size.

2. **Cementitous Materials:** Materials shall conform to the following ASTM specifications as they apply

    a. Portland Cements – Specification C150

    b. Blended Cements – Specification C595

    c. Hydrated Lime Type S – Specification C207

    d. Pozzolans – Specification C618

3. **Aggregates:** Aggregates shall conform to ASTM Specifications C33 for Normal Weight Concrete Aggregate.

4. **Other Constituents:** Air–entraining agents, coloring pigments, integral water repellents, finely ground silica, etc. shall conform to ASTM standards where applicable, or shall be previously established as suitable for use in concrete.

5. **Physical Requirements:**

   a. **Compressive Strength:** At the time of delivery to the work site, the average compressive strength shall be not less than 8,000 psi (55.2 MPa) with no individual unit strength less than 7,200 psi (49.6 MPa), with testing procedures in accordance with ASTM Standard C140.

   b. **Absorption:** The average absorption shall not be greater than 5% with no individual unit absorption greater than 7%.

   c. **Durability:** The manufacturer shall satisfy the purchaser either by proven field performance or the laboratory freeze–thaw test that the paving units have adequate durability.

   d. **Proven Field Performance:** Satisfactory field performance is indicated when units similar in composition, and made with the same manufacturing processes those to be supplied to the purchaser, do not exhibit objectionable deterioration after at least three years. The units used as the basis for proven field performance shall have been exposed to the same environmental factors as is contemplated for the units supplied to the purchaser.

   e. **Freeze–Thaw Test:** When tested in accordance with Section 8 of ASTM C67, Specimens shall have no breakage and not greater than 1.0% loss in dry weight of any individual unit when subjected to 50 freeze–thaw cycles. This test shall be conducted not more than 12 months prior to delivery of units.

   f. **Abrasion Resistance:** When tested by sandblasting in accordance with ASTM C418, Specimens shall not have greater volume loss than 0.3 cubic inches per square inch (15 cubic cm per 50 square cm). The average thickness loss shall not exceed 1/8 inch (3 mm).

   g. **Permissible Variations in Dimensions:** Length or width of units shall not differ by more than 1/16 inch (1.5 mm) from approved samples. Heights of units shall not differ by more than 1/8 inch (3 mm) from the specified standard.

   h. **Visual Inspection:** All units shall be sound and free of defects that would interfere with the proper placing of unit or impair the strength or permanence of the construction. Minor cracks incidental to the usual methods of manufacturer, or minor chipping resulting from customary methods of handling in shipment and delivery, shall not be deemed grounds for rejection.

6. **Sampling and Testing:** The purchaser or his authorized representative shall be accorded proper facilities to inspect and sample the units at the place of manufacture from the lot ready for delivery. Sampling and testing of units shall be in accordance with ASTM Methods C140 except as required.

7. **Rejection:** In case the shipment fails to conform to the specified requirements, the manufacturer may sort it, and new test units shall be selected at random by the purchaser from the retained lot and tested at the expense of the manufacturer. In case the second set of test units fails to conform to specified requirements, the entire lot shall be rejected.

8. **Expense of Tests:** The expense of inspection and testing shall be borne by the purchaser unless otherwise agreed.

B. **Base Course Concrete:** Base course concrete shall conform to the requirements of MCIB Mix No. WA610–1–4.

C. **Sand for Laying Course:** The sand for the laying course shall be a well graded, clean, washed, sharp sand with 100% passing a 3/8" (9.5 mm) sieve size and a maximum of 3% passing a No. 200 (75 um) sieve size. This is commonly known as manufactured concrete sand, limestone screening, or similar. Mason Sand will not be permitted.

2304.3 Construction Details:

A. **Product Handling:** Paver stones shall be delivered and unloaded at jobsite on pallets and bound in such a manner that no damage occurs to the product during handling, hauling and unloading.

B. **Edge Restraint:** All edges of the installed paver stone shall be restrained by the concrete curb, concrete sidewalk, or another suitable method for preventing the movement of the edge stones.

C. **Concrete Base Course:** A concrete base course shall be constructed in accordance with the requirements of Section 2301. The base course shall be shaped to the grade and cross section as shown on the plans with an allowable tolerance of 1/4 inch (5 mm). The base course shall be 4 inches (100 mm) thick, and should be graded to allow a 1 inch (25 mm) thick sand course between the base and the paving stones. Pavement for concrete base course shall be subsidiary to the bid items.

The finished base course shall be ***sufficiently cured and*** approved by the Engineer before placing the sand course.. The uncompacted sand laying course shall be spread evenly over the area to be paved and then screened to a level that will produce 1 inch (25 mm) thickness when the paver stones have been placed and vibrated. Once screened and leveled to the desired elevation, the sand laying course shall not be disturbed in any way.

D. **Placing Paver Stones:** The paver stones shall be installed in rows perpendicular to the major axis of the median being paved. Within each row the stone sizes shall be randomly mixed so that joints between stones are not normally aligned with joints between stones in adjacent rows. No joints shall be aligned for more than three consecutive rows. The paver stones shall be laid in such a manner that the desired pattern is maintained and the joints between the stones are as tight as possible. For maximum interlock it is recommended that joints between stones do not exceed 1/8 inch (3 mm). String lines should be used to hold all pattern lines true.

The gaps at the edge of the paver surface shall be filled with standard edge stones or with stones cut to fit. Curing shall be accomplished to leave a clean edge to the traffic surface using a double–headed breaker or a masonry saw. However, when cutting precision designed areas, a masonry saw is recommended. Whenever possible, no cuts should result with a paver less than 1/3 of original dimension.

Paver stones shall be vibrated to their final level in the sand laying course by two or three passed of a vibrating compactor capable of 3,000 to 5,000 pounds (1360 kg to 2270 kg) compaction force with the surface clean and joints open. After vibration, clean concrete sand containing at least 30% of 1/8 inch (3 mm) particles shall be spread over the paver stone surface, allowed to dry, and vibrated into the joints with additional passes of the plate vibrator so as to completely fill the joints.

Surplus material shall then be swept from the surface. Upon completion of work covered in this Section, the Contractor shall clean up all work areas by removing all debris, surplus material and equipment from the site.

After final vibrating, the surface shall be true to grade and shall not vary by more than 1/4 inch (5 mm) when tested with a 10 feet (3.05 m) board at any location on the surface.

2304.4 Alternate Median Treatment

A. **General:** ***This section governs construction of concrete median, median strip, and impressed red tinted concrete in conformity with the lines, grades, dimensions and typical sections shown on the plans. Concrete median shall consist of a paved median constructed between curbs on a prepared subgrade. Median strip shall consist of a monolithic paved median laid over and doweled to previously constructed pavement. Impressed red tinted concrete is concrete colored full depth and dressed to resemble a brick surface. Concrete work shall be placed in accordance with the requirements of MCIB Section 1 Concrete Materials and the following:***

B. Materials:

1. Concrete shall conform to MCIB Mix WA 610-1-4-0.410.

2. Red tinted concrete shall be produced with Davis "Red Brick" Color #160 or approved equal. The tinting material shall contain 7 to 10% red oxide pigment. The material shall be free from oil, grease, dirt, and nonferrous particles.

3. The contractor shall submit to the Engineer for approval a sample of the finished surface material that clearly demonstrates the impression pattern and color of material.

4. Dowel bars shall conform to ASTM A-615.

5. Curing compound for red tinted concrete and adjacent curbs shall be an acceptable, non-pigmented, clear liquid membrane-forming compound.

C. Median Strip Construction. Drill holes and grout dowel bars into the median base material (surface asphalt should be removed). Uniformly dampen the surface before paving. Hand float only as needed to produce a uniform surface. The top surface shall receive a broom finish. Saw traverse contraction joints on concrete pavement to match the pavement joint lines. Saw contraction joints over asphalt pavement at 10 foot centers. Otherwise jointing shall comply with 2301.4.

D. Construction: Red Tinted Concrete shall be installed in accordance with the manufacture's recommendations. Protect adjacent surfaces from the red stain. Float finish and impress with brick pattern. Immediately after impressing and as soon as marring of the surface will not occur, cover and cure the entire surface and exposed edges with clear membrane or with polyethylene sheeting for not less than 72 hours.

2304.5 Method of Measurement: Concrete Pavers ***and Alternate Median Treatment*** shall be measured by the square foot (square meter or tenth part thereof).

2304.6 Basis of Payment: Concrete Pavers ***and Alternate Median Treatment*** will be paid for by the Contract unit bid price.

SECTION 2305 MAINTENANCE OF TRAFFIC

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

ATSSA
Quality Standards for Work Zone Traffic Control Devices

Manual of Uniform Traffic Control Devices, Part VI (MUTCD)

2305.1 Summary: This section governs the furnishing of all labor, equipment and tools and for the performance of all work necessary to provide Maintenance of Traffic as specified herein, on the plans or within the Special Provisions.

2305.2 General: The Contractor is required to maintain access to all properties served by the streets within the construction site limits.

2305.3 Traffic Maintenance and Warning Devices:

A. General: The Contractor will be responsible for arranging for installation of the necessary traffic control devices (with the exception of the barricades and other channelizing devices) a minimum of 48 hours prior to beginning the project so that inspection can be conducted by the Engineer. Traffic maintenance devices including barricades, flashing lights, flag persons and other traffic control devices shall be in conformance with "Part 6 of the Manual on Uniform Traffic Control Devices" latest edition.

B. Device Maintenance: The Contractor's representative will make daily inspections of the traffic control devices installed and maintain records of any maintenance required and the date on which it was completed. These records will be maintained for the duration of the project and be incorporated as part of the final records. It shall be the Contractor's responsibility to maintain all traffic control devices in proper working condition and placement at all times. The Contractor shall promptly correct any deficiencies in traffic control.

C. Traffic Control Plan Revisions: Public Works Department reserves the right to make adjustments or revisions in traffic handling requirements that may become necessary after construction has started. These changes will be determined on the basis of periodic inspections throughout the duration of the project. Notice of such change will be transmitted to the Contractor and it will be his responsibility to make the necessary changes as soon as practicable after receipt of the notification.

2305.4 Pedestrian Traffic Control:

A. Devices: All traffic control along pedestrian routes (sidewalks) shall meet the requirements of sections of the latest version of the MUTCD. Particular attention should be paid to 6D.01and 6D.02 for pedestrian safety.

B. Pedestrian Route Closures: Pedestrian routes shall not be closed unless approved by the Department of Public Works. If a pedestrian route must

be temporarily closed, an alternate accessible route must be maintained. At no time shall the pedestrian route be closed on both sides of the street at the same time or for more than one continuous block. No sidewalk shall be closed for more than fifteen (15) consecutive calendar days. Audible pedestrian warning devices shall be placed and maintained at each end of the closure alerting pedestrians of the closure and the detour route.

C. Pedestrian Access: Accessible pedestrian access to all buildings served by the sidewalk must be maintained at all times during the project.

D. Pedestrian Routes Protection: Existing pedestrian routes and alternate accessible routes shall be protected from construction activities at all times. This protection may include, but is not limited to, railings, fences, barricades, and covered walkways. When work activities require the use of walkway protection, it shall meet the requirements of Chapter 18 of the Kansas City Missouri Code of Ordinances.

2305.5 Flashers and other traffic control devices: All traffic control devices shall be maintained in acceptable condition as defined by the latest ATSSA "Quality Standards for Work Zone Traffic Control Devices." Devices in unacceptable or marginal condition as determined above shall be removed from the job site and replaced with devices in acceptable condition.

2305.6 Method of Measurement: Maintenance of Traffic will be measured per each device per day listed in the proposal and as adjusted by the Engineer during construction. The device must be set for at least one–half of a calendar day for it to be measured for payment.

2305.7 Basis of Payment: Maintenance of Traffic will be paid for by one of the following:

A. Contract unit bid price

B. Contract lump sum bid price

SECTION 2306 PAVEMENT MARKINGS

Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

ASTM

C321 Standard Test Method for Bond Strength of Chemical–Resistant Mortars
C501 Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Tile Abraser
D36 Standard Test Method for Softening Point of Bitumen (Ring and Ball Apparatus)
D92 Standard Test Method for Flash and Fire Points by Cleveland Open Cup
D93 Standard Test Methods for Flash Point by Pensky Martens Closed Tester
D256 Standard Test Method Methods for Determining the Izod Pendulum Impact Resistance of Plastic
D476 Standard Specification for Titanium Dioxide Pigments, Type II Rutile
D562 Standard Test Method for Consistency of Paints Using Stormer Viscosimeter
D570 Standard Test Method for Water Absorption of Plastics
D638 Standard Test Method for Tensile Properties of Plastics
D711 Standard Test Method for No–Pick–Up Time of Traffic Paint
D768 Standard Specification for Yellow Iron Oxide
D868 Standard Test Method for Evaluating Degree of Bleeding of Traffic Paint
D969 Standard Test Method for Laboratory Test for Degree of Bleeding of Traffic Paint
D1152 Standard Specification for Methanol (Methyl Alcohol)
D1155 Standard Test Method for Roundness of Glass Spheres
D1199 Standard Specification for Calcium Carbonate Pigments
D1210 Standard Test Method for Fineness of Dispersion of Pigment–Vehicle Systems by Hegman–Type Gage
D1214 Standard Test Method for Sieve Analysis of Glass Spheres
D1475 Standard test Method for Density of Paint, Varnish, Lacquer, and Related Products
D2240 Standard Test Method for Rubber Property–Durometer Hardness
D2243 Standard Test Method for Freeze–Thaw Resistance of Waterborne Coatings
D2369 Standard Test Method for Volatile Content of Coatings
D2805 Standard Test Method for Hiding Power of Paints by Reflectometry
D3723 Standard Test Method for Pigment Content of Water Emulsion by Low Temperature Ashing
D3960 Standard Practice for Determining Volatile Organic Content (VOC) of Paints and Related Coatings
D4060 Standard Test Method for Abrasion Resistance of Organic Coatings by Taber Abraser
D4061 Standard Test Method for Retroreflectance of Horizontal Coating
D4366 Standard Test Methods for Hardness of Organic Coatings by Pendulum Damping Tests
D4796 Standard Test Method for Bond Strength of Thermoplastic Traffic Marking Material
D5420 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)
E70 Standard Test Method for pH of Aqueous Solutions With the Glass Electrode
E303 Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester

E308 Standard Practice for Computing the Colors of Objects by Using the CIE System
E660 Standard Practice for Accelerated Polishing of Aggegrates or Pavement Surfaces Using a Small–Wheel, Circular Track Polishing Machine
E1347 Standard Test Method for Color and Color–Difference Measurement by Tristimulus (Filter) Colorimetry
E1349 Standard Test Method for Reflectance Factor and Color by Spectophotometry Using Bidirectional Geometry

AASHTO
M 247 Standard Specification for Glass Beads Used in Traffic Paint
M 249 Standard Specification for White and Yellow Reflective Thermoplastic Striping Material (Solid Form)
T 250 Standard Method of Test for Thermoplastic Traffic Line Material

Manual of Uniform Traffic Control Devices, latest Edition (MUTCD)

ACI
ACI 503 Guide for the Selection and Use of Structural Adhesives with Concrete

Federal Test Method Standard No. 141, Method 4252 – Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing
Federal Test Method Standard No. 141a, Method 6121 – Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing
Federal Standard 595, Colors used in Government Procurement
Federal Specification TT–P–115a – Paint, Traffic (Highway, White and Yellow)
Federal Specification TT–P–1952B – Paint, Traffic and Airfield Marking, Water Emulsion Base

"Standard Color Chips for Highway Signs" (US Bureau of Public Roads, Washington D.C.)

2306.1 Summary: This section governs the furnishing of labor, equipment, and materials and for the performance of work necessary to furnish and install white and yellow permanent or temporary retro–reflector zed pavement marking materials.

2306.2 General: The permanent pavement markings shall be installed immediately after the roadway surface is complete unless prior approval is received by the Engineer. The installation of the yellow markings (as required) is the first priority. If the permanent markings cannot be installed and thus the roadway would be unmarked overnight, temporary removable markings shall be installed and remain until the permanent markings can be installed. The contractor shall make every possible effort to remove the temporary pavement markings and install permanent pavement markings within 48 hours. Only under extreme circumstances and at the approval of the pavement marking inspector or the engineer, will the duration of the temporary pavement markings be extended. Under no circumstance should the temporary pavement markings be in place for more than 2 weeks. If permanent markings cannot be installed within the specified time then semi–permanent markings shall be installed following the guide lines as set forth in the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD) Part VI, Sections F6 and G6. The temporary removable markings shall be removed prior to installation of the permanent markings. In situations where markings conflict with the

traffic routing, such as a lane closure or a lane diversion, conflicting markings shall be removed prior to application of the next set of markings.

2306.3 Striping Applicability Chart: These charts provide guidance for the selection of striping materials.

Marking Material	Roadway Surface	Application	Durability
Thermoplastic	New asphalt	Permanent	High
Aggressive bond thermoplastic	Aged asphalt, concrete	Permanent	High
Preformed thermoplastic	Asphalt, concrete	Permanent	High
Cold plastic	Asphalt, concrete	Permanent	Moderate
Paint	All surfaces	Permanent Temporary	Low
Epoxy	All surfaces	Permanent	High
Temporary Tape (Type I)	All surfaces	Temporary	Low
Temporary Tape (Type II)	All surfaces	Temporary	Low
Line masking tape	All surfaces	Temporary	Low

Roadway Surface	Permanent Marking	Temporary Marking
New asphalt	Thermoplastic	Temporary Tape (I or II)
Old asphalt	Aggressive bond thermoplastic	Temporary Tape (1 or II), paint
Slurry or microsurface	Thermoplastic	Temporary Tape (1 or II), paint
Milled concrete or asphalt	Not applicable	Paint
Asphalt to be milled	Not applicable	Paint
Base asphalt	Not applicable	Paint
New or old concrete	Aggressive bond thermo, Epoxy	Temporary Tape (1 or II), paint
Concrete	Inlaid cold plastic	Temporary Tape (1 or II), paint
Diamond ground concrete	Epoxy	Temporary Tape (1 or II), paint

Note: Old asphalt is asphalt which is more than 6 months old, or which has been open to traffic.

2306.4 Symbol Applicability Charts: These charts provide guidance for the selection of text and non–text symbol materials.

Roadway Surface	Non-Text Symbols	Temporary Non-Text Symbols
New asphalt	Pre-formed thermoplastic	Temporary Tape (I or II)
Old asphalt	Pre-formed thermoplastic	Temporary Tape (1 or II), paint
Slurry or microsurface	Thermoplastic	Temporary Tape (1 or II), paint
Milled concrete or asphalt	Not applicable	Paint
Asphalt to be milled	Not applicable	Paint
Base asphalt	Not applicable	Paint
New or old concrete	Aggressive bond thermo, Epoxy	Temporary Tape (1 or II), paint
Concrete	Inlaid cold plastic	Temporary Tape (1 or II), paint
Diamond ground concrete	Inlaid cold plastic	Temporary Tape (1 or II), paint

Roadway Surface	Text Symbols	Temporary Text Symbols
New asphalt	Pre-formed thermoplastic	Temporary Tape (I or II)
Old asphalt	Pre-formed thermoplastic	Temporary Tape (1 or II), paint
Slurry or microsurface	Pre-formed thermoplastic	Temporary Tape (1 or II), paint
Milled concrete or asphalt	Not applicable	Paint
Asphalt to be milled	Not applicable	Paint
Base asphalt	Not applicable	Paint
New or old concrete	Inlaid cold plastic	Temporary Tape (1 or II), paint
Concrete	Inlaid cold plastic	Temporary Tape (1 or II), paint
Diamond ground concrete	Inlaid cold plastic	Temporary Tape (1 or II), paint

2306.5 Prequalification:

A. Manufacturers interested in prequalifying material under this specification shall submit to the Engineer:

1. A sample of the material. Sample quantities are described in each section.

2. Certifications by qualified testing laboratories that the material meets all required tests.

3. A list of existing installations.

B. The Engineer may test submitted samples or materials as used for compliance with all requirements of this specification.

C. Products will remain on the prequalified list as long as the results of verification testing and field performance are satisfactory. Any changes in formulation should be reported to the Engineer for review and evaluation to determine if requalification is necessary

D. No material shall be used unless the material has been prequalified or approved by the Engineer.

E. A list of qualified materials by manufacturer may be maintained by the Owner.

2306.6 Materials:

A. **Pre–Mix Glass Spheres:** Pre–mix glass spheres shall be uncoated and conform to AASHTO M247 Type 1. The glass spheres used in the formulation shall be lustrous, free from film, scratches, and pits. The glass spheres shall also meet the following requirements:

1. **Roundness:** The roundness of the spheres shall be minimum of 70% when tested in accordance with ASTM D1155.

2. **Gradation:** The gradation when tested in accordance with the method provided in ASTM D1214 (by use of U.S. Standard Sieves) shall be:

Size of Sieve	Mass % Passing
No. 18 (1.00 mm)	80–100
No. 50 (300 μm)	20–50
No. 80 (180 μm)	0–10

3. **Refractive Index:** When tested by a liquid immersion method at 77 degrees F (25degrees C), the refractive index of the spheres shall be a minimum of 1.50.

B. **Drop–On Glass Spheres:** The spheres shall be manufactured from glass of a composition designed to be highly resistant to traffic wear and to the effects of weathering. The particles shall be spherical in shape, containing not more than thirty percent (30%) of irregularly shaped particles. They shall be essentially free of sharp angular particles, and particles showing milkiness or surface scoring or scratching. They shall meet the requirements of AASHTO M247 Type 1.

1. **Gradation:** The gradation when tested in accordance with the method provided in ASTM D1214 (by use of U.S. Standard Sieves) shall be:

Size of Sieve %	Passing (by Weight)
No. 20 (850 µm)	100
No. 30 (600 µm)	80-100
No. 50 (300 µm)	18-35
No. 80 (180 µm)	0-10
No. 100 (150 µm)	0-2

2. **Refractive Index:** When tested by a liquid immersion method at 77 degrees F (25 degrees C), the refractive index of the spheres shall be within the range of 1.50 to 1.60.

3. **Moisture Proof Requirements:** The spheres shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. The spheres shall flow freely from dispensing equipment at any time when surface and atmospheric conditions are satisfactory for application

C. **Thermoplastic Pavement Markings:** This specification covers a white and yellow thermoplastic reflectorized pavement marking material of a type that is applied to asphalt road surfaces in a molten state by mechanical means to receive a surface application of glass spheres, and which upon cooling to normal pavement temperature, produces an adherent reflectorized stripe of specified thickness and width and is capable of resisting deformation.

1. **Characteristics:** The material shall not exude fumes that are toxic, obnoxious or injurious to person or property, when it is heated to the temperature range specified by the manufacturer for application. It shall remain stable when held for 4 hours at this temperature, or when subject to 3 reheatings after cooling to ambient temperature.

   The temperature–viscosity characteristics of the plastic material shall remain constant throughout repeated reheatings, and shall show like characteristics from batch to batch. There shall be no obvious change in color of the material either as a result of repeated reheatings or from batch to batch.

   The thermoplastic material shall easily extrude from the equipment to produce a cross–section of line 90 to 125 mil (1.5 mm to 4.8 mm) thick, which shall be continuous and uniform in shape, and have clear and sharp dimensions.

2. **Serviceability:** The compound shall resist deterioration by contact with sodium chloride, calcium chloride or other chemicals used to prevent roadway ice, or because of the oil content of pavement materials or from oil droppings or other effects of traffic. The markings shall remain intact under normal traffic conditions at temperatures below 140 degrees F (60 degrees C).

3. **Specific Gravity:** The material's specific gravity shall not be less than 1.8 nor exceed 2.3 referred to water at 77 degrees F (25 degrees C) when determined by a water displacement method at 77 degrees F (25 degrees C).

4. **Set Time:** When applied at the specified temperature and thickness, the material shall set to bear traffic in not more than 2 minutes when the air temperature is 50 degrees F (10 degrees C) and not more than 10 minutes when the air temperature is 90 degrees F (32 degrees C).

5. **Composition:** The thermoplastic pavement marking material shall be homogeneously composed of pigment, filler, resin binder and glass reflectorizing spheres. The solid resin shall be a "maleic–modified glycerol ester resin" (alkyd binder) comprising at least one–third of the binder compositions and be no less than eight (8) percent by weight of the entire material formulation. The alkyd binder shall consist of a mixture of synthetic resins (at least one of which is solid at room temperature), and high boiling point plasticizers. The material shall not contain any petroleum derived ingredients. Yellow pigment shall be heat stabilized encapsulated lead chromate. The thermoplastic pavement marking material shall contain the following ingredients:

INGREDIENT (Percent by Weight)	WHITE	YELLOW
Binder (See Note A below)	18.0 min.	18.0 min.
Titanium Dioxide	10.0 min.	--
Glass Spheres	20.0–50.0	20.0–50.0.
Lead Chromate	--	2.0 – 4.5
Inert Fillers	42.0 max	50.0 max

The material shall be thoroughly mixed and furnished in a free flowing granular form. The material shall meet the requirements of this specification for a period of one year. The material shall readily melt in a uniform mixture. The material shall be free from all skins, dirt, and foreign objects.

It shall be of such composition that it will not bleed, stain or discolor when applied to bituminous pavement. The manufacturer shall replace material not meeting the above requirements.

6. **Color:** The color of the thermoplastic material after heating for 4 hours + 5 minutes at 425 + 3 degrees F (218 + 1.4 degrees C) shall conform to the following when tested by Federal Test Method Standard 141 Method 4252:

White	Federal Color Chip No. 37875 (Fed. Std. No. 595)
Yellow	Federal Color Chip No. 13538 (Fed. Std. No. 595)

7. **Reflectance:** The daylight luminous reflectance of the white material shall be not less than 75% when tested according to ASTM E1347. The yellow shall have a minimum brightness of 45% relative to magnesium oxide, and shall be within the green and red tolerance of the "Standard Color Chips for Highway Signs (January 1939)" obtainable from the United States Bureau of Public Roads, Washington, D.C. (TT–P–115a).

8. **Softening Point:** After heating the thermoplastic material for 4 hours + 5 minutes at 425 + 3 degrees C (218 + 1.4 degrees C) and testing in accordance with ASTM D36, the material shall have a softening point 215 + 15 degrees F (102 + 7.1 degrees C).

9. **Flowability:** After heating the thermoplastic material for 4 hours + 5 minutes at 425 + 3 degrees F (218 + 1.4 degrees C) and testing for flowability, the white thermoplastic shall have a maximum percent residue of 18 percent and the yellow thermoplastic shall have a maximum residue of 21 percent.

   After heating the thermoplastic material for 8.5 hours + 5 minutes at 425 + 3 degrees F (218 + 1.4 degrees C) and testing for flowability, the thermoplastic shall have a maximum percent residue of 28 percent.

10. **Indentation Resistance:** Hardness shall be measured by a Shore Durometer, Type A2, as described in ASTM D2240, except that the Durometer and the panel shall be at 77 degrees F (25 degrees C), and a 4.4 lb (2 kg) load applied. After 15 seconds, the reading shall be not less than 55.

11. **Abrasion Resistance:** The material shall not show a maximum loss of 0.02 ounces (0.5 g) subjected to 200 revolutions on a Taber Abraser at 77 degrees F (25 degrees C), using H–22 calibrate wheels, weighted to 17.6 ounces (500 g). The wearing surface should be kept wet with distilled water throughout the test. The panel for this test shall be prepared by forming a representative lot of material at a thickness of 125 mil (3 mm) on a 4 inch (100 mm) square panel (thickness 0.050 + 0.001 inch) [thickness 1.3 + 0.025 mm] on which a suitable primer has been previously applied.

12. **Low Temperature Impact Resistance:** The materials shall not fracture when subjected to an impact of 64 inch pounds at –4 degrees F (7.23 N–m at –20 degrees C) (), for at least 3 hours. The panel is then placed in an instrument also maintained at –4 degrees F (–20 degrees C), consisting of a 10.5 pound (4.7 kg) freely falling weight controlled to drop vertically for 6 inches (150 mm) onto the surface of the panel, which it strikes with a hemispherical indentor having a radius of .28 inches (7 mm).

13. **Water Absorption:** Materials shall have a maximum of 0.5 percent by weight of retained water when tested by ASTM D570, procedure (A).

14. **Yellowness Index:** The white thermoplastic material shall not exceed a yellowness index of 0.15.

15. **Flash Point:** The thermoplastic material shall have a flash point not less than 475 degrees F (246 degrees C) when tested in accordance with ASTM D92.

16. **Cracking Resistance:** After heating the thermoplastic material for 4 hours + 5 minutes at 425 + 3 degrees F (218 + 1.4 degrees C); applying to concrete blocks, and cooling 15 + 3 degrees F (7.1 + 1.4 degrees C), the material shall show no cracks. Properly applied, the material shall show less than six stress cracks per ten lineal feet (three lineal meters) of markings independent of pavement fracturing and faulting, for at least six months.

D. **Aggressive Bond Thermoplastic Pavement Markings:** This specification covers a white and yellow adhesive thermoplastic reflectorized pavement marking material that is applied to road surfaces, including Portland Cement Concrete (PCC) and aged asphalt without need of a primer/sealer. The material is applied to the road surface in a molten state by mechanical means with surface application of glass beads. Upon cooling to normal pavement temperature, it produces an adherent reflectorized stripe of specified thickness and width with limited thermal/seasonal deformation. In order to qualify as a non–sealer thermoplastic that can be applied to concrete surfaces without a sealer, the material must meet or exceed the requirements listed below.

1. **Characteristics:** The thermoplastic material shall be homogeneously composed of pigments, resins, polymers (adhesive constituent), glass reflectorizing spheres and other fillers. The thermoplastic material shall be available in a variety of surface delineation colors from the same manufacturer. The manufacturer shall have the option of formulating the material according to their own specifications. However, certain physical and chemical requirements specified must be satisfied in order to qualify as a non–primed striping application for PCC and aged asphalt surfaces.

   The material shall not exude fumes which are toxic, or injurious to persons or properties upon heating to application temperature.

2. **Specific Gravity:** The specific gravity of the white and yellow thermoplastic pavement marking material shall not exceed 2.15.

3. **Composition:** The pigment, intermix reflectorizing spheres, and fillers shall be uniformly dispersed in the resin and polymer upon heating to application temperature. The material shall be free of dirt and foreign matter and must meet or exceed the compositional requirements (percentage by weight) indicated below. The total resin/binder content must be 22% min – 26% max (weight) of total product ingredients.

Test Component	White	Yellow (Lead Chromate)	Yellow (Heavy Metal Free)
Glass Beads	30% min	30% min	30% min
Pigment –Ti02	10% min	N/A	N/A
Yellow (PbCr03)	N/A	2% min	N/A
Organic Yellow	N/A	N/A	Federal Color
Resin Binder Content	22% min	22% min	22% min
Inert Fillers	42.0 max	50.0 max	At Manufacturer's Discretion

4. **Color:** The thermoplastic material after heating for four hours ±□5 min. at 425 ±3 degrees F (218 ±□2 degrees C) and cooled to 77 ±□3 degrees F (25 ± 2 degrees C) shall meet the following:

White	Daylight reflectance at 45 degrees – 0 degrees – 80% min.
Yellow	Daylight reflectance at 45 degrees – 0 degrees – 45% min.

Yellow color shall match Federal Test Standard Number 5958 – Color 13538 and lie within the following ranges:

X	0.485 – 0.510
Y	0.445 – 0.470

The chromaticities and luminance factors of ordinary colors of retro reflecting material shall be determined under an angle of illumination of 45 degrees; direction of view perpendicular to surface; and illumination CIE standard illuminant D65.

5. **Bond Strength:** After heating the thermoplastic material for four hours ±□5 minutes at 425 ±3 degrees F (218 ±□2 degrees C), the bond strength to Portland Cement Concrete (PCC) shall equal or exceed 275 psi (1.9 MPa) (ASTM Standard Test Method for Bond Strength of Thermoplastic Traffic Marking Materials – D4796 or ASTM C321). Failures of type described in Section 6.1 of ASTM D4796 bond test, must be repeated to obtain a quantifiable number. Failure of types 6.2, 6.3, and 6.4 of ASTM D4796 bond test, must exceed the specified thermoplastic – cement brick separation.

6. **Low Temperatures Cracking (Stress) Resistance for Extended Period:** The material shall be tested according to AASHTO T 250 Section 7 with Section 7.2.3. modified for an extended cold temperature of 15 ±□3 degrees F (–9.4 ±□2 degrees C) exposure period of 72 hours. Any cracking shall constitute failure of the material to qualify as a non–sealer aggressive bonding material for PCC road surfaces.

7. **Impact Resistance (Gardner Falling Weight):** The test specimens should be formed according to the following procedure: Heat approximately 14.1 ounces (400 grams) of material in an open pint can for 4 hours at 425 ±□3 degrees F (218 ±□2 degrees C). Preheat specimen draw down blade, 2 inches x 4 inches (5 mm x 100 mm) with a 1/8 inch (3 mm) die opening for approximately one hour at 425 ±□3 degrees F (218 ±□2 degrees C). The blade is usually placed in the oven containing the sample material during the last hour of sample heating.

   After heating the sample for four hours, remove the sample and the draw down blade from the oven. Place the 125–mil blade onto a PCC block. Quickly pour the sample 425 ±□3 degrees F (218 ±□2 degrees C) into the opening of the draw down screed and draw down the sample for the entire length of the concrete block. Allow the drawn down test sample to condition in the open in the standard laboratory atmosphere, 73.4 ±□3 degrees F (23 ±□2 degrees C) and 50 ±□5% relative humidity.

   Perform the testing procedure according to ASTM D5420 Section 11. Record and report the type of failure as (a) crack or cracks on the surface, (b) cracks that penetrate the entire thickness, (c) brittle shatter (the test specimen in several pieces after impact), or (d) ductile failure (the specimen is penetrated by a blunt tear).

Both the yellow and white non–sealer materials shall have minimum impact resistance of 80 inch pounds (9.0 N–m) with no visible surface cracks.

8. **Impact Resistance (Notched Izod):** After heating the material for four hours □□5 minutes at 425 □□3 degrees F (218 □□2 degrees C) and forming test specimens according to AASHTO T 250 Section 8, both the yellow and white samples shall be a minimum notched impact resistance of 11.0 ±□0.3 inch pounds (1.24 + 0.03 N–m). The specimens shall be tested both at room temperature 73.4 ±□3 degrees F (23 ±□2 degrees C) and low temperature of 15
±□3 degrees F (9.4 ±□2 degrees C) in accordance with ASTM D256 test method A.

9. **Oil and Grease Resistance:** The thermoplastic material shall show no signs of deterioration or solubility after motor oil is rubbed vigorously into a sample for 2 minutes and allowed to penetrate for 5 minutes.

10. **Set Time:** When applied at a temperature range of 412.5 ±□12.5 degrees F (211 ±□7 degrees C) and thickness of 90 to 125 mil (2.3 mm to 3 mm) the material shall set to bear traffic in not more than 2 minutes when the air temperature is 50 ±□3 degrees F (10 ±□2 degrees C) and not more than ten minutes when the air temperature is 90 ±□3 degrees F (32 ±□2 degrees C).

11. **Flash Point:** The thermoplastic material shall have a flash point of not less than 500 degrees F (260 degrees C) when tested in accordance with ASTM D92.

12. **Storage Life:** The material shall maintain the requirements of this specification for a minimum period of one year. The thermoplastic material must melt uniformly with no evidence of skins or unbelted particles for this one year time period. Any material failing to do so shall be replaced by the manufacturer at their expense.

13. **Packaging and Marking:** The thermoplastic material shall be packaged in suitable containers to which it will not adhere during shipment and storage. The container of thermoplastic material shall weigh approximately 50 lb. (23kg). Each container shall designate user information, manufacturer's name and address, batch number and date of manufacture. Each batch manufactured shall have its own separate number. The label shall carry appropriate user warnings and instructions.

14. **NTPEP Test Program:** The material must have been applied, without surface primer, on two NTPEP Decks (PCC) and evaluated for a period of at least one year. A minimum of 90% of the original pavement striping must be intact on the PCC decks after a one–year review period. The percent retention is calculated based on the measured test area square footage (square meter) (neglecting mil thickness wear down) minus the road surface areas that are exposed due to cracking and chipping away of thermoplastic from the concrete surface caused by product bond failure to the substrate.

E. **Preformed Thermoplastic Pavement Markings:** This specification is for the furnishing of retro reflective preformed thermoplastic pavement marking materials that can be adhered to asphalt, concrete and Portland cement concrete pavements by

means of heat fusion. The applied markings shall be very durable, oil and grease impervious and provide immediate and continuing retro reflectivity.

1. **Characteristics:** The preformed marking material shall consist of a resilient white and yellow polymer thermoplastic with uniformly distributed glass beads throughout its entire cross section. Preformed words and symbols shall conform to the applicable shapes and sizes as prescribed in the latest revision of the Manual on Uniform Traffic Control Devices.

   The preformed markings shall be fusible to asphalt concrete and Portland cement concrete pavements by means of the normal heat of a propane type of torch. Adhesives, primers or sealers shall not be used prior to the preformed marking application on asphalt concrete and Portland cement concrete pavements.

   The preformed markings shall conform to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The markings shall have resealing characteristics and be capable of fusing to itself and previously applied worn hydrocarbon and/or alkyd thermoplastic pavement markings.

   The preformed markings shall be capable of application on new, dense and open graded asphalt concrete wearing courses during the paving operation in accordance with the manufacturer's instructions. After application, the markings shall be immediately ready for traffic. The preformed markings shall be suitable for use for one year after the date of receipt when stored in accordance with the manufacturer's recommendations.

   The preformed thermoplastic markings shall not be brittle and must be sufficiently cohesive and flexible at temperatures exceeding 50 degrees F (10 degrees C) for one person to carry without the danger of fracturing the material prior to application.

2. **Composition:** The retro reflective pliant polymer thermoplastic pavement markings shall consist of a homogeneous mixture of high quality polymeric thermoplastic binders, pigments, fillers and glass beads. The thermoplastic material must conform to AASHTO designation M 249 with the exception of the relevant differences due to the material being supplied in a preformed state.

3. **Glass Beads:** The markings shall contain 30% glass spheres which shall conform to AASHTO M 247 Type 1, except that glass spheres shall have a minimum of 70% true spheres on each sieve and 80% true spheres overall.

   The glass beads must be homogeneously blended throughout the material with a securely bonded protruding exposed layer of beads that provide immediate and continuous retro reflectivity; no additional glass beads shall be dropped on the material during application. Curved arrows must be available without protruding glass beads if reversibility is needed.

4. **Retro reflectivity:** The preformed marking shall upon application exhibit uniform adequate nighttime retro reflectivity. At 86 degree 30 feet (9.1 m) incidence angle and 1 degree 30 feet (9.1 m) divergence angle, the markings shall

have average minimum intensities of 350 mill candelas for white and 175 mill candelas for yellow as measured with a Mirolux retroreflectometer. Using a Taber Abraser with an H–18 wheel and a 4.4 ounce (125 g) load, the sample shall be inspected at 200 cycles, under a microscope, to observe the extent and type of bead failure. No more that 15% of the beads shall be lost due to pop out and the predominant mode of failure shall be "wear down" of the beads.

5. **Color Characteristics:** The thermoplastic material without glass beads shall meet the following:

White	Daylight reflectance at 45–degree/ 0 degree of 80% minimum
Yellow	Daylight reflectance at 45–degree/ 0 degree of 45% minimum.

The daylight reflectance shall not change significantly when the preformed thermoplastic is properly applied to the roadway surface

For highway use, the white markings shall contain a minimum of 8% by weight of Titanium Dioxide pigment to ensure a color similar to Federal Highway White, Color No. 17886 Standard 595. Yellow color shall reasonably match color chip Number 13538 of Federal Standard number 595 and be lead free.

6. **Skid Resistance:** The surface of the preformed thermoplastic markings shall provide a minimum skid resistance value of 45 BPN when tested according to ASTM E303.

7. **Thickness:** The width of the supplied material shall have a minimum average thickness of 90 mils (2.3 mm).

8. **Flexibility:** The preformed thermoplastic marking material shall have flexibility at 50 degrees F (10 degrees C) such that no cracking occurs in the test sample when a 1 inch by 6 inches (25 mm by 150 mm) sample is bent through an arc of 90 degrees at a uniform rate in 10 seconds (9 seconds per degree) over a one inch (25 mm) mandrel. The sample must be conditioned prior to testing at 50 + 2 degrees F (10 + 0.9 degrees C) for a minimum of four hours. At least two specimens tested must meet the flexibility requirements at 50 degrees F (10 degrees C) for a passing result.

9. **Environmental Resistance:** The applied markings shall be resistant to deterioration due to exposure to sunlight, water, oil, diesel fuels, gasoline, pavement oil content, and salt and adverse weather conditions.

10. **Effective Performance Life:** When properly applied, in accordance with the manufacturer's instructions, the pavement markings shall be neat and durable. The markings shall remain retro reflective and show no fading, lifting, shrinkage, tearing, roll back or other signs of poor adhesion.

F. **Cold Plastic Pavement Markings:** This specification covers a white and yellow pre–formed cold plastic reflectorized pavement marking material of a type that is applied to a road surface by an inlaid, pre–coated pressure sensitive adhesive that produces an adherent reflectorized stripe of specified thickness and width and is capable of resisting deformation.

1. **Characteristics:** The material shall be manufactured without the use of lead–chromate pigments or other, similar, lead–containing chemicals.

   Glass beads shall be incorporated to provide immediate and continuing retro reflection. Ceramic skid particles shall be bonded to the top layer to provide a skid–resistant surface.

   Preformed word and symbol markings shall conform to the applicable shapes and sizes as outlined in the Manual on Uniform Traffic Control Devices.

   The preformed markings shall be capable of being adhered to pavements by an inlaid, pre–coated pressure sensitive adhesive. A surface preparation adhesive may be used to precondition the inlay pavement surface.

   The preformed marking film shall mold itself to pavement contours by the action of traffic. Following proper inlay application and tamping, the markings shall be immediately ready for traffic.

2. **Composition:** The retro reflective pavement marking film shall consist of a mixture of high–quality polymeric materials, pigments and glass beads distributed throughout its base cross–sectional area. A reflective layer of glass beads and a layer of skid–resistant ceramic particles shall be bonded to the top urethane wearing surface. The urethane wear surface shall have a nominal thickness of 0.005 inches (13 mm). The film shall have a pre–coated, shear–resistant, pressure sensitive adhesive.

3. **Color:** The daytime color of the white film shall provide a minimum initial luminance factor, Y, of 80 and shall conform to the following chromaticity requirements:

WHITE		YELLOW	
X Values	**Y Values**	**X Values**	**Y Values**
0.290	0.315	0.474	0.455
.0310	0.295	0.491	0.435
1.330	0.360	0.512	0.486
0.350	0.340	0.536	0.463

   The daytime color of the yellow film shall provide an initial luminance factor, Y, in a range of 36 to 59 and shall conform to the above chromaticity requirements:

   Measurements shall be made in accordance with ASTM E1349, using illuminant “C” and 0/45 (45/0) geometry. Calculations shall be in accordance with ASTM E308 for the 2–degree observer.

4. **Reflectance:** The white and yellow films shall have the following initial minimum reflectance values as measured in accordance with the testing procedures of ASTM D4061. The photometric quantity to be measured shall be coefficient of retro reflected luminance (RL) and shall be expressed as mill candelas per square foot per foot–candle (mcd–ft–2–fc–1) (mill candelas per square meter per lux (mcd–m–2–lux–1)).

	WHITE	YELLOW
Entrance Angle	86.0º 86.0º 86.5º	86.0º 86.0º 86.5º
Observation Angle	0.2º 0.5º 1.0º	0.2º 0.5º 1.0º
Retro reflected Luminance RL (mcd–ft–2–fc–1)	700 500 400	410 250 175

5. **Skid Resistance:** The surface of the retro reflective films shall provide an initial minimum skid resistance value of 55 BPN as measured by the British Portable Skid Tester in accordance with ASTM E303. The surface of the retro reflective film shall retain an average skid resistance value of 45 BPN, when tested in accordance with ASTM E303, for a period of one year when installed in non–snow removal areas. The 45 BPN minimum value shall be an average of several readings taken in both the wheel track and non–wheel track areas.

6. **Tensile Strength and Elongation:** The film shall have a minimum tensile strength of 150 lbs. per square inch (7.18 kilopascals) of cross–section when measured in the direction of the length of the roll and tested in accordance to ASTM D638, except that a sample 6 inch x 1 inch (150 mm x 25 mm) shall be tested at a temperature between 70 degrees F and 80 degrees F (21.1 degrees and 26.7 degrees C) using a jaw speed of 10 to 12 inches per minute. The sample shall have a maximum elongation of 50% at break when tested by this method.

7. **Reflectivity Retention:** The glass beads must be strongly bonded and not be easily removed by traffic wear. Using a Taber Abraser with an H–18 wheel and a 4.4 ounce (125 g) load, the sample shall be inspected at 200 cycles, under a microscope, to observe the extent and type of bead failure. No more that 15% of the beads shall be lost due to pop out and the predominant mode of failure shall be “wear down” of the beads.

8. **Glass Beads:** The size, quality and refractive index of the glass beads shall be such that the performance requirements for the markings shall be met. The bead adhesion shall be such that beads are not easily removed when the material surface is scratched.

   The film shall have glass bead retention qualities such that when a 2 inches by 6 inches (50 mm by 150 mm) sample is bent over a 1/2 inch (12.7 mm) diameter mandrel, with the 2 inch (50 mm) dimension perpendicular to the mandrel axis, microscopic examination of the area on the mandrel shall show no more than 10% of the beads with entrapment by the binder of less than 40%.

9. **Thickness:** The film, without adhesive, shall have a minimum thickness of 60 mil (1.55 mm).

G. **Lead–Free, Water–Borne Emulsion Based White and Yellow Traffic Paint:** The pavement marking paint shall be a rapid dry. The traffic paint shall provide optimum adhesion for glass spheres when both binder and glass spheres are applied in the recommended quantities.

1. **Drying Time:** When applied at a wet film thickness of 15 mils (38mm) with a top dressing of 6–10 pounds (0.70 – 1.20 kg) of glass spheres per gallon (per liter) of paint and when the pavement temperature is between 50 degrees F and

120 degrees F (4.4 degrees C and 48.9 degrees C) and the relative humidity doesn't exceed 80%, the binder shall dry to a no–tracking condition in a minimum of 20 seconds and a maximum of 60 seconds.

These dry times shall not be exceeded when the paint is applied with specialized equipment so as to have the pigmented binder at a temperature of 150 degrees F to 170 degrees F (65.5 degrees C to 76.7 degrees C) at the spray gun.

The no–tracking condition shall be determined by passing over the applied line in a simulated passing maneuver with a passenger car traveling 35 MPH (56 KPH). There shall be no visual deposition of the paint to the pavement surface when viewed from a distance of 50 feet (15.2 meters). Furthermore, the pigmented binder, without glass spheres, shall dry to no–tracking condition in 180 seconds or less when tested in accordance with ASTM D711.

2. **Directional Reflectance:** The daylight directional reflectance of white pigmented binder (without glass spheres) shall be not less than 85% relative to magnesium oxide when tested in accordance with Federal Test Method Standard No. 141a, Method 6121. If yellow, after drying shall suitably match color 33538 of Federal Standard 595. The paint for the pavement markings shall contain no lead and/or chromium and shall have volatile organic content conforming to the latest Environmental Protection Agency regulations.

   In addition, the paint and/or components shall conform to the American Society for Testing Materials (ASTM) as follows:

   D93 Standard Test Methods for Flash Point by Pensky Martens Closed Tester
   D476 Standard Specification for Titanium Dioxide Pigments, Type II Rutile
   D562 Standard Test Method for Consistency of Paints Using Stormer Viscosimeter
   D711 Standard Test Method for No–Pick–Up Time of Traffic Paint
   D768 Standard Specification for Yellow Iron Oxide
   D868 Standard Test Method for Evaluating Degree of Bleeding of Traffic Paint
   D969 Standard Test Method for Laboratory Test for Degree of Bleeding of Traffic Paint
   D1152 Standard Specification for Methanol (Methyl Alcohol)
   D1199 Standard Specification for Calcium Carbonate Pigments
   D1210 Standard Test Method for Fineness of Dispersion of Pigment–Vehicle Systems by Hegman–Type Gage
   D1475 Standard test Method for Density of Paint, Varnish, Lacquer, and Related Products
   D2243 Standard Test Method for Freeze–Thaw Resistance of Waterborne Coatings
   D2369 Standard Test Method for Volatile Content of Coatings
   D2805 Standard Test Method for Hiding Power of Paints by Reflectometry
   D3723 Standard Test Method for Pigment Content of Water Emulsion by Low Temperature Ashing
   D3960 Standard Practice for Determining Volatile Organic Content (VOC) of Paints and Related Coatings
   D4060 Standard Test Method for Abrasion Resistance of Organic Coatings by Taber Abraser

D4366 Standard Test Methods for Hardness of Organic Coatings by Pendulum Damping Tests
E70 Standard Test Method for pH of Aqueous Solutions With the Glass Electrode
E1347 Standard Test Method for Color and Color–Difference Measurement by Tristimulus (Filter) Colorimetry

The paint shall show no cracking, flaking, blistering, appreciable loss of adhesion, softening, coagulation, discoloration, and have a minimum bleeding ratio of 0.97 when tested in accordance with Federal Specification TT–P–1952B.

The paint shall be capable of dilution with water at all levels without curdling or precipitation such that the wet paint can be readily cleaned up with water only.

The minimum contrast ratio shall be 0.96 when drawing down with a 0.005 bird film applicator on a 2A Leneta Chart or equal and air–dried for 24 hours. Contrast Ratio = Black/White.

H. **Temporary Tape:** This specification covers pavement marking tape of two colors, white and yellow, and of two types, Type I and Type II.

Type I–Regular (This type is not required to be easily removable intact.)

Type II–Removable (This type is to be readily removable intact, either manually or with a roll–up device after having been in place through the construction season.)

1. **General:** This material shall be a pavement striping tape designed to provide reflective delineation under both dry and moderate rainfall conditions. The tape shall consist of glass spheres tightly embedded to a binder; on a conformable backing precoated with a pressure sensitive adhesive. The striping material shall be thin, flexible, formable and following application shall remain conformed to the texture of the pavement surface. The tape shall be furnished in the color and type designated on the Plans or in the contract. The markings shall be precoated with a pressure sensitive adhesive and shall be capable of being adhered to asphalt concrete or Portland cement concrete in accordance with manufacturer's instructions without the use of heat, solvents or other additional adhesive means, and shall be immediately ready for traffic after application. The adhesive shall not require a liner or release paper. The striping material shall have a uniform appearance, free from cracks and the edges shall be true, straight and unbroken. The material shall be weather resistant and show no appreciable fading, lifting or shrinkage when applied in accordance with the manufacturer's recommendations.

2. **Color and Daylight Reflectance:** The daylight reflectance (ASTM E1347) of white shall be not less than 70%. The color of yellow shall be within the red and green tolerance limits of the Highway Yellow Color Tolerance Chart issued by the U.S. Department of Transportation.

3. **Dimensions:** The width and length shall be as shown on the Plans or in the contract. The material shall be available in rolls and there shall be no more than three splices per 50 yards (45.7 m) of length.

4. **Packaging:** The material shall be packaged in accordance with accepted commercial standards and when stored under normal conditions, shall be suitable for use for a period of at least one year after purchase.

5. **Adhesion:** The material shall adhere to asphalt and concrete surfaces when applied according to manufacturer's recommendations at surface temperatures above 50 degrees F (10 degrees C) and shall be immediately ready for traffic following application.

6. **Removability:** Type II tape shall be removable from asphalt and Portland cement concrete intact or in large pieces, either manually or with a roll–up device, at temperatures above 40 degrees F (4.5 degrees C) without use of heat, solvents, grinding or blasting.

7. **Reflection:** The white and yellow material shall be retro reflective, reflecting white or yellow respectively and shall be readily visible at night when viewed with automobile headlamps using high beams from a distance of at least 300 feet (91.4 m).

8. **Durability:** Type Il material shall maintain adhesion, show no alligatoring, show no signs of pulling apart, and shall suffer no more than a 25% loss of beads, sand and grit when subjected to 30, 000 revolutions on a small–wheel circular track as described in ASTM E660, with the following variations or exceptions:

   a. Two opposite wheels mounted with Goodyear 3.40–5 NHS Industrial Rib tires shall be used with a total load of 51.5 pounds (23.4 kg) on each tire. Tire air pressure shall be maintained at 25 pounds (11.3 kg). The wheels shall be mounted perpendicular to the specimens and toed out 2° to produce a slight abrading action.

   b. Specimens shall be applied to 6 inch (150 mm) diameter dense graded bituminous concrete surface which has been compacted at 3000 psi (20.7 MPa) for two minutes. After application, the specimens shall be allowed to cure at least 16 hours before beginning the test.

9. **Prequalification:** Manufacturers interested in prequalifying material under this specification shall submit 20 linear feet (6 linear meters) of each color to the Engineer, and shall comply with the provisions of Paragraph 2307.4.

I. **Epoxy:** This specification is for the application of epoxy resin and glass beads as reflective pavement markings on Portland cement concrete or bituminous pavements. The epoxy resin material shall be toxic heavy metal free, two–component, 100% solids, and shall be formulated and tested to perform as a pavement marking material with glass spheres applied to the surface. The two components are an epoxy resin and an amine curing agent. The contractor shall provide complete manufacturer’s specifications and material safety data sheets to the Engineer for all material furnished.

   1. **Characteristics:** The material shall not exude toxic fumes when heated to application temperature. The material which, when mixed in the proper ratio and applied at 0.14 mil (500 μm) wet film thickness at 74.8 degrees F (23.8 degrees

C) with the proper saturation of glass beads, has a no–tracking time of less than 40 minutes for slow curing material and less than 10 minutes for rapid curing material. The material shall be capable of fully curing under a constant surface temperature of 32 degrees F (0 degrees C) or above.

2. Properties of Cured Material:

a. **Color:** Provide white which complies with Federal Standard 595 17875. Provide yellow which matches the standard shade within the red and green tolerance limits when compared with the Highway Yellow Color Tolerance chart available from the U.S. Department of Transportation, Washington, D.C. (Federal Standard 595 13538).

b. **Abrasion Resistance:** 0.0028 ounces (80 mg) maximum loss when tested at 30 + 1.5 mils (750 + 38 μm) and a 72 hour cure and with a CS–17 wheel under a load of 2.2 lbs. (1000 grams) for 1000 cycles

c. **Hardness:** Shore D hardness of 75 minimum.

d. **Adhesion to Concrete:** When catalyzed, has such a high degree of adhesion to the specified concrete surface that there is a 100% concrete failure. Apply the material at a film thickness of 15 + 1.5 mils (375μm + 38μm) to concrete with a minimum compressive strength of 4061 psi (28 MPa). Allow the material to cure for 72 hours at 77 degrees F (25 degrees C) before the test is performed.

e. **Yellowness Index:** White only. Value after 72 hours in QUV – 30 maximum when tested at 15 ± 1.0 mils (375μm + 25μm) and a 72 hour cure.

f. **Field Evaluation:** Field test materials at AASHTO NTPEP regional test facilities, which include both hot and cold weather conditions and are a minimum of six months in duration.

3. Glass Beads For Drop–On Application (double drop system):

a. For the first drop, furnish large beads, which are compatible with the epoxy system, and comply with AASHTO M 247 except with the following gradation (FP–96, Type 4):

Sieve Size	Percent Passing
No. 10 (2.00 mm)	100
No. 12 (1.70 mm)	95-100
No. 14 (1.40 mm)	80-95
No. 16 (1.18 mm)	10-40
No. 18 (1.00 mm)	0-5
No. 20 (850 μm)	0-2

b. For the second drop, furnish regular beads which are specifically manufactured to be compatible with the epoxy system, and which comply with the requirements of AASHTO M247, Type 1.

c. Both types of beads are to be coated with a moisture resistant coating and an adhesion promoting coating which is compatible with the epoxy system.

4. Test Methods:

a. Adhesion to Concrete ACI 503, Appendix A.1

b. Hardness ASTM D2240

c. Abrasion Resistance ASTM C501

5. Prequalification:

a. Manufacturers interested in prequalifying material under this specification must comply with the provisions of Paragraph 2307.4 and shall provide a one liter sample of each color plus one liter of hardener to the Engineer for laboratory testing. Also include a copy of the quality control test report for each lot of material, an infrared spectroscopy analysis for each component if available, material safety data sheets and a complete set of installation recommendations and instructions. Forward an official copy of the AASHTO NTPEP test report along with evidence that the product in reference is identical to that submitted for prequalification.

b. The material will be evaluated for compliance with all requirements of this specification, and the manufacturer will be notified of the results. Both component A and component B will be analyzed and "fingerprinted" using infrared spectroscopy for use in screening future verification samples to ensure that materials submitted for use are of an identical formulation as originally approved.

c. **Verification testing**: The Engineer will take a one liter verification sample of Part A and Part B of the epoxy from one lot of each color per project. Send the samples to the engineer for testing and evaluation. Lots previously tested will be exempted from testing and may be exempted from sampling if coordinated with the engineer. Samples may be tested using infrared spectroscopy and testing as necessary. Deviations as determined by comparison with the prequalification sample will be cause for removal from the prequalified list. The Engineer may also take a 0.5 gallon (2 liter) sample of each type of glass bead used on the project. Forward all samples to the engineer for verification testing

2306.7 Method of installation: The proposed permanent markings shall be laid out by the ***Contractor as shown on the plans***. Markings shall not be applied until the layout and conditions of the surface have been approved by the Engineer. If a paint line is used for layout purposes (in lieu of a chalk line or string line) the paint line shall not be wider than 1/2 inch (16.5 mm) in width. If wider, the paint shall be removed following the application of the final permanent marking. New markings shall match existing markings as applicable in areas abutting existing road surfaces. The surface shall be dry and all dust, debris, oil, grease, dirt, temporary markings and other foreign matter shall be removed from the road surface prior to the application of the permanent marking material. The Contractor shall be responsible for keeping traffic off freshly applied

markings until they have set sufficiently to bear traffic. Traffic control is the responsibility of the Contractor and shall conform to the MUTCD. Failure to comply with traffic control guidelines will result in the Pavement Marking Contractor being directed to stop operations and leave the site until proper and approved traffic control has arrived and put in place on site.

Temporary pavement markings shall be installed the same day that the existing pavement markings are damaged, removed or covered up prior to lane opening. Temporary pavement markings shall be installed using the same cycle length as the permanent markings and be at least 2 feet (600 mm) long. Double yellow markings shall be used for temporary centerline and single white markings shall be used for temporary lane lines on four lane roadways. Single yellow markings shall be used for temporary centerline on two lane roadways as directed by the engineer. Half–cycle lengths with a minimum of 2 foot (600 mm) stripe and 10 foot (3.05 m) gap should be used on roadways with severe curvature.

A. **Glass Spheres:** The drop on glass beads shall be applied at a rate of eight to ten pounds per 100 square feet (3.6 to 4.5 kg per 9.3 square meters).

B. **Thermoplastic Pavement Markings:** Thermoplastic material shall readily apply to the pavement at temperatures of 400 – 425 degrees F (204 – 218 degrees C) from approved equipment to produce an extruded line that shall be continuous and uniform in shape having clear and sharp dimensions. Application temperatures shall not exceed 450 degrees F (232 degrees C).

   Thermoplastic may be used for cross walks and stop bars as specified under the conditions described herein. The thermoplastic markings shall be applied to the pavement surface in a molten state by mechanical means with surface application of glass spheres, and upon cooling to normal pavement temperature, produce an adherent retro–reflectorized stripe of specified thickness and width and capable of resisting deformation.

   1. **Equipment:** The equipment used to install the thermoplastic shall be as follows:

      a. A self–propelled machine is required in order to fulfill the timing needs of the marking installation for longitudinal lines.

      b. If thermoplastic is used for transverse lines, i.e., crosswalks and stop lines, a push cart shall be used according to the following requirements: Only one pass with the thermoplastic pavement marking equipment shall be allowed in order to provide the required line width according to the plans. Multiple passes of narrower lines with overlaps to provide the required width shall not be allowed unless otherwise approved by the inspector after review of a test strip installation. If approved, the contractor shall be required to heat the seam with a torch and feather the overlapped material with a putty knife. Liquid thermoplastic shall not be used for word or symbol markings.

      c. Constructed to provide mixing and agitation of the materials. Conveying parts between the main material reservoir and the shaping die shall be constructed as to prevent accumulation and clogging.

d. Constructed so that mixing and conveying parts up to and including the shaping die will maintain the materials at a temperature not less than 400 – 450 degrees F (204 – 232 degrees C). To assure that the material does not fall below the minimum temperature, the shaping die shall be heated by means of a gas–fired infrared heater or a heated, oil–jacketed system.

e. Constructed as to insure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off square stripe ends and shall provide a method of applying "skip" lines. The equipment shall be constructed to be able to provide for varying die widths and to produce varying widths of traffic markings. The use of pans, aprons, or similar appliances with die overruns will not be permitted.

f. All conditions apply as stated above for material temperatures, line definition and workmanship when a hand pushcart is used for cross walks. The Inspector will verify measurement.

g. Equipped with a special kettle for melting and heating the material shall be provided. The kettle shall be equipped with a thermostat so that heating can be done by controlled heat transfer liquid rather than by direct flame so as to provide positive temperature control and prevent overheating of the material.

h. Constructed for a nominal application of 90 – 125 mil (2.3 – 3.2 mm) thickness.

i. The heater and applicator shall be so equipped and arranged as to meet the requirements of the National Board of Fire Underwriters of the National Fire Protection Association, of the state, and of the local authorities.

j. Equipped with an automatic glass bead dispenser attached to the striping machine in such a manner that the beads are dispensed almost instantaneously upon the installed line. The glass bead dispenser shall be equipped with an automatic cut–off control synchronized with the cut–off of the thermoplastic material.

k. The equipment shall be arranged as to permit preheating of the pavement immediately prior to application of the thermoplastic material, if preheating is recommended by the thermoplastic manufacturer.

l. The applicator shall be capable of containing a minimum of 1000 pounds (453.6 kg) of molten material (not applicable for hand–liner use).

m. The applicator shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc.

n. The Contractor's striper shall be equipped with electrical foot (meter) counters. The counters shall individually tabulate the length of line applied by each gun whether solid or dashed. The Contractor shall determine the accuracy of the foot (meter) counters and establish an adjustment factor as required to determine the pay item quantities. The foot (meter) counters shall be periodically checked to assure accurate measurements. No thermoplastic

shall be applied without the accurate operation of the foot (meter) counters. The Contractor shall provide the Engineer with a certified document on these calibrations.

2. Application Over Existing Markings:

a. Existing thermoplastic markings on asphalt road surfaces may be over laid with thermoplastic material providing that the existing markings (thermoplastic) are less than 30 mils (760 μm) thick, and are securely bonded to the substrate. If the thermoplastic is greater than 30 mils (760 μm), or not securely bonded to the substrate, then it shall be ground to 30 mils (760 μm), or removed completely if not securely bonded to the road.

b. Existing solvent based paint on asphalt road surfaces may be over laid with thermoplastic provided that more than 75% of the road surface is exposed, and there is no more than a single coat of paint on the remaining unexposed area. If more than one layer of paint exists, the paint is not securely anchored to the substrate, or there is less than 75% of the road surface exposed, then the paint must be thoroughly removed.

c. All existing polyester, epoxy, or other type pavement marking paints on asphalt or concrete road surfaces must be completely removed from all road surfaces prior to the installation of thermoplastic material.

3. **Application Temperatures:** To insure optimum adhesion, the pavement and ambient air temperature shall be 50 degrees F (10 degrees C) and rising. The thermoplastic material shall be applied in a melted state at a temperature of 400 – 425 degrees F (204 – 218 degrees C). The temperature of the material within the shaping dies shall be maintained at the manufacturer's recommendations for application temperatures, but in no case shall the temperature fall below 400 degrees F (204 degrees C) or exceed 450 degrees F (232 degrees C).

The material shall not break down or deteriorate if held at the plastic temperature for a period of four (4) hours or by reason of three (3) reheatings to the plastic temperature (400o F to 450o F).

Where manufacturer's application temperatures differ from those as specified, the manufacturer's temperatures shall apply upon approval of the Engineer.

4. **Line Quality:** The finished lines shall have well defined edges and be free of waviness. Pavement marking lines shall be straight or of uniform curvature and shall conform with the tangents, curves, and transitions as specified in the pavement marking standards and/or as directed by the Inspector.

5. **Line Thickness:** The minimum thickness of the lines as viewed from a lateral cross section shall be not less than 90 mil (2.4 mm) near the edges, or less than 125 mil (3.2 mm) at the center. Drop–on glass beads shall not be included in the measurement, or if so, then appropriate allowances shall be made for the added mil thickness. A device for gauging the installed material thickness shall be furnished to the City Inspector as requested for use on the project. The gauge shall be easy to read and shall readily indicate excessive variations.

6. **Clean Up:** The Contractor shall be responsible for removing all pavement markings material spilled upon the roadway surface or adjoining area. The Contractor shall use methods acceptable to the Engineer/Inspector for removing the spilled material.

7. **Line Repair:** Any pavement marking which is crossed by a vehicle and tracked shall be replaced and any subsequent marking made by the vehicle shall be removed by methods acceptable to the Inspector at NO additional cost to the City.

C. **Preformed Thermoplastic Pavement Markings:** The markings shall be applied in accordance with the manufacturer's recommendations on clean and dry surfaces.

   1. **Asphalt:** The materials shall be applied using the propane torch method recommended by the manufacturer. The material must be able to be applied at ambient and road temperatures down to 32 degrees F (0 degrees C) without any preheating of the pavement to a specific temperature. The pavement shall be clean, dry and free of debris and oil or grease residue.

      a. At temperatures below 50 degrees F (10 degrees C), the preformed thermoplastic pavement markings shall be kept as warm as possible to maintain flexibility.

      b. Remove pavement surface moisture by holding a propane torch approximately 6 inches (150 mm) above the section of asphalt using a continuous circular motion.

      c. Heat the pavement with the torch upon placing the material to a temperature of 200 degrees F (93 degrees C) for 90 mil (2.3 mm), and up to 300 degrees F (149 degrees C) for 125 mil (3.2 mm) materials.

      d. Immediately after the road surface has been properly preheated, position the material with exposed bead side up and heat.

      e. Position the torch approximately 12 inches (305 mm) over the marking so the flame is extended and heat is evenly applied moving the torch in a circular motion across the marking. When the correct temperature of the marking has been reached, it will turn slightly darker or pale yellow if the material is white. Over heated or burned material shall be removed.

      f. After the entire material section has been heated and bonded to the pavement, re–heat the perimeter of the marking and the road surface to bond the edges.

      g. If installing reversible arrows, which do not contain a top coating of glass beads, the glass spheres shall be hand applied on the molten material.

h. Feather the leading edge of the pavement marking with a putty knife or bevel with the torch. Leading edges are any edge that would be susceptible to snow plow blades approaching from the direction of normal travel.

i. After cooling, use a putty knife to attempt to remove a portion of the material. The material shall not pry off without asphalt embedded to the underside.

2. **Concrete:** New concrete surfaces must be sandblasted to entirely remove curing compound. The same application procedure shall be used as described for asphalt pavements. However, a compatible primer sealer may be applied before application to assure proper adhesion.

3. **Chip Seal Surfaces:** The same application procedure shall be used as described for asphalt pavements. However, exposed aggregate should be removed where the preformed thermoplastic pavement marking is to be applied.

D. **Cold Plastic Pavement Markings:** The Contractor shall furnish and install white and yellow permanent retro–reflectorized cold preformed plastic pavement marking material at the location shown on the plans, in conformance with the details and material specifications included herein.

The cold plastic markings shall consist of a homogeneous, extruded, prefabricated material of specified thickness and width which shall contain reflective glass spheres uniformly distributed through–out the cross–section, and shall be applied only to concrete pavement surfaces by means of an approved inlaid grinding process with pre–coated adhesive and pressure.

1. **Contractor's personnel:** It is important that the contractor's personnel be completely knowledgeable of all application requirements and procedures prior to product application. It is the responsibility of the contractor to contact the supplier of the cold plastic material if questions regarding application procedures or conditions arise.

2. **Prequalification:** Manufacturers may be required to supply a 3 sq. ft. (0.28 sq. m.) sample of each color for laboratory testing, and must comply with Paragraph 2307.4.

3. **Procedure:** This procedure explains how to apply tape to concrete surfaces only. Apply the tape according to manufacturer's instruction in conjunction with an approved inlaid grinding method.

4. **Road conditions:** It is recommended that the tape be installed as soon as practical following tape manufacturer instructions.

a. Cold plastic pavement markings shall be inlaid by an approved grooving process into concrete pavement surfaces. Cold plastic will not be allowed on asphalt pavement surfaces whether inlaid into hot asphalt or existing asphalt surfaces. Grooving the pavement surface allows preformed pavement

marking tape to better adhere by creating a fresh surface. Grooving also produces a lower profile marking by embedding the tape into the pavement surface, which helps protect the tape from snowplow damage.

b. The cutting head shall consist of diamond tipped cutting blades "gang stacked" 0.25 inches to 0.50 inches (6 mm to 13 mm) wide. The spacers between each blade must be such that there is less than a 10 mil (.254 mm) raise in the finished groove between the blades. Water–cooling the blades may be necessary for long line grooving.

c. The groove width shall be equal to the tape width plus 1 inch + 1/8 inch (25 mm + 3.2 mm). The depth of the groove shall be 75% of the tape thickness + 15%. For series 420, 60 mil (1.5 mm) tapes, the groove shall be 45 mils + 10 mils or 0.05 inch + 0.01 inch (1.25 mm + 0.25 mm). The bottom of the groove should have a smooth, flat surface. If a coarse tooth pattern is present, increase the number of blades and decrease the thickness of the spacers between the blades on the cutting head. If water–cooling is used, flush the groove immediately after grooving to clean the surface.

d. Clean the surface of the road and the groove using a broom and/or high–pressure air blower. If either of these methods fail to clean the road surface, then high–pressure water wash shall be used. Road surface, including the surface of the groove must be dry and all dust, dirt, debris, oil, grease and foreign material removed before applying tape. If using water–cooling to groove, the groove must be completely dry prior to tape application.

5. **Tape Application:** If there is a crack in the pavement, or if the tape is to be applied over a bridge expansion joint, manhole or utility box, lay the tape over the crack joint or fitting, then cut the tape 1 inch (2.54 cm) away from the crack or joint on each side. Apply the required surface preparation adhesive and allow to dry completely (5–10 minutes at 70 degrees F (21 degrees C), but not over 30 minutes.

6. **Tamping:** Tamp the tape thoroughly with a tamping cart with a minimum 200 pound (90 kg) load, three times back and forth (six passes) over each part of the tape. Start in the center of the marking and work out to the edges removing any trapped air.

7. Do not twist or turn the tamper cart on the tape

8. Make six passes (three passes back and forth) over each part of the tape (tamping is very important)

9. Make sure all edges are firmly adhered

10. Application Conditions

    a. Air temperature 60 degrees F (15.5 degrees C) and rising

    b. Surface temperature 70 degrees F (21.1 degrees C) and rising

c. Overnight air temperature 40 degrees F (4.4 degrees C) the night before tape application

d. Pavement surface must be clean and dry. No rainfall should occur within 24 hours prior to application

e. Butt splices must be used; do not overlap tape ends

f. Traffic must be kept off of pavement surfaces coated with a surface preparation adhesive prior to tape application (follow manufacturer's instruction regarding the use of surface preparation adhesive)

11. **Surface moisture:** Cold preformed plastic tapes will not adhere if moisture is present. Therefore, road surfaces must be dry and above the minimum required temperature for application of all tapes. If rainfall occurs within 24 hours prior to application, a surface moisture test (plastic wrap or roofing paper method as approved by the inspector) must be performed and approval obtained from the inspector. The groove must be visibly dry for a minimum of two hours prior to application. A moisture test shall be completed after the two–hour drying time to ensure no presence of moisture.

E. **Pavement Marking Paint:** The Contractor shall furnish and install white and yellow retro–reflectorized pavement marking paint material at the location shown on the plans, in conformance with the details and material specifications included herein.

1. The wet thickness and dry thickness of the pavement marking paint shall not be less than 15 mils (0.4 mm) and 12 mils (0.3 mm), respectively without glass beads.

2. Glass beads shall be applied uniformly over the entire length of line at the rate of 6 to 10 lbs. per gallon (0.70 – 1.20 kg per liter) of paint.

3. The gun tip shall be oriented perpendicular to the centerline to ensure that the beginning and ends of all lines are perpendicular to the centerline and not skewed.

4. The equipment shall be maintained such that the needle can be fully closed when shut as to ensure square cut lines at the beginning and ends.

F. **Epoxy Pavement Marking:** The Contractor shall furnish and install white and yellow epoxy markings at the location shown on the plans, in conformance with the details and material specifications included herein.

1. Equipment:

a. Use equipment that is capable of spraying both yellow and white epoxy in the manufacturer's recommended proportions. Provide equipment that call place stripes on the left and right sides, and place two lines simultaneously with either line in a solid or intermittent pattern in yellow or white. All guns must be in full view of operators at all times. If words, symbols, crosswalks, cross–hatching and stop bars are to be of epoxy resin material, equip the

truck with a hand spray wand for such application. Mount the equipment on a truck of sufficient size and stability, and with an adequate power source, to produce lines of uniform dimension and prevent application failure. Provide equipment with metering devices to register the accumulated volume dispensed for each material, each day. Additionally, provide individual pressure gauges, clearly visible to the operator, for each pump used.

b. Provide equipment with two glass bead dispensers (double drop system) that uniformly distributes the glass beads to the surface of the epoxy pavement marking at a rate of at least 25 pounds per gallon (3 kilograms per liter). Glass beads may be applied by a pressure gun or controlled free fall.

2. **Contractor's Personnel:** Assure that at least one employee on the project when pavement markings are being applied holds an American Traffic Safety Services Association (ATSSA) pavement marking certification.

3. Surface Preparation:

a. On existing pavements, remove the existing pavement markings in accordance with Section 822 of the Standard Specifications. Remove the existing markings and prepare the surface according to the manufacturer's recommendations (for the type of markings being installed).

b. On new Portland cement concrete pavement (PCCP), use shot blasting to remove curing compounds and laitance from the surfaces to which the pavement marking will be applied. Prepare the surfaces of new concrete bridge decks the same as new PCCP.

c. On all pavements, THOROUGHLY remove all dirt, grit, grease, grime, vegetable matter, residue of prior pavement marking application (including such adhesives or primers that may have been used in their application), and any other foreign matter from the roadway surface prior to the application of epoxy pavement markings.

4. **Alignment:** All layout required in the construction of the pavement marking is the responsibility of the Contractor. Lay out the pavement marking as detailed on the Plans. When the Plans do not provide details, submit a layout plan (conforming to the requirements of the Manual on Uniform Traffic Control Devices (MUTCD)) for the pavement markings to the Engineer for approval. Normally locate longitudinal pavement marking stripes 2 inches (50 mm) from existing longitudinal joints. Provide adequate guide marks (approximately 2 inches (50 mm) by 6 inches (150 mm) at approximately 30 to 50 ft. (10 to 15 m) intervals) for the application of the pavement markings.

5. Pavement Marking Application:

a. When no traffic is present, and for edgelines under any condition of traffic, a slower curing epoxy material (40 minutes) may be used. When the application is taking place under traffic, use a fast setting (10 minutes) epoxy material for center lines and skip lines.

b. Apply the epoxy material closely behind the cleaning procedure.

c. Provide the Project Engineer with a copy of the manufacturer's application instructions. Apply the epoxy pavement markings in accordance with the manufacturer's recommendations. In the absence of manufacturer's recommendations, apply the markings when the ambient and pavement surface temperatures are 50 degrees F (10 degrees C) and rising. Cease pavement marking operations when the ambient or the pavement surface temperature drops to 50 degrees F (10 degrees C).

d. Before mixing the components of the pavement marking material, heat the individual components to the temperature ranges recommended by the manufacturer of the material. Avoid exceeding the maximum recommended temperature at any time.

e. Apply the epoxy pavement marking material at a thickness of 20 mils ± 0.2 mils (500 µm ± 50 µm) on asphalt and PCCP. Immediately apply the glass beads to the epoxy pavement marking at the rate of 25 pounds per gallon (3 kilograms per liter) of epoxy, equally divided between the large and regular bead gradations. Apply the large beads on the first drop and the regular beads on the second.

2306.8 Method of Removal: Temporary pavement markings on milled surfaces scheduled to be overlaid do not have to be removed prior to performing the overlay. Permanent pavement markings installed on new asphalt surfaces shall be removed without structurally damaging the pavement or scarring the surface. The method of pavement marking tape removal shall be by a high pressure water blast method, a low pressure water and sand blast method, a steel shot blast method, or burning method. Grinding or black paint covering shall not be allowed on new pavement surfaces.

2306.9 Performance Measures

A. Thermoplastic and aggressive bond thermoplastic performance measures

1. **Lack of specified thickness:** The full unit price bid per foot (meter) shall be withheld if lack of thickness is found more than three (3) times per 1 mile (1.6 km), or project if less than 1 mile (1.6 km) in length. Each line shall be checked a minimum of six (6) times per 1 mile (1.6 km), or project if less than 1 mile (1.6 km) in length.

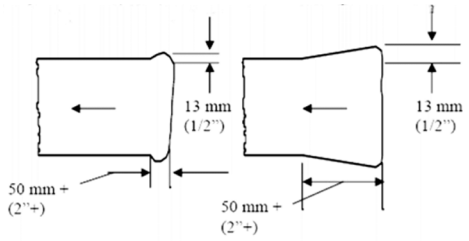
2. **Lack of specified width:** Payment shall be made with penalty being equal to 25% of the unit price bid per foot (meter) for each 1/4 inch (6.4 mm) of width lacking not to exceed 100% of the unit price bid per foot (meter) for the length of the line less than specified width. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

3. **Lack of specified length/cycle:** Payment shall be made with penalty being equal to 25% of the unit price bid per foot (meter) for each 1 inch (50 mm) of length lacking or exceeding the specified length for broken lane line and/or broken center line not to exceed 100% of the unit price bid per foot (meter) for the length

of the line less than specified length. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

4. **Lack/Excess of Surface Beads or Improper Application:** The full unit price bid per foot (meter) shall be withheld for each lineal foot (meter) of material with inappropriate application rate of the surface glass beads. The same penalty shall apply if the beads are not evenly disbursed across and along a line or if the beads imbed improperly. This penalty shall be imposed for each instance that the Contractor fails to take corrective action after one warning by the Engineer.

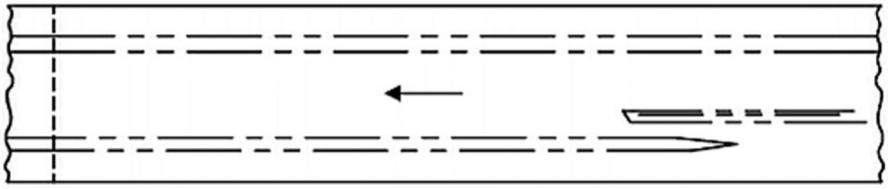
5. **Bell ends:** The full unit price bid per foot (meter) shall be withheld for wide "bell" ends greater in length than 2 inches (50 mm). This penalty shall be for the full 6 feet (1.8 m) of a lane line or broken centerline or for no more than 6 feet (1.8 m) of a long line.



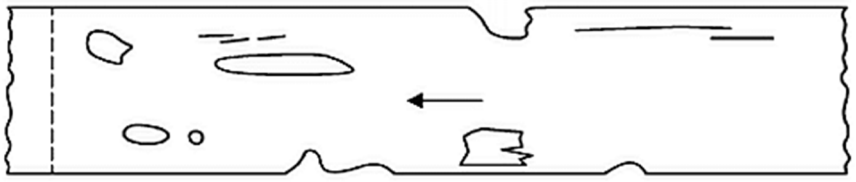
6. **Lack of** adhesion**:** The full unit price bid per foot (meter) shall be withheld for 3 feet (1 meter) for each occurrence if found more than three (3) times per 1 mile (1.6 km), or project if less than 1 mile (1.6 km) in length.

7. **Line Deviation:** A line that in the judgment of the Engineer deviates from the specified layout by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.

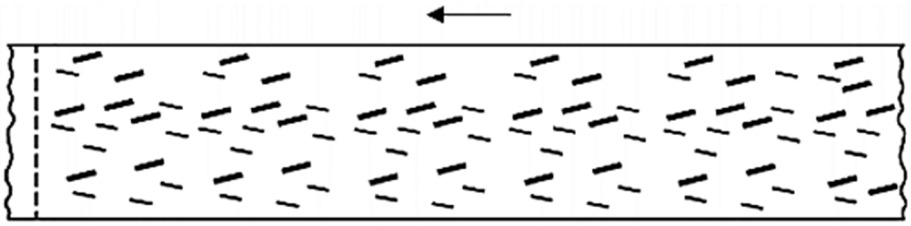
8. **Pitted Line:** The full unit price bid per foot (meter) shall be withheld for each pit greater than 10 feet m (3.05 m) in length.



9. **Gaps in Line or Crumbly Edges:** The full unit price bid per foot (meter) shall be withheld for the entire length of the portion of any line receiving less than the required amount of thermoplastic material. This penalty shall be imposed when the Contractor fails to correct line quality after the second warning within 1 mile(1.6 km), or project if less than 1 mile (1.6 km) in length.

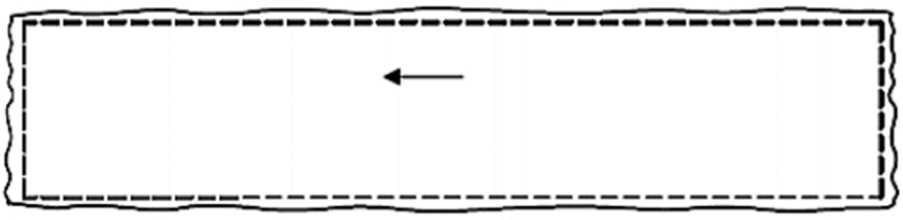


10. **Rough Line Surface:** The full unit price bid per foot (meter) shall be withheld for the entire length of the portion of any line with a rough or "burlap" surface. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

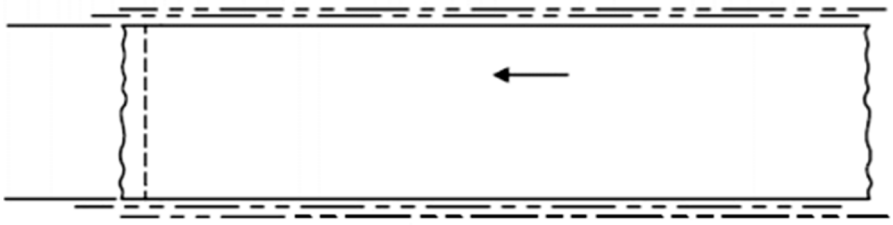


11. **Excessive Dripping between Lines:** The full unit price bid per foot (meter) shall be penalized for the length of any dribbled open space between broken lines that is not removed to the satisfaction of the Engineer before leaving the project site that work day. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

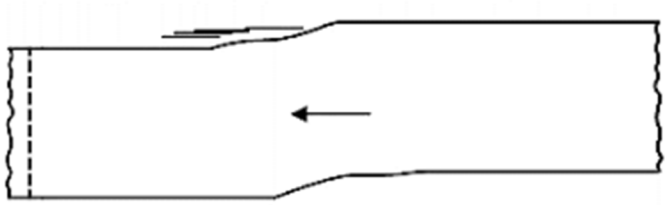
12. **Swollen Line of Excessive Width:** The full unit price bid per foot (meter) shall be penalized for swollen lines in excess of the specified width.



13. **Smeared Line Edges:** Fifty (50) percent of the unit price bid per foot (meter) shall be penalized for each occurrence of a length greater than 15 feet (4.6 m).



14. **Wavy Line:** The full unit price bid per foot (meter) shall be withheld for the entire length of waviness in a line caused by poor operation by the driver/operator of the application equipment. Penalty shall be imposed from the first occurrence.



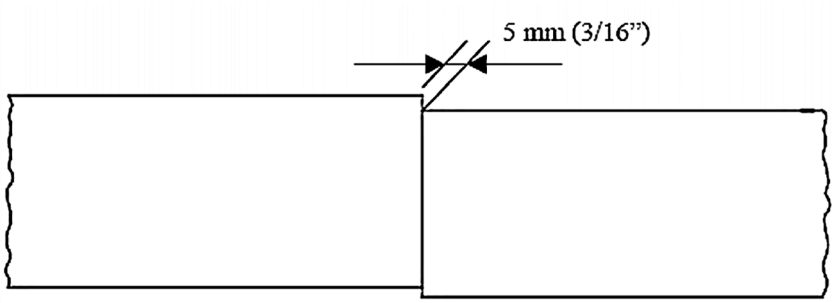
15. **Work Outside the Scope/Limits of Project:** Payment for all pavement marking work performed shall be withheld in full until the Contractor:

    (a) removes all pavement marking material placed outside the scope/limits of the project, and
    (b) repairs the pavement surface as directed by and to the satisfaction of the Engineer.

B. Preformed Thermoplastic Installation Performance Measures

1. **Lack/Excess of Surface Beads or Improper Application:** The full unit price bid per foot (meter) shall be withheld for each lineal foot (meter) of material or per each for symbol markings with inappropriate application rate of the surface glass beads. The same penalty shall apply if the beads are not evenly disbursed across and along a line or if the beads imbed improperly. This penalty shall be imposed for each instance that the Contractor fails to take corrective action after one warning by the Engineer.

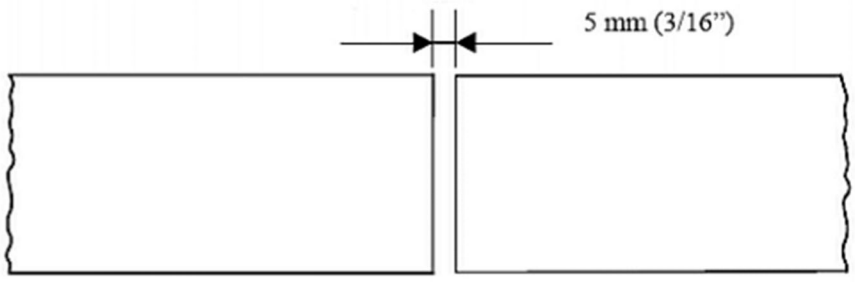
2. **Lack of adhesion: The** full unit price bid per foot (meter) or per each for symbol markings shall be withheld for 3 feet (1 meter) for each occurrence if found more than three (3) times per 1 mile (1.6 km), or project if less than 1 mile (1.6 km) in length.



3. **Line Deviation:** A line that deviates from the specified layout by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.

4. **Wavy Line:** The full **unit** price bid per foot (meter) shall be withheld for the entire length of waviness in a line caused by poor workmanship and/or application procedures. Penalty shall be imposed from the first occurrence.

5. **Gaps Between Successive Lines:** Successively placed lines that contain gaps as specified by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.



6. **Burned or Discolored Markings:** Fifty (50) percent of the full unit price bid per foot (meter) shall be withheld for each lineal foot (meter) of material or per each for symbol markings which shows signs of burning or discoloration due to prolonged application of the torch. This penalty shall be imposed for each instance that the Contractor fails to take corrective action after one warning by the Engineer.

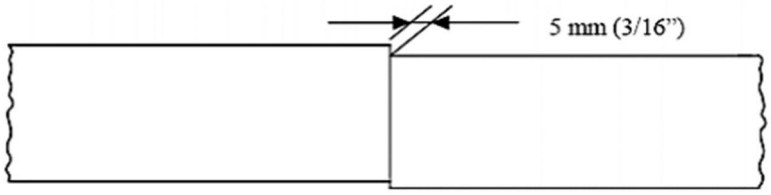
7. **Work Outside the Scope/Limits of Project:** Payment for all pavement marking work performed shall be withheld in full until the Contractor:

   (a) removes all pavement marking material placed outside the scope/limits of the project, and
   (b) repairs the pavement surface as directed by and to the satisfaction of the Engineer. 5 mm (3/16”)

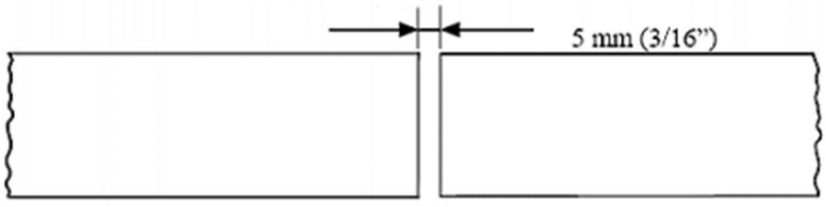
C. Cold plastic installation performance measures

1. **Lack of adhesion:** The full unit price bid per foot (meter) shall be withheld for 3 foot (1 meter) for each occurrence if found more than three (3) times per 1 mile (1.6 km), or project if less than 1 mile (1.6 km) in length.

2. **Line Deviation:** A line that in the judgment of the Engineer deviates from the specified layout by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.

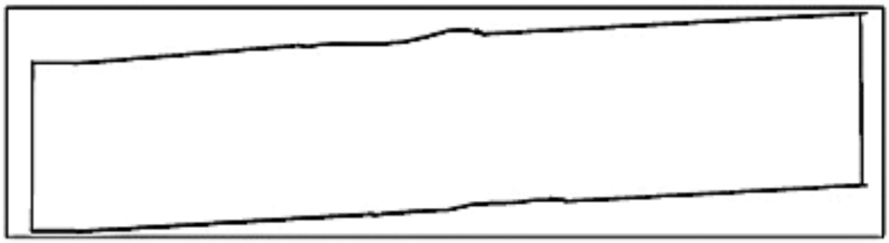


3. Gaps Between Successive Lines: Successively placed lines that contain gaps as specified by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.



4. **Inlaid Groove Quality:** The full unit price bid per foot (meter) shall be withheld for the entire length of line that does not meet the requirements for depth of the inlaid material or for a groove that displays a coarse tooth pattern bottom that is not conducive to complete adhesion of the marking material. Penalty shall be imposed from the first occurrence. 5 mm (3/16”) 5 mm (3/16”)

5. **Wavy or Misaligned Line:** The full unit price bid per foot (meter) shall be withheld for the entire length of waviness caused by poor operation by the driver/operator of the grooving/installation equipment or for any misalignment in the material installed within the inlaid groove. Penalty shall be imposed from the first occurrence.



6. **Work Outside the Scope/Limits of Project:** Payment for all pavement marking work performed shall be withheld in full until the Contractor:

   (a) removes all pavement marking material placed outside the scope/limits of the project, and
   (b) repairs the pavement surface as directed by and to the satisfaction of the Engineer and the local entity, if different from the Engineer.

D. Pavement marking paint and epoxy installation performance measures

1. **Lack of specified thickness:** The full unit price bid per foot (meter) shall be withheld if lack of thickness is found more than three (3) times per 1 mile (1.6 km), or project if less than 1 mile (1.6 km) in length. Each line shall be checked a minimum of six (6) times per 1 mile (1.6 km), or project if less than 1mile (1.6 km) in length.

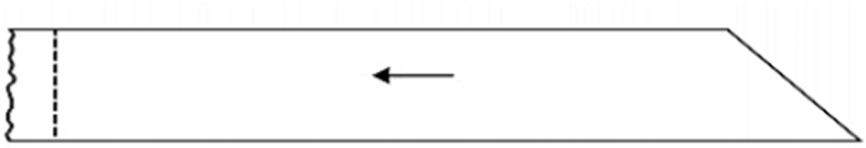
2. **Lack of specified width:** Payment shall be made with penalty being equal to 25% of the unit price bid per foot for each 1/4 inch (6.4 mm) of width lacking not to exceed 100% of the unit price bid per foot (meter) for the length of the line less than specified width. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

3. **Lack of specified length/cycle:** Payment shall be made with penalty being equal to 25% of the unit price bid per foot (meter) for each 1 inch (50 mm) of length lacking or exceeding the specified length for broken lane line and/or broken center line not to exceed 100% of the unit price bid per foot (meter) for the length of the line less than specified length. Penalty shall be imposed upon the first occurrence and every occurrence thereafter.

4. **Lack/Excess of Surface Beads or Improper Application:** The full unit price bid per foot (meter) shall be withheld for each lineal foot (meter) of material with inappropriate application rate of the surface glass beads. The same penalty shall apply if the beads are not evenly disbursed across and along a line or if the beads imbed improperly. This penalty shall be imposed for each instance that the Contractor fails to take corrective action after one warning by the Engineer.

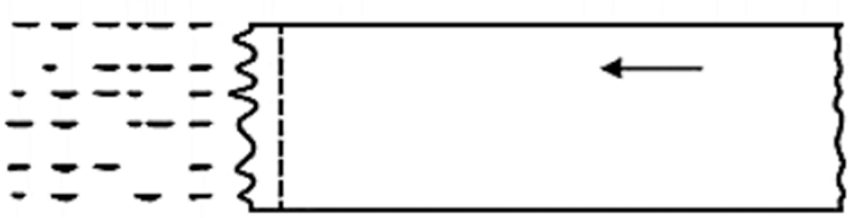
5. **Pointed Ends:** The full unit price bid per foot (meter) shall be withheld for pointed ends. This penalty shall be for the full 6 feet (1.8 m) of a lane line or broken centerline or for no more than 6 feet (1.8 m) of a long line.

5. **Skewed Ends:** The full unit price bid per foot (meter) shall be withheld for skewed ends. This penalty shall be for the full 6 feet (1.8 m) of a lane line or broken centerline or for no more than 6 feet (1.8 m) of a long line.

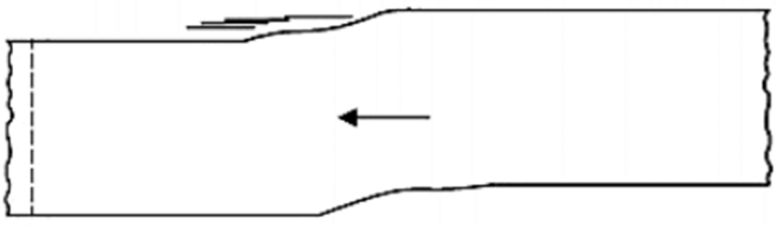


7. **Line Deviation:** A line that in the judgment of the Engineer deviates from the specified layout by an unreasonable amount shall be replaced. The Contractor shall be responsible for removal of the deviated marking material/repair of the pavement as designated by, and to the satisfaction of, the Engineer at no additional compensation.

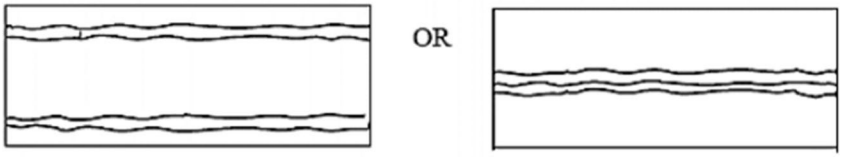
8. **Excessive Dripping between Lines:** The full unit price bid per foot (meter) shall be penalized for the length of any dribbled open space between broken lines that is not removed to the satisfaction of the Engineer before leaving the project site that work day. Penalty shall be imposed upon the first occurrence and every occurrence hereafter.



9. **Wavy Line:** The full unit price bid per foot (meter) shall be withheld for the entire length of waviness in a line caused by poor operation by the driver/operator of the application equipment. Penalty shall be imposed from the first occurrence.



10. **Non–Uniform Thickness:** The line shall be uniform thickness across the entire cross section of the line with well–defined edges. Heavy inner thickness and thin edges or vice–versa will not be accepted. The full unit price bid per foot (meter) shall be withheld for lines that are not of uniform thickness. Penalty shall be imposed from the first occurrence.



11. **Work Outside the Scope/Limits of Project:** Payment for all pavement marking work performed shall be withheld in full until the Contractor:

    (a) removes all pavement marking material placed outside the scope/limits of the project, and
    (b) repairs the pavement surface as directed by and to the satisfaction of the Engineer.

2306.10 Method of Measurement: Pavement Markings ***and Removal of Pavement Markings*** will be measured by one of the following:

A. Per linear foot (linear meter) of line. Skip lines are paid based upon length of marked section; 1 foot of a dual line is paid for at two unit feet bid.
B. Per each symbol.

2306.11 Basis of Payment: Pavement Markings ***and Removal of Pavement Markings will be paid for by the contract unit or lump sum price listed on the Bid Form Unit Prices schedule:***

A. Contract unit bid price

B. Contract lump sum bid price

SECTION 2307 MEASUREMENTS AND PAYMENTS

2307.1 Summary: This section governs the method of measurement and the basis of payment for furnishing all labor, equipment, tools, and materials and for the performance of all related work necessary to complete any construction covered in Section 2300.

2307.2 General: Unless specifically altered by the Special Provisions, the methods of measurement and payment shall be as specified in each section herein, and as listed in the Proposal.

2307.3 Measurement: The Engineer or his representative will measure the work for payment. The method of measurement and computations used in determination of quantities of work performed will be those methods generally recognized as conforming to good engineering practice.

2307.4 Items not listed in the Proposal: There shall be no measurement or separate payment for any item of work not specifically identified and listed in the Proposal and all costs pertaining thereto shall be included in the contract unit prices for other items which are listed in the Proposal.

2307.5 Measurement and Payment Summary Table

Item Description	Ref. Section	Method of Measurement	Basis of Payment
Sidewalks	2301	1 sq. ft. (0.1 sq. m.)*	Unit Bid Price
Sidewalk Ramps	2301	1 sq. ft. (0.1 sq. m.)* Each	Unit Bid Price Lump Sum
Concrete Driveways	2301	1 sq. ft. (0.1 sq. m.)*	Unit Bid Price
Bicycle/Pedestrian Paths (PCC)	2301	1 sq. ft. (0.1 sq. m.)*	Unit Bid Price
Temporary Asphalt Sidewalks	2302	0.1 ton (0.1 metric ton) 1 sq. ft. (0.1 sq. m)*	Unit Bid Price
Asphalt Driveways	2302	0.1 ton (0.1 metric ton) 1 sq. ft. (0.1 sq. m)*	Unit Bid Price
Bicycle/Pedestrian Paths (Asphalt)	2302	0.1 ton (0.1 metric ton) 1 sq. ft. (0.1 sq. m)*	Unit Bid Price
Rock Blanket	2303	0.1 sq. yd. (0.1 sq. m)* 1 ton (1 metric ton)	Unit Bid Price
Concrete Paver Stones	2304	1 sq. ft. (0.1 sq. m.)**	Unit Bid Price
Maintenance of Traffic	2305	Each device listed per day	Unit Bid Price Lump Sum
Pavement Markings	2306	1 lin. Ft. (1 ln. m.) each	Unit Bid Price Lump Sum

*Items measured by area shall be listed with the specified depth of material indicated.
** Concrete Paver Stones includes PCC base course

SECTION 2308 FENCING

2308.1 Summary: This section governs the installation, and removal of fence. Referenced Standards: The following standards are referenced directly in this section. The latest version of these standards shall be used.

Missouri Standard Specifications For Highway Construction
Section 1043 Fence Materials
Section 607 Chain – Link Fence
MCIB, Section 1 Concrete Materials

2308.2 Materials:

A. All materials used for the installation of a permanent chain link fence shall be new material conforming to Section 1043 of the Missouri Standard Specification for highway construction except concrete for posts shall be MCIB Mix No. A543-1-4-0.479 or approved equal.

B. All material used for the installation of permanent decorative fence shall be new material as specified, or as shown on the plans or match the existing fence.

2208.3 Construction Details:

A. Removal: Existing fence shall be removed as specified or as shown on the plans or as directed by the Engineer. Removed fencing may be used for temporary fencing only with the Engineer's approval.

B. Chain-Link Fence. Chain-Link Fence shall be installed at the locations shown or as directed by the Engineer in accordance with Section 607 of the Missouri Standard Specifications For Highway Construction except that the bottom of the fabric shall be not more than 1 ½ inches (38 mm) above the finished ground line. All residential fence shall have a top rail and all edges of fence fabric shall be knuckled.

C. Decorative Fence: Decorative shall be installed at the locations shown or as directed by the engineer in accordance with the manufactures instructions and recognized industry standards or as directed by the Engineer.

2308.4 Measurement and Payment

A. Fence: Fence shall be measured along the slope of the fence to the nearest linear foot (.05m). Vehicle gates shall not be included in this measurement.

B. Gates: Gates shall be measured per each for the size and type specified.

C. Temporary Fence: Temporary fence will be measured by one of the following.

_ No measurement made.
_ Per foot measured along the slope to the nearest linear foot

D. Fence Removal: Fence removal will be measured by one of the following.

_ No measurement made.
_ Per linear foot to nearest foot.

E. Payment. Fence of the respective type and size will be paid for as listed on the Bid Form – Unit Prices. There will be no separate payment for pedestrian gates; they are subsidiary to the fence pay item.

SECTION 2309 STEEL BEAM GUARDRAIL

2309.1 Scope: This section governs furnishing materials for and installation of steel beam guardrail.

2309.2 Materials:

A. Steel Posts: All poses, terminal post connectors, and steel blocks for guardrail shall be formed from a structural steel meeting the requirements of ASTM A-36, and shall be galvanized in accordance with ASTM A-123.

B. Guardrail and Hardware: All guardrail and hardware shall conform to the requirements of AASHTO M-180 Class A, Type 1. Hardware shall be galvanized in accordance with ASTM A-153. Guardrail shall be galvanized with a minimum of 1.80 ounces of Zinc per sq. ft. All Zinc shall be "Prime Western' grade or better.

2309.3 Erection:

A. Setting Posts: Posts shall be set to the depth and spaced at the intervals shown on the construction plans or standard drawings. They shall be set vertical and true to line and grade. Steel posts may be driven by a power hammer or may be set in dug or bored holes of a size sufficient to permit thorough compacting of the backfill around the post. The backfill material shall be dry sand, placed in layers not exceeding 12 inches (30.5 cm) in thickness to height 12 inches (30.5 cm) below the finished grade. After erecting and adjusting the rail to true line and grade, the sand backfill shall be compacted by flooding. The final 12 inches (30.5 cm) of backfill consisting of suitable earth material shall then be compacted in six inch (15.24 cm) lifts. Any "mushrooming" of the top of a post shall be removed and damaged spelter coating on posts shall be repaired by the zinc alloy stick method while the surface is heated to approximately 600° F (315° C). Other methods of repairing the spelter coating shall receive prior approval of the Engineer.

B. Erecting Guardrail: Bolt holes shall be shop punched. Field punching, reaming and drilling will not be permitted. Guardrail beams shall be spliced, only at posts by lapping in the direction of traffic, using the required number of splice bolts. Beams for twisted turned down terminal sections may be either field or shop twisted. Sufficient twist shall be introduced such that the beam shall retain the required shape in a relaxed condition. Beams to be erected on a radius of 150 feet (45.7 m) or less shall be shop-curved as shown on the plans.

Each end of every installation of guardrail shall have an end, bridge anchor, or terminal section of the design and type shown on the construction plans or standard drawings. They shall be of the same material and shall be galvanized in accordance with the requirements for the guardrail beam.

Galvanized rail shall be handled in a manner to avoid damage to the galvanized coating. Any sections of rail, end sections or terminal sections on which the spelter coating has been bruised or broken shall be rejected, or may, with the prior approval of the Engineer, be repaired by the method prescribed for repairing damaged spelter coating of steel posts.

2309.4 Measurement and Payment

Steel beam guardrail will be measured from center of terminal post to center of terminal post per linear foot and quarter part thereof. Payment will be made at the contract unit or lump sum bid price. There will be no separate payment for terminal end sections except when specified in the project manual.

Sidewalk Ramp Details

DIVISION II
CONSTRUCTION AND MATERIAL SPECIFICATIONS
SECTION 2500 SANITARY SEWERS

Approved and Adopted this 16th day of December, 1992

KANSAS CITY METROPOLITAN CHAPTER
OF THE AMERICAN PUBLIC WORKS ASSOCIATION

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SECTION 2501 SCOPE

This Division governs all work, materials and testing required for installation of gravity and pressure pipelines of the respective types and sizes shown on the Plans for the particular location and conforming to the requirements of these specifications. All pipelines shall be constructed to proper line and grade as shown on the Plans and shall result in an unobstructed, smooth and uniform conduit.

SECTION 2502 GENERAL

2502.1 Description: Sanitary sewer construction shall consist of furnishing all labor, materials and equipment for the complete installation of sewers and appurtenances in accordance with the contract documents, standard drawings, approved shop drawings, General Provisions and these specifications.

2502.2 Specification Modifications: It is understood that throughout this section these Specifications may be modified by appropriate items in the Special Provisions or notes on the Contract Drawings.

2502.3 Revisions of Standards: When reference is made to a Standard Specification i.e. ASTM, ANSI, AWWA, MCIB, the Specification referred to shall be understood to mean the latest revision of said specification as amended at the time of the Notice to Bidders, except as noted on the Plans or in the Special Provisions.

SECTION 2503 MATERIALS

2503.1 General: This section governs materials that may be required to complete pipeline construction, exclusive of structures, as shown on the Plans and/or as provided for in the Special Provisions.

A. Requirements: Furnish pipe of materials, joint types, sizes, and strength classes indicated or specified. Higher strengths may be furnished at the Contractor's option at no additional cost to the Owner.

B. Manufacturer: the manufacturer shall be experienced in the design, manufacture and commercial supplying of the specific material.

C. Inspection and Testing: Inspection and testing shall be performed by the Manufacturer's quality control personnel in conformance with applicable standards. Testing may be witnessed by Owner, Engineer, or approved independent testing laboratory. The Contractor shall provide three (3) copies of certified test reports indicating the materials conform to the specifications.

D. Handling: Equipment and methods shall be adequate to protect the pipe, joint elements and prevent shock contact of adjacent units during moving or storage. Damaged sections that cause reasonable doubt as to their structural strength or water tightness will be rejected.

2503.2 Pipe, Fittings, Joints, Coatings and Linings:

A. **General**: Furnish pipe and fittings of materials, joint types, sizes, strength classes, coatings and linings as indicated and specified.

B. Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Pipe and Fittings: Pipe and fittings shall conform to ASTM D 2680, except as otherwise specified herein.

1. General: Furnish maximum pipe lengths, normally produced by the manufacturer except for fittings, closures and specials. All field cuts that result in an exposed end section shall be sealed in accordance with the manufacturers' recommendation.

2. Design: Pipe shall consist of two concentric thermoplastic tubes integrally braced across the annulus with resultant annular space filled with inert material to provide continuous support between inner and outer tubes. Bell-end shall be factory attached solvent weld coupling.

3. Joints: Pipe joints and fittings shall be solvent cement or elastomeric type conforming to ASTM D 2680.Natural rubber gaskets will not be accepted.

4. Fittings: fittings defined as tee (T) or wye (Y) connections suitable for assembly to four (4) inch or six (6) inch building service lines shall be bell end with a minimum wall thickness conforming to SDR 35 and shall be provided by the pipe manufacturer. A special design is required for service connections 8 inches and larger. Saddle tees or wyes will not be permitted during sewer main

installation.

C. **Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings**: Pipe and fittings shall conform to ASTM D 2751, except as otherwise specified here-in.

1. General: Furnish maximum pipe lengths, normally produced by the manufacturer, except for fittings, closures and specials.

2. Design: Pipe shall have an integral wall bell and spigot joint and a minimum wall thickness conforming to SDR 23.5.

3. Joints: Pipe joints and fittings shall be solvent-cement or elastomeric conforming to ASTM D 2680.Gaskets for elastomeric joints shall conform to ASTM F477.Joint tightness shall also conform to ASTM D 3212.Natural rubber gaskets will not be accepted.

4. Fittings: Fittings defined suitable for assembly to four (4) inch or six (6) inch building service lines shall be bell-end with a minimum wall thickness conforming to SDR 23.5 and shall be provided by the pipe manufacturer.

D. **Ductile-Iron Pipe and Fittings**: Pipe and fittings shall conform to ANSI A21.51, except as otherwise specified herein.

1. General: furnish maximum pipe lengths normally produced by the manufacturer except for fittings, closures and specials.

2. Design: All ductile iron pipe shall ***be Class 52 meeting the requirements of AWWA C150 (ANSI A21.50) and AWWA C151 (ANSI A21.51) or as*** shown on the drawings.

3. Joints: Mechanical and push0on joints for pipe and fittings shall conform to the requirements of ANSI A21.11. Flanged joints for ductile iron pipe and fittings shall conform to the requirements of A21.10.Gaskets shall be neoprene or other synthetic rubber material. Natural rubber gaskets will not be acceptable.

4. Fittings: Fittings shall be in accordance with ANSI/AWWA C110 and shall have a pressure rating of not less than that specified for the pipe. Fittings used with ductile iron pipe shall be ductile iron and cast iron. Fittings for pipe with mechanical joints shall have mechanical joints. Fittings for pipe with push-on joints shall have either mechanical joints or push-on joints.

5. Coatings: Pipe and fittings shall be furnished with exterior bituminous coating conforming to ANSI A 21.51.

6. Linings: Pipe and fitting linings shall conform to the following:

a. Pipe shall have an interior ***Calcium Aluminate-mortar lining conforming to AWWA C104 (ANSI A21.4), a 40 mil. Polyethylene lining in accordance with ASTM D 1248 or be PVC (polyvinyl chloride) lined.***

b. Pipe and fittings shall have an interior coating not less than one (1) mil in

thickness which conforms to all appropriate requirements for seal coat in ANSI/A 21.4.

7. Polyethylene Encasement: Pipe and fittings shall be installed with a polyethylene tube encasement having a thickness of 0.008: (8 mils) and conforming to ASTM D-1248, Type 1, Class C, Grade E-1 material.

E. **Polyvinyl chloride (PVC) Pressure Rated Plastic Pipe (SDR) and Fittings**: Pipe and fittings shall conform to ASTM D 2241, except as otherwise specified herein.

1. General: Furnish maximum pipe lengths normally produced by the manufacturer, except for fittings, closures and specials. Pipe shall be used only for pressure flow systems.

2. Materials: The pipe shall be made of PVC plastic pipe having a cell classification of 12454 B or 12454 C as defined in ASTM D 1784.

3. Design: Pressure flow systems, i.e. force mains, shall have the wall thickness shown on the plans, with a minimum wall thickness not less than SDR 32.5 with a minimum burst pressure not less than 400 psi conforming to pipe materials designation codes PVD 1120, PVC 1220, or PVC 2120.

4. Joints: Pressure flow systems shall be joined in accordance with ASTM D 3139 with particular attention given to Section 5.3.

5. Fittings: Fittings for pressure flow systems shall have a minimum wall thickness conforming to SDR 32.5 and a minimum hydrostatic design stress of 400 psi conforming to pipe materials designation codes PVC 1120, PVC 1220, and PVC 2120.

F**. Type PSM polyvinyl chloride (PVC) Sewer Pipe and Fittings**: ***4 through 15 inch diameter pipe and fitting shall conform to ASTM D 3034 and pipe having diameter eighteen (18) through twenty sever (27) inch shall conform to ASTM F 679 except as otherwise specified herein.***

1. General: Furnish maximum pipe lengths normally produced by the manufacturer except for fittings, closures and specials.

2. Materials: The pipe shall be made of PVC plastic having a cell classification of 12454 B or 12454 C or 13364 B as defined in ASTM D1784.

3. Design: Pipe shall have an integral bell and spigot joint. Wall thickness shall ***conform to SDR 26, for ASTM D 3034 pipe. Wall thickness shall be SDR 21 for ASTM D 2241 pipe. Wall thickness shall be T-1 for ASTM F 679 pipe. The maximum cover depth for SDR 26 pipe shall be twenty two (22) feet and the maximum cover depth for SDR 21 pipe shall be thirty (30) feet. If for any reason, the maximum cover depth is exceeded, the Contractor shall suspend pipe installation and notify the design engineer and the City.***

4. Joints: Joint tightness shall conform to ASTM D 3212.Joints shall be push-on type only with the bell-end grooved to receive a gasket. Elastomeric seal (gasket)

shall have a basic polymer of synthetic rubber conforming to ASTM F 477.Natural rubber gaskets will not be accepted.

5. Fittings: ***Fittings defined as wye (Y) connections suitable for assembly to four (4) inch or sex (6) inch building service lines shall be bell-end with a minimum wall thickness conforming to SDR 26 and shall be furnished by the pipe manufacturer. A special design is required for service connections 8 inches and larger. Saddle connections will not be permitted during sewer main installation.***

G. Reinforced Concrete Pipe and Fittings: Pipe and fittings shall conform to ASTM C 76 except as otherwise specified herein.

1. General: Furnish maximum lengths normally produced by the manufacturer except for fittings, closures and specials.

2. Design: Pipe shall be Class III, Class IV, or Class V, wall B as shown on plans. Fine aggregate shall be natural sand conforming to the requirements of MCIB Section 1 Concrete Materials. Reinforcement may be circular or elliptical. Elliptically reinforced pipe shall be marked in accordance with Section 17.2, ASTM C 76 for correct installation. Modified or special designs are prohibited unless so specified in the Special Provisions.

3. Joints: Pipe and fittings shall be furnished with either spigot groove type joint with O-ring gasket or steel end joint with spigot groove and O-ring gasket conforming to ASTM C 361 and ASTM C 443. The basic polymer for O-ring gaskets shall be synthetic rubber and shall conform to ASTM C361 and ASTM C 443.

4. Fittings and Specials: Provide strength equal to design D-loads of adjacent pipe and be fabricated as one of the following types:

a. Steel cylinder segments not less than U.S. No. 16 gauge lined with three fourths (3/4) inch concrete or mortar and reinforced concrete exterior.

b. Concrete pipe sections shall be cut while still green; reinforcing exposed and welded together at junctions and miters. Splice shall be built up to nominal wall thickness with mortar or concrete. Miters shall not exceed 30 degrees at deflections angles between segments. Minimum center line curve radius shall not be less than twice the pipe diameter.

H. Vetrified Clay Pipe and Fittings: Pipe and fittings shall conform to ASTM C 700 Extra Strength except as otherwise specified herein.

1. General: Furnish maximum pipe lengths normally produced by the manufacturer with either bell-end or plan-end except for fittings, closures and specials.

2. Joints: All pipe joints shall conform to ASTM C 425 with synthetic rubber seals. All compression couplings for clay plain-end pipe shall conform to ASTM C 594.

2503.3 Pipe Embedment Materials.

A. **Scope**: Pipe embedment materials shall be furnished and installed to complete the

work shown on the Plans or as called for in the Contract Documents.

B. ***Granular Bedding Material: Granular bedding material shall be crushed clean limestone aggregate meeting one of the following gradations:***

Sieve Size	¾”	½”	
1”	100		
¾”	90-100	100	
½”		80-100	
3/8”	20-55	40-70	
No. 4	0-10	0-15	
No. 8	0-5	0-5	

In areas where the pipe trench is below the potential high point of the water table, only three-eights (3/8”) bedding may be used.

C. **Concrete for embedment and encasement**:

1. Concrete shall test not less than a twenty-eight (28) day compressive strength of 3000 psi and shall otherwise conform to Section 2510.3.6.

2. Reinforcing steel when required shall be placed as shown on the Plans and shall conform to Section 2510.3.7.

2503.4 Backfill materials:

*A. **Scope**: Backfill materials shall be as required and/or permitted to complete the work shown on the Plans or called for in the Contract Documents.*

*B. **Granular Backfill Material**: Granular backfill material shall meet the gradation requirements as outlined in Section 2202.2*

*C. **Select Earth Backfill Material**: Select earth backfill shall be finely divided job excavated material free from debris, organic matter, rocks larger than one (1) inch and/or frozen materials.*

*D. **Other Earth Backfill**: Other backfill may be job excavated material free from debris and organic matter. No rock greater than one foot in its longest axis shall be placed in any trench excavation as backfill.*

*E. **Backfill Under Streets:** All backfill under street or alley pavement shall be controlled low strength material meeting the requirements of 2602.2 unless otherwise approved by the Engineer.*

2503.5 Tunneling, Boring and Jacking Materials:

A. **Scope**: This section governs the furnishing of all materials necessary for the construction of tunnels at locations shown on the Plans or where constructed at the Contractor's option when approved by the Engineer.

B. **General**: Furnish materials and necessary accessories with strengths, Thicknesses, coatings, and fittings indicated, specified and/or necessary to complete the work.

C. **Steel Liner Plate**: Steel tunnel liner plates shall be Armco "Standard" Commercial Shearing and Stamping Company "Commercial," Republic "Truscon Paneled Out," or equal and shall be galvanized in accordance with ASTM A 123.The design and shape of the liner plates shall be such that assembly can take place entirely from within the tunnel liner. Liner plates shall be capable of withstanding the erring thrust load and transmitting this from plate to plate. The minimum outside diameter shall be four (4) feet and the minimum wall thickness shall be United States Standard Gauge 12 (0.246 inches).Sufficient sections shall be provided with one and one-half (1 ½) inch or larger grouting holes located near the centers so that when the plates are installed there will be one line of holes on either side of the tunnel and one at the crown; the lower line of holes on each side shall not be more than eighteen (18) inches above invert. The holes in each line shall not be more than five (5) feet apart and unless otherwise approved, shall be staggered. Bolts and nuts shall conform to ASTM A 153, A 307, A 325 and A 449 as applicable. Steel liner plates shall have bolted joints in both longitudinal joints in adjacent rings when assembling.

D. **Steel Casings**: Steel casings for bored or jacked construction shall be steel pipe conforming to ASTM A 139 with a minimum diameter as shown on the Plans. Corrugated steel casing pipe will be considered on a case-by- case basis.

1. Minimum wall thickness shall be in accordance with the following table:

Diameter of Casing-Inches	Nominal Wall Thickness-Inches	
	Under Railroads	All Other Use
16	0.312	0.188
18	0.312	0.250
20	0.375	0.250
22	0.375	0.250
24	0.406	0.281
26	0.438	0.281
28	0.469	0.312
30	0.469	0.312
32	0.500	0.312

34	0.500	0.312
36	0.500	0.344

2. Steel shall be Grade B under railroads and Grade A on all other areas.

3. Steel pipe shall have welded joints in accordance with AWWA C 206.

E. **Reinforced Concrete Pipe**: Reinforced concrete pipe used as casing shall conform to ASTM C 76 except as otherwise specified under Section 2503.2.7.

F. **Casing conduit Grout**: Casing conduit grout shall be a pumpable grout resulting in minimum set strength of 400 psi. in 28 days.

G. **Sand**: Sand used as fill in casing conduits shall be a clean sand and thoroughly dry. All sand fill shall conform to the requirements under Section 2510.3.6.

H. **Wood Skids**: Wood skids shall be provided as indicated on the Plans. The wood shall be pressure-treated with a preservative in accordance with ASTM D 1760.Cut surfaces shall be given two (2) heavy brush coats of the same preservative.

SECTION 2504 SITE PREPARATION

2504.1 Scope: This section governs normal project site preparation for construction.

2504.2 General:

A. Contractor shall do all clearing necessary for performance of his work and shall confine his operations to that area provided through easements, licenses, agreements and rights-of-way. The Contractor's entrance upon any lands outside of that area provided by easements, licenses, agreements or public rights-of-way, shall be at the Contractor's sole liability.

B. The Contractor shall not occupy any portion of the Project Site prior to the date established in the Notice to Proceed without prior approval of the Engineer.

2504.3 Obstructions:

A. **General**: Natural obstructions, existing facilities and improvements encountered during site preparation shall be removed, relocated, reconstructed or worked around as herein specified. Care shall be used while performing site preparation work adjacent to any facilities intended to remain in place. Except as otherwise specified, the Contractor shall be responsible for any damage to existing facilities and improvements and any repairs required shall be promptly made at the Contractor's expense. Waste materials shall be disposed of in a satisfactory manner off the work site. Restoration of utilities damaged by the Contractor shall be restored as directed by the utility company at no additional cost to the Owner. Unless otherwise provided in Basis of Payment no separate or additional payment will be made for any work in connection with removal, relocation or restoration of obstructions and existing facilities.

B. **Surface Obstructions**:

1. Sidewalks, curbs and gutter, drainage structures and similar obstructions shall be tunneled under if tunneling is best suited, otherwise the obstruction shall be cut in straight lines or removed to the nearest construction joint if located within five feet of the center-line of the trench. In no case shall the joint or line of cut be less than one foot outside the edge of the trench. Surface obstructions removed to permit construction shall be reconstructed as specified and to the dimensions, lines and grades of original construction. Back-fill of tunneled sections shall be performed in accordance with Section 2507.All restoration shall be in accordance with Section 2508.

2. Mailboxes shall be maintained in the manner that the Postal Service requires to prevent interruption of mail delivery.

3. Site preparation shall include where necessary and permitted the removal of trees, shrubs, brush, crops, and other vegetation within the limits of the easements (right-of-way) or as may be provided for in licenses, permits and agreements. The following procedures for protection of existing greenery are required.

a. Trees: All reasonable effort shall be made to save as many trees as possible. Trees are defined as six inches in diameter and greater when measured at a point three feet above the ground surface. If trees can be saved by trimming, this shall be done in accordance with acceptable pruning practices.

All trees within easements or right-of-way provided, which are specifically to be removed or saved have been marked on the plans with the following notations:

1) Trees marked "S" shall be saved.

2) Trees marked "X" shall be removed.

3) Trees marked "R" shall be removed and replaced.

Trees to be removed shall be completely removed, including stump and large

roots, unless such removal may result in damage to existing pipelines. In that event, trees shall be sawn off not more than four (4) inches above the ground and the stump shall be removed to twelve (12) inches below finish grade. Any tree replaced shall be outside the permanent sewer right-of-way and shall be like species of nursery stock. (Generally, 2 to 2 ½ inch caliper)

b. Small Plants and Flowers: At least two weeks prior to the start of construction, property owners shall be notified by the contractor of the proposed starting date. The purpose of this notification is so that the property owners can remove any small plants or flowers that they, the property owners, desire to save.

4. Fences: Fences interfering with construction, and located within public rights-of way or as may be allowed for in permits or agreements, may be removed by the Contractor only if the opening is provided with a temporary gate that will be maintained in a closed position except to permit passage of equipment and vehicles unless otherwise herein specified. Fences within temporary construction easements may be removed by the Contractor provided that temporary fencing is installed in such a manner as to serve the purpose of the fencing removed. The contractor shall locate and record all fence corners prior to removal. All fencing removed shall be restored by the Contractor to the condition existing prior to construction unless otherwise specified in the Special Provisions. The Contractor is and shall be solely liable for the straying of any animal's protected or corralled or other damage caused by any fence so removed.

5. Property Pins: The Contractor shall preserve all property corners, pins or markers. In the event any property corners, pins or markers are removed by the Contractor, such property points shall be replaced at the Contractor's expense and shall be reset by competent surveyors properly licensed to do such work. In the event such points are section corners or Federal land corners, they shall be referenced and filed with the appropriate authority.

6. Sodded and Landscaped Areas: Sodded and/or landscaped thoroughfares and area on or adjacent to improved property shall be disturbed only to the extent required to permit construction. Such areas shall not be used as storage sites for

construction supplies and insofar as practicable shall be kept free from stockpiles or excavated materials.

C. Subsurface Obstruction:

1. Where existing utilities and service lines are to be encountered, the Owner thereof shall be notified by the Contractor at least 48 hours (not including weekends and/or holidays) in advance of performing any work in the vicinity. All excavation, pipeline installation and backfilling work in the vicinity of such utilities shall be accomplished in the manner required by the respective Owner and, if requested, under their direct supervision. The Contractor shall be responsible for any and all damages to a public or private utility that may occur as the result of the construction.

2. The Contractor shall make a reasonable effort to ascertain the existence of obstructions and shall locate obstructions by digging in advance of machine excavation where definite information is not available as to their exact location.

Where such facilities are unexpectedly encountered and damaged, responsible officials and other affected parties shall be notified and arrangements made for the prompt repair and restoration of service.

3. Private Sewer Facilities: The Contractor shall make every reasonable effort to protect private sewer facilities. They are not shown on the Plans. When these facilities are disturbed or damaged by the work, the Contractor shall make necessary repairs to the facilities for continuous service prior to the close of the work day at no cost to the Owner.

SECTION 2505 EXCAVATION

2505.1 Scope: This section governs the methods and procedures required for pipeline excavations for open cut and tunneling.

2505.2 General: The terms “excavation” and “trenching” shall mean the removal and subsequent handling of all material required to perform the work.

A. All pipeline excavation work shall be accomplished under supervision of a person experienced with the materials and procedures which will provide protection to existing improvements, including utilities and the proposed pipeline.

B. The alignment, depth, and pipe subgrade of all sewer trenches shall be determined by overhead grade lines parallel to the sewer invert.

C. When pipe is to be installed in embankment or fill, the embankment shall be constructed in accordance with APWA section 2102.6 and shall be built up to a plane

at least 18 inches above the top of the pipe prior to the excavation of the sewer trench.

D. The Contractor shall not open more trench in advance of pipe laying than is necessary. Four Hundred (400) feet will be the maximum length of open trench allowed on any line under construction. All open trenches shall be adequately protected.

E. In the event hazardous wastes as defined by the Resource Conservation and Recovery Act of 1976 (PL94-580) are encountered, work shall be halted and the Engineer shall be notified. Work shall be resumed only after the Engineer notifies the Contractor. Regulation of removal, handling and disposal of hazardous wastes is the responsibility of Federal and State agencies.

2505.3 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.

2505.4 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 include interbedded seams of soft materials. Such interbedded soft material 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.

2505.5 Earth Excavation: Earth excavation is defined as the removal of all material not defined as rock.

2505.6 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 the excavation 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 that will not damage property.

2505.7 Blasting: 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 the applicable safety code requirements and regulations relative to the handling, storage and use of explosives and protection of life and property, and he shall be responsible for all damage thereto caused by his or his subcontractor's operations.

The Contractor shall provide insurance as required by Section 00700 Construction General Conditions, 00800 Construction Supplementary Conditions and Special Provisions. The governing agency shall be notified at least twenty four (24) hours before blasting operations begin.

2505.8 No Blasting Areas: No blasting of any kind for rock excavations or any other purpose will be allowed if so noted on the Plans.

2505.9 Open-Cut Method (Trenching):

A. **Scope**: This item establishes the requirements to be flowed for pipeline excavation performed by the open-cut method (trenching).

B. **General**: Excavations for pipelines shall be accomplished by the open-cut method (trenching) except as specified or approved by the Engineer. Trenching shall be with a minimum inconvenience and disturbance to the general public.

The Contractor shall sort and stockpile the excavated material so the proper material is available for backfill.

C. **Trench Depths**: All trenches shall be excavated to depths required for proper pipe embedment. Overdepth excavation shall be required when the subgrade is unstable. Overdepth excavations shall be backfilled with granular pipe embedment material unless otherwise directed by the Engineer.

D. **Trench Walls**: Undercutting of trench walls is not permitted.

E. **Trench Widths**:

1. Minimum Widths: Trench widths and pipe clearances shall be not less than that shown in the following table.

MINIMUM TRENCH AND PIPE CLEARANCES (INCHES)			
Nominal Pipe Diameter	Trench Width1	Pipe Slide Clearance2	Soil/Incompressible Pipe Bottom Clearance
4	22	6	4/6
6	22	6	4/6
8	22	6	4/6
10	24	6	4/6
12	27	6	4/6
15	30	6	4/6

18	34	6	4/6
21	39	7	4/9
24	43	7	4/9
27	48	8	4/9
30	54	8	4/9

Measured below a horizontal plane six (6) inches above the top of the pipe line. Measured from the outside face of pipe barrel to inside face of trench.

a. Maximum Widths: The allowable maximum trench widths hereinafter specified apply only to that portion of the trench below the horizontal plane parallel to and six (6) inches above the top of the pipe.

The allowable maximum widths may be exceeded at manholes, bore pits, tees, and in unstable earth material. Where the maximum trench width is exceeded the Contractor shall provide the appropriate strength class of pipe embedment to provide safe support strength to the pipeline.

When trench width exceeds those in the tables shown for Vitrified Clay Pipe or when the side clearance exceeds two and one-half (2 ½) times the outside pipe diameter at either side of the flexible conduit, it shall be the Contractor's responsibility at no additional cost to the Owner to provide bedding adequate to develop the required lateral support for the pipe and/or provide a pipe of sufficient strength class to accommodate the loading conditions as approved by the Engineer.

b. Trench Slope: The trench width above a horizontal plane six (6) inches above the top of the pipe may vary and side sloping is permissible unless otherwise specified.

c. Trench Shields: When trench shields are utilized by the Contractor, said shields or any part thereof shall not extend lower than six (6) inches above the top of the proposed pipeline nor shall the maximum allowable trench width be exceeded.

F. **Clay Pipe Trench Width Tables**: The trench width tables list trench widths that are the minimum and maximum allowed. If the maximum trench width is exceeded, the Contractor shall so inform the Engineer prior to installation of pipe embedment material and/or pipe. Unless otherwise specified, H-20 Truck Loading Tables shall be used. All delays caused by the Contractor's failure to immediately notify the

Engineer when overwidth trenching occurs will not be grounds for an extension of the contract time limit or additional payment.

MAXIMUM TRENCH WIDTH (INCHES)

Pipe: Extra Strength Vitrified Clay ASTM C 700
Embedment: Class B
Soil: Non-Cohesive (K '= 0.165) 120pcf (No Live Load)

Nominal Pipe Size (inches)
Cover Depth (feet) 8 10 12 15 18 21 24 27 30

2.5-10 a a a a a a a a a 10-12 a a a a a a a a 68 71 12-14 a a 42 45 49 54 60 63 65 14-16 a a 40 43 46 51 57 59 62 16-18 a 37 39 41 45 50 54 57 59 18-20 34 36 38 40 44 48 52 55 57 20-22 34 36 37 40 43 47 51 53 56 22-24 34 35 37 39 42 46 50 52 54 24-26 33 35 37 39 42 46 50 51 53 26-28 33 35 36 38 41 45 49 51 53 28-30 33 34 36 38 41 45 48 50 52

Cover depths designed "a" are not critical and width does not govern.
Cover depths designated "b" result in loads exceeding safe support strength.

MAXIMUM TRENCH WIDTH (INCHES)

Pipe: Extra Strength Vitrified Clay ASTM C 700
Embedment: Class B
Soil: Non-Cohesive (K '= 0.165) 120pcf (H-20 Truck Loading)

Nominal Pipe Size (inches)
Cover Depth (feet) 8 10 12 15 18 21 24 27 30

2.5-10 a a a a a a a a a 10-12 a 36 39 45 51 56 62 65 68 12-14 a 36 38 43 48 54 58 61 64 14-16 a 34 37 43 46 51 57 60 62 16-18 33 34 37 41 45 50 54 57 59 18-20 33 34 37 40 44 48 52 55 57 20-22 33 34 37 40 43 47 51 53 56 22-24 33 34 37 39 42 46 50 52 54 24-26 33 34 37 39 42 46 50 51 53 26-28 33 34 36 38 41 45 49 51 53 28-30 33 34 36 38 41 45 49 50 52

Cover depths designed "a" are not critical and width does not govern.
Cover depths designated "b" result in loads exceeding safe support strength.

MAXIMUM TRENCH WIDTH (INCHES)

Pipe: Extra Strength Vitrified Clay ASTM C 700
Embedment: Class B
Soil: Non-Cohesive (K '= 0.130) 120pcf (No Live Load)

Nominal Pipe Size (inches)
Cover Depth (feet) 8 10 12 15 18 21 24 27 30

2.5-10 a a a a a a a a a 10-12 a a a a 4 54 60 64 67 12-14 a a 38 42 46 50 55 59 61 14-16 a 33 37 39 43 48 53 55 57 16-18 a 33 36 38 41 46 50 52 55 18-20 31 32 35 37 40 44 48 50 53 20-22 30 31 34 36 39 43 47 49 52
22-24 30 31 33 35 38 42 45 48 b 24-26 29 31 33 34 37 41 44 47 b 26-28 29 30 32 34 37 41 44 b b 28-30 29 30 32 34 36 40 43 b b

Cover depths designed "a" are not critical and width does not govern.
Cover depths designated "b" result in loads exceeding safe support strength.

MAXIMUM TRENCH WIDTH (INCHES)

Pipe: Extra Strength Vitrified Clay ASTM C 700
Embedment: Class B
Soil: Cohesive (K ' = 0.130) 120pcf (H-20 Truck Loading)

Nominal Pipe Size (inches)
Cover Depth (feet) 8 10 12 15 18 21 24 27 30

2.5-8 a a a a a a a a a 8-10 a a a a a a a a 71 10-12 a a 38 42 47 53 59 61 64 12-14 a 34 38 42 46 50 54 57 59 14-16 a 33 37 39 43 48 53 55 57 16-18 32 33 36 38 41 46 50 52 55 18-20 31 32 35 37 40 44 48 50 53
20-22 30 31 34 36 39 43 47 49 b 22-24 30 31 33 35 38 42 45 48 b 24-26 29 31 33 34 37 41 44 47 b 26-28 29 30 32 34 37 41 44 b b 28-30 29 30 32 34 36 40 43 b b

Cover depths designed "a" are not critical and width does not govern.
Cover depths designated "b" result in loads exceeding safe support strength.

G. Maximum Trench Widths for Reinforced Concrete and Ductile Iron Pipe: When reinforced concrete and ductile iron pipe is utilized, the strength class and the maximum allowable trench width as established by the Engineer will be shown on the Plans.

H. Option to Trenching: Contractor may perform excavation by tunneling methods as set forth herein at no additional cost to the Owner provided prior written approval for each such location is obtained from the Engineer.

2505.10 Tunneling, Boring and Jacking:

A. **Scope**: This item establishes the requirements to be followed for pipeline excavation performed by tunneling, boring and jacking methods.

B. **General**: Tunneling includes all underground horizontal excavations necessary to install the pipeline. The Contractor shall submit to the Engineer, prior to actual work, a written description of his proposed tunneling operation. It shall include the types and locations of shafts, methods to provide safe support strength for the pipeline when the shafts or bore pits exceed maximum allowable trench widths and other features that would affect the pipeline.

Tunneling shall be done with a minimum inconvenience and disturbance to the general public and abutting property owners.

C. **Tunnel Cross Section**: The tunnel shall be circular in cross section and of the size specified. Alternate size and shape may be submitted for consideration by the Engineer.

D. **Construction**:

1. General: All tunnel excavation shall provide an excavation conforming to the outside diameter of the casing and/or carrier conduit. The excavation shall be to an alignment and grade which will allow the carrier conduit to be installed to proper line and grade as shown on the Plans and as established in Section 2506.2.9-Installation.

2. Excavation: Conduct excavation in a manner to prevent disturbing overlying and adjacent material. Perform dewatering and chemical soil stabilization or grouting if necessary, due to existing field conditions.

SECTION 2506 INSTALLATION

2506.1 Scope: This section governs construction methods and procedures for the installation of gravity and pressure pipelines and appurtenances.

2506.2 General: All pipeline installations shall conform to the following requirements:

A. **Governmental Requirements**: Sanitary sewer line installation shall comply with applicable State and County Health and Environment Departments requirements. See Special Provisions for governing requirements.

B. **Trench Dewatering**: Contractor shall maintain a dry and stable trench, obtain necessary permits, and provide for the proper method of discharging such water from the work site at all times until pipeline installation is completed to the extent that hydrostatic pressure flotation or other adverse effects will not result in damage to the pipeline.

Proper dewatering techniques are the Contractor's responsibility. All work performed by the Contractor which is adversely affected by his failure to adequately dewater trenches will be subject to rejection by the Engineer. The Contractor shall repair and/or replace the affected pipeline without additional compensation.

C. **Drainage Course Crossing Encasement**: Any pipeline crossing a well-defined drainage course having less than three (3) feet of cover over the pipe shall be encased in concrete. The length of encasement shall be as shown on the Plans or if not shown as specified by the Engineer.

D. **Trench Shoring and Bracing**: All shoring, bracing or blocking shall be furnished and installed as necessary to preserve and maintain exposed excavation faces, to protect existing improvements, to protect the proposed pipeline and to provide for safety.

Shoring or other methods for support of trench walls is the responsibility of the Contractor and shall be accomplished by methods that will not adversely affect pipeline alignment, grade and/or structural integrity.

All bracing, sheeting and/or shoring installed below a horizontal plane six (6) inches above top of proposed pipe shall not be disturbed or removed after pipe and/or pipe embedment has been installed unless otherwise specified. The bottom skids of a trench shield shall not extend lower than six (6) inches above top of proposed pipe.

E. **Pipe Embedments**: All pipe embedment shall conform to Class B ***First Class Modified*** unless otherwise specified. Installation shall be in strict conformance with instructions for the appropriate Class being utilized.

All Class A concrete embedments for rigid conduits shall begin and end at a pipe joint.

F. **Bedding Installation**:

1. The trench subgrade shall be prepared to provide a uniform and continuous pipe support between pipe bells and joints.

2. Place and densify embedment material by shovel slicing or vibrating and prepare embedment material so that the pipe will be true to line and grade after installation.

3. After each pipe has been brought to the grade, aligned, and place in final position, deposit and densify by shovel slicing sufficient bedding material under the pipe haunches and on each side of the pipe to hold the pipe in proper position during subsequent pipe jointing, bedding, and backfilling operations. Place bedding material uniformly and simultaneously on each side of the pipe to prevent lateral displacement.

4. Place pipe that is to be bedded in Class A (concrete) embedment in proper position on temporary supports consisting of wood blocks or bricks with wood wedges. When necessary, anchor or weight the pipe to prevent flotation when the concrete is placed.

5. Place concrete for Class A (concrete) embedment or encasement uniformly on each side of the pipe and deposit at approximately its final position. Do not move concrete more than five (5) feet from its point of placement.

6. If unstable subgrade conditions are encountered and it is determined by the Engineer that the bedding specified will not provide suitable support for the pipe, additional excavation to the limits determined by the Engineer will be required. This additional excavation shall be backfilled with material approved by the Engineer.

G. **Pipe Embedment Designations and Descriptions**:

1. Class A. Embedment – Concrete Cradle, Arch or Encasement:

   a. All Class A embedments require A 480-1-4 concrete except as otherwise specified. After initial set of concrete, one (1) foot of backfill material should be placed over the conduit or concrete. The backfill above this point shall not be placed nor sheeting removed until at least forth-eight (48) hours after placement of the concrete. Time requirements may be adjusted by the Engineer to obtain structural integrity.

   b. Class A embedments for all pipe shall be installed with reinforcing steel of not less than p = 0.4%, where p is the ratio of the area of steel to the area of concrete, or as otherwise specified. Reinforcing steel shall be uniformly spaced and have a minimum lap of sixteen (16) bar diameters.

2. Class B Embedment: The pipe shall be bedded in granular material, with a minimum thickness below the pipe as specified in Section 2505.9.5.

a. First Class: The granular material shall be placed to the horizontal center line

of the pipe. The backfill from the horizontal center line to a level not less than twelve (12) inches above the top of the pipe shall be carefully placed select earth backfill compacted to eighty-five percent (85%) of maximum density at an optimum moisture + or – 2% as defined in AASHTO T99 or ASTM D 698.The select material shall be free from debris, organic matter, frozen material and rocks larger than one (1) inch. Class IV and Class V embedment materials, as defined in ASTM D 2321, shall not be used for bedding, hunching, or initial backfill of flexible pipe.

b. First Class Modified: The backfill shall be the same as for First Class except all of the material used to a level not less than six (6) inches above the top of the pipe bell or coupling shall be bedding aggregate.

3. Class C Embedment: The pipe shall be bedded in granular material with a minimum thickness beneath the pipe as specified in Section 2505.9.5

It shall be sliced under the haunches of the pipe to a height one-sixth (1/6) of the outside diameter of the pipe. Backfill above the bedding to a point twelve (12) inches above the top of pipe, shall be carefully placed select earth backfill compacted to eighty-five percent (85%) of maximum density as defined in AASHTO T99 or ASTM D 698.

H. **Tees, Wyes and Building Service Lines**: Tees (Ts), wyes (Ys), and building service lines shall be installed as shown on the Plans or specified herein.

1. Tees, wyes and saddles shall be installed at forty-five (45) degrees with pipe springline for pipe sizes 8 through 16 inch diameter. Tees, wyes and saddle shall not be installed in pipe sizes greater than or equal to eighteen (18) inch diameter.

2. Building service lines shall be installed with a straight alignment and at a uniform grade not less than two (2) percent unless otherwise specified and shall be embedded with Class B embedment. When a building service line grade exceeds twenty (20) percent, pipeline anchors shall be installed as required under Section 2506.2.11., which the first anchor not more than twelve (12) nor less than seven (7) feet upstream of the tee or wye.

3. The Contractor shall maintain an accurate record for submittal to the Engineer of location, size and direction of each tee, wye, saddle and/or location, size and length of each building service line. Locations shall use the pipeline stationing as shown on the Plans or the distance from the first downstream manhole. In the event such records are not kept or are lost before final acceptance of the work, the required information shall be predetermined by the Contractor at no additional cost to the Owner.

4. Service lines shall be terminated and capped one foot on the public side of right of-way or easement lines.

I. **Gravity Sewers**: All gravity sewers shall be installed to the alignment, elevation, slope, and with pipe embedment as specified and/or shown on the Plans. Maintain

the following tolerances from true alignment and grade between adjacent manholes:

Alignment	6 i
Grade	+

Joint deflection shall not exceed the maximum allowable deflection per joint according to ASTM C 425, ASTM C 594 and AWWA C 600.Only one correction for alignment and/or grade shall be made between adjacent manholes.

J. **Pressure Sewers (Force Main):**All pressure sewers shall be installed with required pipe embedment to depths shown on the Plans (not less than 42 inches) and to a continuous slope when not shown. Approved air relief valves shall be installed at all locations shown on the Plans or where required by the Engineer.

The Contractor shall block and anchor the pipeline to accommodate thrust and testing forces at pipe deflections, bends, tees, and plugs in accordance with the Contract documents. All damage caused by the Contractor's failure to provide adequate thrust supports shall be corrected by the Contractor at no additional cost to the Owner.

K. **Anchors**: Pipelines shall be anchored in accordance with the table below:

PIPELINE ANCHORS	
Percent of Grade	Center to Center Max. Spacing (Feet)
20-35	36
35-50	24
50	

The anchor shall be of concrete or other material approved by the Engineer. Concrete anchors shall have a minimum thickness of twelve (12) inches. The anchor shall extend not less than one (1) foot into undisturbed earth on the sides and bottom and one (1) foot above top of pipe. In incompressible material, the above dimensions may be six (6) inches each side and bottom. The anchor shall support a joint fitting.

L. **Pipe Laying**: All pipe shall be installed in accordance with the pipe manufacturer's recommendations, except as modified herein.

1. Pipe laying shall not proceed if the trench width as measured at the top of pipe exceeds the maximum allowable trench width. If this occurs, the Contractor shall submit to the Engineer for approval a better bedding for the pipe or pipe of sufficient strength to provide safe supporting strength.

2. All pipe and fittings shall be stored and handled with care to prevent damage thereto. Do not use hooks to transport or handle pipe or fittings. Do not drop pipe or fittings.

3. Rejected pipe and fittings shall be marked and removed from the Project Site at no cost to the Owner. All pipe and fittings shall be examined for soundness and specification compliance prior to placement in the trench, and rejected pipe or

fittings shall not be incorporated into the pipeline. Check the class or pipe strength to be sure proper pipe is installed.

4. Clean joint contact surfaces prior to jointing. Use lubricants, primers, or adhesives as recommended by the pipe or joint manufacturer.

5. ***Pipe installation shall begin at the lowest point and precede uninterrupted upgrade without gaps unless otherwise approved, in writing, by the Engineer.***

6. Unless otherwise required, lay all pipe straight between manholes. Excavate bell holes for each pipe joint. When jointed, the pipe shall form a true and smooth pipeline.

7. Pipe connecting to a structure shall be supported with Class A embedment, cradle or encasement to the first joint outside the structure excavation. If flexible wall connections are used, Class B embedment may be used in lieu of concrete embedment provided the height of backfill does not exceed the covers depths in Section 2505.9.6., which would result in loads exceeding the pipe's safe supporting strength.

8. All pipelines shall be plugged at the end of each day's progress. Plugs or other positive methods of sealing shall be utilized at all times to protect any existing system from entrance of stormwater or other foreign matter.

9 When a sanitary sewer line crosses an existing pipeline and the clearance is less than two (2) feet, special embedment may be required.

M. Connection of Pipes of Dissimilar Materials: The connection of pipes of different materials shall be made using approved transition coupling and shall provide a permanent and watertight connection that will withstand the hydrostatic test pressure.

2506.3 Detailed Installation Requirements: All pipes shall be installed in accordance with the following standards:

A. ASTMD-2321 – ABS Solid Wall, ABS Composite Wall,
ASTMD-2321 – PVC Solid Wall, PVC Composite Wall.

B. ***ANSI/AWWA C 600-Ductile Iron Pipe and the following requirements for polyethylene tube protection.***

C. ASTM C 12 – Vitrified Clay Pipe.

D. Reinforced Concrete Pipe – Installed in accordance with American Concrete Pipe Association's "Installation Manual."

E. Polyethylene tube protection shall be installed in accordance with ANSI/AWWA C105, Method A as outlined below.

F. Polyethylene tubing shall be approximately two (2) feet longer than the length of the pipe section to provide a one (1) foot overlap on each adjacent pipe section. Any rips, punctures, or other damage to the polyethylene shall be repaired with

adhesive tape of with a short length of polyethylene tube cut open, wrapped around the pipe and secured with adhesive tape.

G. Appurtenances such as bends, reducers and offsets shall be covered with polyethylene in the same manner as the pipe. Odd-shaped appurtenances such as valves, tees, and crosses, which cannot be wrapped in a tube, shall be wrapped with a flat sheet or split length of polyethylene tube. The sheet shall be passed under the appurtenance and brought up around the body. Seams shall be made by brining the edges together, folding them over twice, and taping them down. Polyethylene shall be securely taped in place of overlaps, valve stems and other penetrations.

H. Openings for branches, serve taps, air valves and similar appurtenances shall be made by making an x-shaped cut in the polyethylene and temporarily folding the film back. After the appurtenance is installed, tape the slack film securely to the appurtenance and repair the cut as well as any other damaged areas in the polyethylene with tape.

I. When joining with unwrapped pipe, extend the polyethylene tube to cover the unwrapped pipe a distance of at least two (2) feet and secure the end with circumferential turns of tape.

2506.4 Casing and Carrier Conduits: Casing and carrier conduits shall be installed at required locations by methods acceptable to the Engineer. Installation of the carrier conduit shall be completed prior to installation of the adjacent portions of the pipeline to allow for adjustments.

A. Casings Types:

1. Steel Casing Pipe: Steel casing pipe is a flexible conduit and shall be designed to conform with one of the following design concepts (other methods may be submitted to the Engineer for approval).

   a. Method A: The steel casing conduit is considered a temporary construction means for the installation of the carrier conduit; therefore, catholic and corrosion protection is not required provided that the carrier and its joints are structurally designed to withstand all possible loadings (live, earth and superimposed) which would otherwise be supported by the casing conduit, and to withstand al pressures necessary to install the required grout. All exterior voids around the casing conduits shall be filled with casing conduit grout (2503.6).Interior void between the carrier and casing conduits shall be filled with sand conforming to Section 2510.3.6. Sand shall be applied under pressure to fill all of the voids without adversely affecting the carrier conduit, joints, alignment and grade.

   b. Method B: The steel casing conduit is considered a permanent installation to protect the carrier conduit and to support all loads, therefore, cathodic and corrosion protection and watertight removable end seals are required for the casing conduit. Care shall be exercised to prevent the carrier conduit from floating and receiving any load transfer from the casing conduit unless it is designed for such loading. The void between casing and carrier conduits shall be treated as shown on the drawings. Cathodic and corrosion protection

for method B shall be provided by two magnesium anodes, one at each end of the casing pipe, with a lead wire connected to the encasement pipe by thermite welding.

1) Reinforced Concrete Casing Pipe: Reinforced concrete casing pipe is a rigid conduit and shall be installed in accordance with recommended procedures in the latest printing of the Concrete Pipe Design Manual prepared by American Concrete Pipe Association.

B. **Casing Installation**: Installation of casing shall be supervised by a foreman experienced in such work. Casing shall be installed by a combination of auguring and jacking. Alignment and gradient shall be such that the carrier conduit can be installed to line and grade shown on the drawings.

Welding shall be performed by a person experienced with the type of welding necessary. All welds shall conform to AWWA C 206.

C. **Liner Plate Installation**: Liner plates shall be assembled immediately following the excavation. Advance liner plates or casing continuously with excavation. All voids between liner and surrounding earth shall be filled with casing conduit grout forced in under pressure. As the pumping through any hole is completed, it shall be plugged to prevent the back-flow of grout. After lining installation is complete, it shall be cleaned of all debris and all leaks sealed.

D. **Carrier conduit Installation**: After completion of the installation of the casing, the carrier conduit shall be carefully pushed or pulled through the casing in a manner that will maintain proper jointing of the pipe joints and provide required gradient and alignment. Pipe skids shall be provided as indicated on the Plans. The skids shall be securely strapped to the pipe with steel strapping material at least three-quarters (3/4) inch wide.

E. **Sand Fill**: The annular space between lining and sewer pipe shall be filled with sand from end seal to end seal unless otherwise specified. The fill shall be placed inside the casing in a manner that will not disturb the alignment and/or grade of the sewer pipe. Sand used in casing conduits shall be as specified in Section 2510.3.6. Sand shall be blown into the casing so that all space is filled.

F **End Seals**: Construct end seals after sewer pipe has been installed and approved. Brick shall be in accordance with ASTM C 32, Grade SS or SM and mortar in accordance with ASTM C 270.

G. **Initial Testing**: Air pressure and/or exfiltration test as required shall be successfully performed on the carrier conduit prior to filling the void between casing and carrier conduits with sand or the sealing of the ends of the casing conduit

H. **Carrier Conduit Installed Without Casing**: Carrier conduits installed without casing shall be assembled at the entrance to the auger hole and carefully pushed or jacked through the opening using a method designed to prevent disturbing the assembled joints. Auger holes shall be sized to accommodate the carrier conduit with a minimum of annular space around the conduit. When finally in place, carrier conduit shall be true to the line and grade required on the Plans.

SECTION 2507 BACKFILL

2507.1 Scope: This section governs the furnishing of all labor, equipment, tools and materials to property backfill trenches and structures.

2507.2 General:

A. All trash and debris shall be removed from the pipeline excavation prior to backfilling.

B. Unless otherwise specified, all sewer trenches and excavation around structures shall be backfilled to the original surface of the ground with suitable earth or earth and rock. When an earth and rock mixture is used, it shall be placed and thoroughly consolidated with sufficient earth to completely fill all voids between the rocks.

C. The backfill material shall be placed in lifts not to exceed 2 feet in depth. Each lift shall be compacted to the required density prior to the next lift being placed.

D. Commercial sand backfill shall not be used.

E. In areas marked “garden” or “flower garden”, the original topsoil shall be replaced to original elevation and depth. (Minimum depth shall be twelve (12) inches).

F. Backfill material shall be carefully placed to avoid damage to or displacement of the pipe and other exposed utilities or structures.

G. Backfill shall not be placed when material contains frost, is frozen, or a blanket of snow prevents proper compaction. Contractor shall remove waste material, trees, organic material, rubbish, or other deleterious substances.

H. No rock whose greatest dimension exceeds six inches shall be placed within two (2) feet to the top of the pipe in any excavation as backfill. No rock greater than one foot in its largest axis shall be placed in any trench excavation as backfill.

2507.3 Backfilling In Street or Alley Right-of-Way and Under Pavement: **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 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.

1. Backfilling under street and alley pavements where heavy compaction equipment is utilized.

Backfilling shall be placed as shown in ***Figure 1.***

PAVEMENT

D

W C

12” B ***MINIMUM***

H

2

2” IN EARTH (MINIMUM) 6” IN ROCK (MINIMUM)
H

A

ALL CULVERT TYPES

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

(Sewer Lines Using Earth Compaction Equipment)

2. The following cross-sectional view of typical storm sewer trench construction under street and alley pavements, Figure 2, shall apply to all storm sewer backfill areas where trenches are not widened to allow heavy roadway compaction equipment.:

Backfilling shall be placed as shown in ***Figure 2***.

PAVED AREA

C

12″ MINIMUM,

NO

SPRINGLINE

H

2

H

B

A

ALL CULVERT TYPES

2″ IN EARTH (MINIMUM) 6″ IN ROCK (MINIMUM)

A – *Consolidated* granular bedding material.

B – Flowable Fill (CLSM).

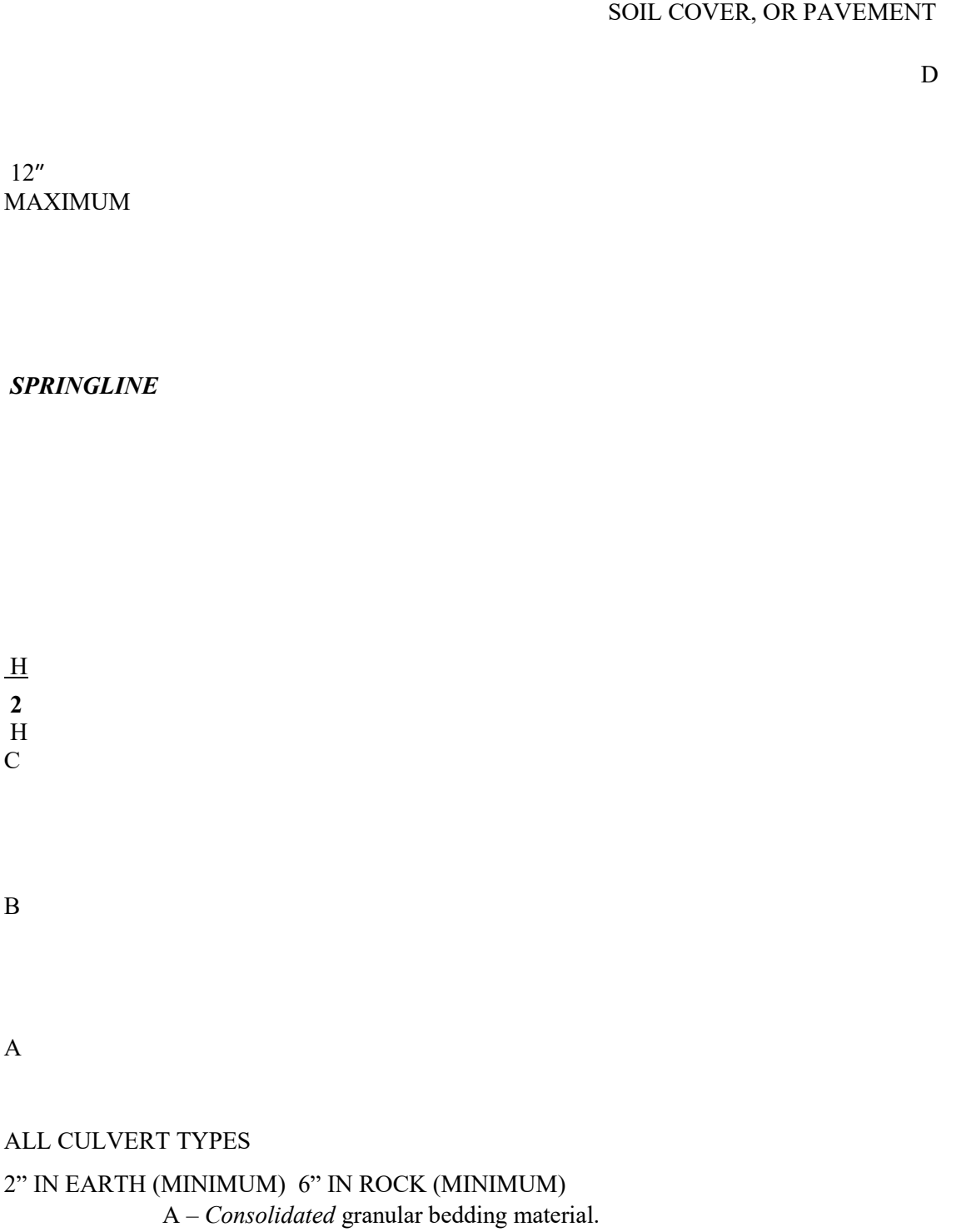
C – ***Compacted Subgrade -*** *Subgrade thickness shall be as specified in Table 1 of Section 5206 and as directed by the engineer. Subgrade preparation shall be done in accordance with Section 2201, and shall consist of untreated compacted aggregate, stabilized aggregate base, or compacted soil – in accordance with the associated Sections 2201, 2202, and 2203.*

FIGURE 2

(For Trenches Without Roadway Compaction Equipment)

2507.4 Backfilling In Areas Other Than Street or Alley Right-of-Way: ***Trench backfilling in areas other than street and alley pavements where the near edge of trench is behind the back of curb.*** From the top of the pipe embedment (as defined in Section 2506.2.7.b.) to a point at grade the backfill material shall be compacted to no less than 90% of maximum density at optimum moisture plus or minus 2% as determined by ASTM 698.

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***,*** *except in the Central Business District, as defined in section 2209.2, where untreated compacted aggregate shall not be used. 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)

2507.4 Backfill Around Structures:

A. No backfill shall be placed over or around any structure until the concrete or mortar has attained a minimum strength of 2000 psi and can sufficiently support the loads imposed by the backfill without damage.

B. The Contractor shall use utmost care to avoid any wedging action between the side of the excavation and the structure that would cause any movement of the structure. Any damage caused by premature or unbalanced backfill or by the use of equipment on or near a structure will be the responsibility of the Contractor.

C. No rock larger than four (4) inches maximum dimension shall be placed within one (1) foot of the exterior surface of any structure.

D. ***Backfill around structures in street or alley right-of-way from the bottom of the structure to the bottom of the subgrade shall meet the requirements of 2507.3.***

SECTION 2508 RESTORATION

2508.1Scope: This section covers all work required in surface restoration on private and public properties that are disturbed by construction.

2508.2 General: The Contractor shall restore the project site to conditions equal to or better than those existing prior to entry unless otherwise specified.

A. Maintain adequate safety signs, barricades and lights until final restoration of work area is completed.

B. Public property shall be restored to the requirements of the public body having jurisdiction.

2508.3 Clean-Up: The Contractor, upon completion of installation and backfill operations, shall prepare the area for final grading including but not limited to the following items:

A. Clean-up shall follow the backfilling operations as closely as possible.

B. Excess material shall be removed from the site including material that has washed into the stream beds, storm water facilities, streets, etc.

C. Tools, equipment and construction material shall be removed except for in designated storage areas along the pipeline route.

D. Restore surface and sub-surface drainage and provide temporary wash checks where necessary.

2508.4 Finished Grading: The Contractor shall finish grade the area to lines and grades shown on the Plans or if not shown to those that existed prior to the area being disturbed. Special attention shall be directed to assure surface drainage. The area shall be smoothed by raking or dragging.

2508.5Seeding: The requirements set forth under Section 2401 – Seeding shall be used as if fully written herein.

2508.6 Sodding: The requirements set forth under Section 2402 – Sodding shall be used as if fully written herein.

2508.7 Pavement Replacement:

A. **Scope**: This section covers the furnishing of all labor, equipment, tools and materials in the performance of all work for the replacement of pavement including sidewalks, driveways and curbing as shown on the Plans and in the Special Provisions.

B. **Definition**: Pavement replacement as used herein shall mean reconstruction of the entire structural section of all pavements removed in excavated areas, including sidewalks, driveways and curbing and all damaged pavement surfaces outside of excavation limits.

C. **General**:

1. Replacement of pavement shall proceed in accordance with the traffic control plans and/or approved construction schedule.

2. Prior to pavement replacement, all edges that were previously cut but have been subsequently damaged shall be recut and all adjacent undermined and heaved pavement shall be removed.

3. Removed pavement shall be replaced in conformance with the requirements of applicable portions of Section 2200 – Paving, or Section 2300 – Incidental Construction.

4. Non-Standard Pavement: Pavement sections not conforming to Section 2200 of these Specifications shall be replaced in accordance with requirements of the jurisdictional agency.

2508.8 Fences: All fencing damaged and/or removed existing prior to construction shall be restored to a condition not less than that which existed prior to construction.

2508.9 Walls: Retaining and architectural walls, if disturbed or damaged, shall be restored architecturally and structurally to conditions not less than that which existed prior to construction.

2508.10 Trees, Shrubs and Bushes: Any tree, shrub or bush replaced shall be planted outside the permanent sanitary sewer right-of-way and shall be of the same species as the removed tree, shrub or bush. Any tree, shrub or bush specie that is prohibited by local restrictions shall be substituted with a related species. Replacement planting shall conform to the guidelines ANSI-Z60.1-1980 of Nurserymen. The Contractor shall notify the property owners at least two weeks prior to the start of construction so property owners can remove small plants and flowers.

SECTION 2509 TESTING

2509.1 Scope: This section governs the furnishing of all labor, equipment, tools and materials, and the performance of any or all acceptance tests.

2509.2 General: The Contractor shall furnish all labor, equipment, materials and reports for the required acceptance tests. All pipelines, including building service lines, shall undergo and pass all required tests to determine soundness and workmanship. Pipelines that do not conform to the project requirements shall be repaired and/or replaced and shall be retested until the pipeline meets the project requirements. Test results shall be recorded by the Contractor and a copy shall be submitted to the Engineer. No testing shall be performed before backfill and compaction operation has been completed.

2509.3 Alignment and Grade: Alignment, grade and visible defects shall be checked as follows:

A. **Visual Internal Inspection**:

1. Contractor shall clean pipe of excess mortar, joint sealant and other dirt and debris prior to inspection.

2. Sewer will be inspected by flashing a light between manholes and/or by physical passage to determine the presence of any misaligned, displaced, or broken pipe and other defects.

B. Television Inspection: Sewer lines installed under this project are subject to inspection by closed circuit television at the Owner's expense.

2509.4 Infiltration – Exfiltration: Hydrostatic or air pressure tests shall be conducted on sewers before acceptance by the Owner. For sewers with a diameter less than twenty-four (24) inches, the infiltration-exfiltration shall not exceed two hundred (200) gallons per day per inch of nominal diameter per mile of sewer line for any section of the system. For sewers with a diameter twenty-four (24) inches or greater, infiltration-exfiltration shall not exceed six thousand ($6,000) gallons per day per mile of pipe.

A. **Infiltration**: Where sewers are laid within the ground water table, infiltration testing shall be conducted. Where evidence of infiltration is discovered by the Engineer, the Contractor shall install weirs or other suitable flow rate measuring devices adequate to determine to the satisfaction of the Engineer that the specified infiltration limit is not exceeded for that reach of gravity sewer. Where the specified infiltration limit is exceeded, the Contractor shall repair or replace the defective reach of pipeline at no additional cost to the Owner. Following repair of the pipeline, the Contractor shall re measure infiltration flow rates and make additional repairs until an acceptable infiltration flow rate is achieved.

B. **Exfiltration**: Exfiltration tests shall be performed by the Contractor using one or a combination of methods as set forth below. Each section of gravity pipeline between manholes and/or structures after backfill shall be tested after backfill has been completed.

1. Hydrostatic Tests for Gravity Systems:

a. Test section shall be filled not less than twelve (12) hours prior to testing. Refill test section prior to performing test.

b. Perform at depths of water as measured above center line of pipe of not less than 2 feet nor more than 10 feet (consideration shall be given for water table above said center line). Maintain test as necessary to locate all leaks but not less than two hours.

2. Hydrostatic Tests for Pressure Systems:

a. Conformance Procedure: Perform hydrostatic pressure and leakage tests. Conform to AWWA C 600 procedures as modified herein. Tests shall apply to all pressure sewers.

b. 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 Owner, 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.

c. Pressure Test: Conduct at 1.5 times maximum operating pressure determined by the following formula:

Ppt = (1.5) (.433) (OP-GE), in which

Ppt = test pressure in psi at gauge elevation

OP = operating pressure in feet as indicated for highest elevation of the hydraulic gradient on each section of the line.

GE = elevation in feet at center line of gauge. Perform pressure tests satisfactorily prior to determining leakage.

d. Leakage Test: An allowable leakage test shall be conducted after the pressure test has been satisfactorily completed. The Contractor shall maintain on the new main for at least two (2) hours a minimum pressure of not less than that determined by the following formula:

Plt = 0.433 (OP-GE), in which

Plt = test pressure in psi at gauge elevation

OP and GE – as defined in Section 2509.4.2.b (3) 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 after the air has been expelled and the pipe has been filled with water. No main or section thereof will be accepted if and while it has a leakage rate in excess of that determined by the following formula.

L = 0.00007 N D P, in which

L = allowable leakage in gallons per hour

N = number of joints in the length of main tested

D = nominal diameter of the pipe in inches

P = average test pressure during the leakage test in psig

Should the actual leakage exceed the allowable leakage, the test pressure shall be maintained so that the leakage may show up on the surface of the ground. All leaks shall be repaired and the leakage test repeated as necessary until the main passes the leakage test.

3. Air Testing of Gravity Systems:

a. Contractor may perform air tests for all pipe (except concrete) for all sizes.

b. Furnish all facilities required including necessary piping connection, test pumping equipment, pressure gauges, bulkheads, regulator to avoid over pressurization, and all miscellaneous items required.

c. 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 will also be used to indicate loss of air pressure due to leaks in the sewer line.

d. 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 reading Dial White coated aluminum with black lettering, 270o arc and mirror edge. Pipe Connection Low male ½ 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 Engineer whenever air tests are performed.

e. 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.

Pipe Size	Required Tire per 100 LF	Maximum Required Tim
8”	70 sec.	227 sec.
10”	110 sec.	283 sec.
12”	158 sec.	340 sec.
15”	248 sec.	425 sec.
18”	356 sec.	510 sec.
21”	485 sec.	595 sec.
24”	634 sec.	680 sec.
27”	765 sec.	765 sec.
30”	851 sec.	851 sec.

If air test fails to meet above requirements, repeat test as necessary after all leaks and defects have been repaired and backfilled. Prior to acceptance, all constructed sewer lines shall satisfactorily pass the low pressure air test.

f. In areas where ground water is known to exist, install a one-half inch diameter capped pipe nipple approximately 10” long through manhole wall on top of 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.

2509.5 Deflection Test:

A. General: Flexible pipelines shall be tested for deflection by pulling a mandrel through the entire length thereof.

1. The mandrel (go/no-go) 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 dimensions of the mandrel shall be as listed in the accompanying table. 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 as shown in the accompanying table.

2. The Engineer shall be responsible for approving the mandrel. Proving rings shall be used to verity this.

3. The mandrel shall be hand-pulled ***without any mechanical assistance,*** by ***one of*** the Contractor***'s personnel*** 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 Owner, shall re-round or replace the sewer to the satisfaction of the Engineer. These repaired sections shall be retested.

4. The testing shall be conducted after final trench backfill.

D and L Dimensions For 9 Arm Mandrel					
Nominal Diameter	**L (Min)**	**ASTM 3034 SDR 35**	**ASTM 3034 SDR 26**	**ASTM 2241 SDR 21**	**ASTM 679 T-1 Wall**
8"	8"	7.52"	7.37"	7.41"	--
10"	10"	9.40"	9.21"	9.24"	--
12"	12"	11.19"	10.96"	10.96"	--
15"	15"	13.70"	13.42"	--	--
18"	18"	--	--	***15.47"***	***16.76"***
21"	21"	--	--	***--***	***19.74"***
24"	24"	--	--	***20.63"***	***22.21"***
27"	***27"***	***--***	***--***	***--***	***25.03"***

The above dimensions were determined using the following formula: .95 x (Average O.D.-2 x min. wall thickness).

2509.6 Soil Density Tests:

A. General: Compaction tests shall be performed as specified in the Special Provisions. If so specified, all compaction tests shall be performed by a testing laboratory approved by the Engineer.

1. Testing Methods: Testing shall be in accordance with the following:
   a. Maximum Density: Maximum density shall be determined by the standard

proctor analysis method as defined by AASHTO T99 or ASTM D 698.

b. Density of Soil in Place: The density of soil in place shall be determined by the analysis methods as defined by ASTM D 1556, or ASTM D 2167, or ASTM D 2922.

2. Method of Payment: The Contractor shall pay all costs for density tests. Tests shall be required as follows:

a. For pipelines located within street or alley rights-of-way, density tests representative of each three (3) foot of trench depth shall be taken at five hundred (500) linear foot intervals along the lines or at each cross street.

b. For pipelines located outside of street or alley rights-of-way, density tests representative of each three (3) foot of trench depth shall be taken at one thousand (1,000) foot intervals along the lines.

3. Additional Tests: The Engineer may require additional density tests with payment as follows:

a. Test results conforming to specified densities will be paid for by the Owner.

b. Test results not conforming to specified densities shall be paid for by the Contractor at no additional cost to the Owner.

SECTION 2510 MANHOLES AND SPECIAL STRUCTURES

2510.1 Scope: This section governs the furnishing of all labor, equipment, tools, and materials, and the performance of all work incidental to the construction of manholes, drop manholes and special sewer structures complete with covers, steps, fittings and appurtenances as required in accordance with the Plans and Special Provisions.

2510.2 General: As used herein special structures refers to manholes on large sewers, special junction structures, metering stations and similar structures constructed on the pipeline.

Manholes and special structures may be constructed of precast concrete sections, cast in-place concrete.

2510.3 Manhole Materials:

A. Brick shall conform to ASTM C 32, Grade SS or SM, nominal size 2 ¼ x 4 x 8 inches. For grade SM, the maximum water absorption by five (5) hour boiling shall not exceed twelve (12) percent per individual brick or nine (9) percent for the average of five (5) bricks.

B. **Mortar and plaster coating**: Mortar and plaster coatings for masonry manhole units shall conform to ASTM C 270. The mix shall consist of two (2) parts Portland cement to one (1) part masonry cement to six (6) parts standard plaster sand. No mortar or plaster mixed more than thirty (30) minutes shall be incorporated in the work.

C. **Non-Shrink Grout**: Non-shrink grout shall be in the plastic state and show no expansion after set as tested in accordance with ASTM C 827 and shall develop compressive strength not less than three thousand (3,000) pounds per square inch with a trowelable mix within twenty-four (24) hours per ASTM C 109. The placement time shall be not less than forth-five (45) minutes based on initial set per ASTM C 191.

D. **Waterproofing**: Waterproofing shall be a coal-tar coating and conform to ASTM D 450. Exterior surfaces shall be coated with Tnemec “46-450 Heavy Tnemecol” or approved equal. Where specified, interior surfaces (which are exposed to raw sewage and sulfide gases) shall be coated with Tnemec “46-449 heavy Duty Black” or approved equal. The minimum dry thickness for all waterproofing shall be 14.0 mils.

E. **Precast Concrete**: Precast concrete manholes shall conform to ASTM C 478 with the following modifications.

1. Wall thickness not less than one-twelfth (1/12) of inside diameter ***plus one (1) inch or five (5) inches***, whichever is greater**.**

2. Cement, Fine Aggregate, Coarse Aggregate and Water used in the manufacture of precast manholes shall be as specified in Section 2510.3.6.

3. Developed bases shall be used where practical. The diameter of the base pad shall be eight (8) inches greater than outside diameter of the manhole.

4. Pipe opening shall be circular or horseshoe shaped with surfaces grooved or textured to improve mortar bond. Flexible gaskets shall be used with developed base manholes. Flexible gaskets shall be Press-wedge, A-Lock, or approved equal.

5. The minimum distance from the invert of the downstream pipe to the top surface of the base shall be three (3) inches.

6. Joints between manhole sections, adjustment rings, and below the ring and cover shall be sealed with preformed bitumastic sealants, Kent-Seal, Ram-Nek, E-Z Stick or approved equal. The minimum bead dimension shall be one inch.

7. ***Both the bell and spigot ends of the manhole sections shall be primed with a liquid primer that is compatible with bitumastic sealants, Kent-Seal, Ram-Nek, E-Z Stick or approved equal.***

8. ***Reducing sections may be used at six (6) feet or more above the invert.***

9. ***Eccentric cone sections shall be used unless noted otherwise on the project plans.***

F. **Manhole and Special Concrete**: Manhole and special concrete shall conform to "The Mid-West Concrete Industry Board Incorporated" (MCIB) Specifications and to the requirements therein for the MCIB Mix Number specified on the drawings or as provided herein.

a. ***Standard Concrete: Standard concrete used for concrete encasements and embedments, thrust blocks, pipe anchors, pipe collars, etc. shall be MCIB Mix Number A 480-1-4-0.542, unless otherwise specified***.

b. ***Structural Concrete: Structural concrete used for aerial crossing piers, wetwell walls, manhole walls, bases, inverts, and flat slabs, etc. shall MCIB Mix Number A 558-1-2-0.421, unless otherwise specified.***

c. Admixtures: Air-entraining admixtures shall provide an air content within the range of 4 ½ to 7 ½ percent by volume as measured by the pressure method (ASTM C 231). The air entraining admixtures shall meet the requirements of ASTM C 260.

d. Portland Cement: Portland cement shall conform to ASTM C 150 Type I. Where high early strength is desired, Type III can be used.

e. Fine Aggregate: Fine aggregate shall be clean, natural sand meeting the requirements of ASTM C 33.Grading shall be within the limits as set forth by MCIB.

f. Coarse Aggregate: Coarse aggregate shall be limestone meeting the requirements of ASTM C 33. The sum total of all deleterious material shall not exceed the requirements of ASTM C 33.

g. Water: Water shall be clean and free from deleterious substances. Only potable
water will be acceptable without testing.

G. **Reinforcement steel**: Reinforcement steel shall conform with the following minimum requirements.

a. Design: Reinforcing steel shall conform to one of the following.

(1) Welded Wire Fabric – ASTM A 185.

(2) Reinforcing Bars – ASTM A 615, Grade 40, or Grade 60.

(3) Fabricated Steel Bar and Rod mats – ASTM A 184, Grade 40, or Grade 60.

b. Fabricating tolerances: Tolerances for concrete reinforcement shall conform to the following requirements.

(1) Sheared length = +/- 1 inch.

(2) Stirrups, ties, and spiral = +/-2 inches.

(3) All other bends = +/2 1 inch.

H. **Iron Castings**: Casting shall conform to the requirements of ASTM A 48, ***Class 35 B, ASUTO M306 and KCMO Standard MH-RC.*** Castings shall be clean and without surface defects that will impair serviceability. Plugging or filling of holes or other defects will not be permitted. Parting fins and pouring gates shall be removed.

1. Rings and Covers: Rings and covers shall meet the following minimum requirements ***and Kansas City Standard MH-RC.***

a. ***Cam lock covers shall not be placed in roadway pavement unless shown on the plans or directed by the engineer. All other covers shall be cam lock. All covers shall have provisions for opening, such as concealed pick holes.***

b. ***Bearing surfaces between the ring and cover shall be machine finished or ground to assure interchangeability and a non-rocking fit in any position.***

c. ***Bolt-down type manhole rings shall be anchored to the manhole walls with not less than four (4) three-fourths (3/4) inch (M18x2.5) diameter steel bolts embedded a minimum of four (4) inches, (100 mm), plus or minus one half (1/2) inch, (10 mm), into the cone section of the manhole, except where the entire ring is embedded in a concrete top slab.***

d. ***Bolt-down manhole rings and their covers shall be provided with machined***

surfaces, O-ring or T-ring gaskets and cam locks. Cam lock bolt heads shall fit flush or below the top of the cover. The O-ring or T-ring rubber gasket shall be neoprene or other synthetic material, sixty (60) plush or minus five (5) hardness when measured by ASTM D 2240 type Durometer.

e. All manhole rings and covers placed in paved areas shall be adjustable to meet any slope and grade of the roadway, from 0 to 17%, and shall be able to be raised or lowered in ¼ inch increments, up to 2¼ inches. Ring height must be adjustable after installation without disturbing the surrounding pavement. The ring and lid shall be rated for H20 traffic.

2. Steps:

a. Cast-Iron steps ***are not allowed***.

b. Steel core, plastic coated steps: Steel core plastic coated steps shall meet the following minimum requirements.

(1) The plastic coating shall be a copolymer polypropylene meeting ***ASTM D4101.***

(2) The steel core shall be a minimum of ½ inch in diameter and grade 60.

(3) The requirements of ASTM C 478 shall be met except minimum pull-out strength shall be 1,000 pounds.

H. Joint sealing systems.

1. Exterior: Heat shrinkable joint wrap shall conform to ANSI/AWWA A C216- 89. The wrap system shall consist of a two-part material (backing + adhesive) with a closure system and a G-type primer. It shall consist of an irradiated cross-linked polyolefin sheeting, pre-coated with a layer of anti-corrosion adhesive. The backing shall have a minimum recovery of 22%. The adhesive shall be mastic-type, specially formulated to become fluid at temperatures achieved during installation and maintain flexibility in cold climates with installation temperatures down to -40°F. Upon cooling the adhesive shall form a tough, elastometic protective layer. The wrap shall employ a closure seal to allow sealing of the overlap area. The overall thickness of an applied sleeve shall nominally measure 0.100 inches (2.5 mm), (Wrapid Seal as manufactures by Canusa has been approved.)

2. Internal: All internal sealing materials shall be able to withstand hydrogen sulfide and other corrosive gases and shall be approved by the engineer before bidding.

a. Rubber Seal Systems: Internal flexible rubber sleeve, extensions and wedge strips shall be extruded or molded from a high grade rubber compound conforming to the applicable requirements of ASTM C 923, with a minimum 1500 psi tensile strength, maximum 18% compression set and hardness (Durometer) or 48+ or -5. (Cretex Specialty Products system has

been approved).

Sleeves shall be either double or triple pleated with a minimum unexpanded vertical height of 8" and 10" respectively, a minimum thickness of 3/16" and shall be capable of a vertical expansion when installed of not less than 2". The top and bottom section of the sleeve shall contain an integrally formed expansion band recess and multiple sealing fins.

Extensions shall have a minimum thickness of 3/16". The top section of the extension shall be shaped to fit into the bottom band recess of the sleeve under the bottom chimney seal band. The bottom section of the extension shall contain an integrally formed expansion band recess and multiple sealing fins matching that of the rubber sleeve.

Splices used to fabricate the sleeve and extension shall be hot vulcanized and be strong enough to withstand a 180º degree bend with no visible separation.

b. Barrier Seal Systems: Barrier seal systems shall be of an impermeable material such as ASTM D 148 polyethylene with a UV inhibitor for above ground applications that will carry an AASHTO M-306 proof load of 25,000 pounds.

3. Flexible Gaskets: Flexible gaskets shall conform to the requirements of ASTM C923and the type of pope used. PSX and ALOK gaskets are approved and ALOK X-CEL gaskets are approved for 8, 10 and 12 inch pipes. For fifteen (15) inch pipe and larger, flexible water-stop gaskets conforming to the requirements of ASTM C923 may be used.

4. Mastic Filler: Mastic filler shall be a butyl rubber material meeting ASTM C 990 and AASHTO M-198 and be compatible with all material that it contacts (i.e. Wrapid Seal, PRO-STIK or an approved equal).

5. Manhole Adjustment Rings: Rings shall be constructed of concrete, HDPE or recycled rubber.

If HDPE adjustment rings are used, they shall be injection molded-recycled HDPE – as manufactured by LADTECH, Inc. or approved equal. They shall be installed as per manufacture's recommendations.

If recycled rubber adjustment rings are used, they shall consist of no less than 80%, by weight, recycled rubber and no less than 10% by volume shredded fiber as manufactured by GNR Technologies or approved equal. They shall be installed per manufacture's recommendations.

The top and bottom of all adjustment rings shall be sealed using a mastic filler meeting the requirements of 2510.3 or an epoxy paste. The epoxy paste shall be a two component, moisture insensitive, containing no solvents, and capable of bonding with all materials it is to be used on, like Epoxytec Micor C.P.P. or approved equal.

2510.4 Manhole Site Preparation: Manhole site preparation shall be governed by Section 2504.

2510.5 Manhole Excavation:

A. **Excavation**: Excavation for manholes and special structures shall be governed by this Section and Section 2505.It shall be achieved in a suitable and orderly manner providing a minimum disturbance to the general public.

B. **Depth of Excavation**: Depth of excavation shall be to that required for proper installation of the manhole or structure. Over-depth excavation may be required by the Engineer if the subgrade is unstable. Over-depth excavation due to unstable subgrade shall be backfilled as required by the Engineer. Over-depth excavation occurring through an oversight by the Contractor shall be backfilled as required by the Engineer at no additional cost to the Owner.

C. **Side Clearances**: Side clearances outside the manhole and/or structures shall be no greater than to allow for forming, connection of piping, proper application of special coatings, if required, and to permit inspection. When concrete is to be placed directly against excavated faces, excavation shall be sufficiently outside of the manhole or structure to provide not less than three (3) inches of concrete cover over the steel reinforcement.

2510.6 Manhole Installation: Manhole installation shall be governed by this Section and Section 2506.It shall be performed by the Contractor on a schedule that will provide an orderly progression of the work.

A. **Bases**:

1. Precast developed bases shall be reinforced in accordance with ASTM C 478.

2. If preferred developed bases are not used, poured concrete bases shall be used. Developed bases shall be installed on a maximum of 4 inches of crushed rock. Depths exceeding this amount shall be filled with mass concrete.

3. Poured-in-place bases shall have a minimum thickness of eight (8) inches. When poured-in-place bases are used, the invert shall be poured monolithically with the base. The bottom wall sections shall be embedded in the base section a minimum of three (3) inches. The bottom precast wall section shall not be set upon a previously poured base. Solid concrete blocks shall be used for supporting and leveling the wall section prior to pouring the base.

Base thickness may be reduced to six (6) inches when it is poured on solid rock which meets the approval of the Engineer.

4. Poured-in-place bases shall extend to the first joint from the manhole when reinforced concrete and vitrified clay pipe is used without flexible joints as specified in Sections 2503.

B. **Inside Dimensions**: The minimum horizontal clear distance in the barrel of the manholes shall not be less than four feet unless otherwise specified on the Plans.

C. ***Brick shall not be used for new manhole construction***.

E. Precast:

1. Delivery: Precast concrete components shall not be delivered to the job until representative concrete control cylinders have attained at least 80 percent of the specified minimum design strength.

2. Inspection: Precast concrete shall be inspected ***at the manufacturer prior to delivery to the job site***. Rejection of defective or cracked precast concrete components shall be in accordance with ASTM C478.

3. Wall Thickness: Wall thickness shall conform to the requirements of Section 2510.3.

4. Construction: Precast sections shall be cleaned of all dirt, grass, and other deleterious matter. Seal each joint ***of adjustment rings and castings with a double bead of preformed bitumastic joint sealant***. Sections shall be placed such that steps are aligned but without rotation or damage to sealant integrity. Lift holes ***and the area between the pipe and the precast sections, when flexible gaskets are not used, shall be patched with non-shrink grout.***

5. ***Waterproofing: A coal-tar coating, in accordance with paragraph 2510.3 shall be applied to the exterior of all precast manhole sections, flat-top sections and adjustment rings. The coating shall be made after the inspection and approved of the manhole sections and adjustment rings by the Public Works Engineering Division materials and testing laboratory. Backfill shall not be made until the coating has cured.***

F. Cast-In-Place:

1. Wall Thickness: Wall thickness shall conform to the dimensions as shown on the drawings.

2. Construction: Reinforcement steel shall be placed as shown on the drawing. Tie-holes shall be patched with non-shrink grout. Wall sleeves, where required, shall be installed as shown on the drawings. Water stops shall be installed at the wall and slab connection and shall be of the size, thickness and material as shown on the drawings.

3. Waterproofing: Interior protective coatings, where required, shall conform to the material specifications. Application shall conform to the manufacturer's recommendation.

G. Top Slabs: Thickness shall conform to the dimensions and reinforcement steel shall be placed as shown on the drawings.

H. Pipe Stubs: Stubs shall be installed at the locations, angles, elevations and of the materials shown on the drawings. A water-tight removable stopper shall be installed in each pipe stub. Pipe stubs shall be installed so that a pipe joint will be two (2) feet or less from the outside manhole wall.

I. Inverts: Inverts shall be structural concrete and steel-troweled to produce a dense, smooth finish ***and joint with the square cut end of the pipes. The outside wall of the pipe at the springline shall extend to the inside wall of the manhole, but shall not project more then 1 inch beyond the wall.*** The invert channel shall be "U" shaped in

cross section and extend upward one-half of the inside pipe diameter ***if the pipe diameter is less than 18 inches. If the pipe diameter is 18 inches of greater, the 'U" shaped invert shall extend upward for the full inside pipe diameter.***

J. Steps: Steps shall be aligned vertically below the casting and spaced at sixteen (16) inch centers. The top step shall be not more than one (1) foot below the top of the cone. The lowest step shall be not more than two (2) feet above the invert bench. Field-drilled step holes are not permitted in precast concrete manholes.

K. Top Elevation: The finished top elevation of manhole castings shall conform to the following unless otherwise shown on the plans or directed by the Engineer.

1. In paved or future paved areas, the top of the casting shall conform to the slope of the pavement and be 1/8 inch below the finished pavement elevation.

2. In non-pavement areas, the top of the casting shall be no more than six (6) inches above the surrounding ground nor less than the sod's upper root limit. The final elevation shall be at a point where water will not pond over the manhole cover.

K. Manhole Adjustment: All new manholes will be provided with adjustment rings(s) underneath the casting as shown on Plans. The joints shall be sealed with preformed bitumastic sealant. The maximum allowable adjustment distance between the top of the cone and the bottom of the casting shall be 12". If the top of an existing manhole is required to be raised to an elevation that will exceed the maximum adjustment distance or lowered more than the adjustment rings will allow, all vertical adjustments shall be made to the barrel of the manhole.

L. Castings: Castings shall be installed with the mud ring inserted inside the manhole opening and resting on a minimum of two rows of preformed bitumastic sealer. Bolt down castings shall be held in place as shown on the Plans.

M. Joint Sealing Systems:

1. External Joint Sealing Systems:

a. Adjustment rings and manhole joints below the surface of the ground shall be covered with heat shrinkable joint wrap and shall be installed in accordance with AWWA C-206. Manhole surface to be covered shall be free of dirt, sharp points and preheated to remove moisture. Primer shall be applied over the entire area to be covered and let dry (5-15 minutes).

Wrap shall be cut twelve (12) inches longer than the exterior circumference of the manhole, or as recommended by manufacturer. The wrap shall extend six (6) inches above and below each joint and

the wrap at the cone section and casting shall be a minimum of eighteen (18) inches wide.

Place wrap around the manhole and position the self-adhering closure seal at the overlap. Heat the overlap area and pat down with a gloved hand to ensure bonding. Then continue heating until the entire wrap has

recovered. Smooth out the wrinkles and allow the adhesive to set by quenching with water or allowing to air cool prior to backfilling.

b. Adjustment rings and manhole joints above the surface of the ground shall be covered with an adhesive wrap of elastomeric and/or rubber materials (minimum thickness 0.065 inches) as approved by the engineer. The wrap shall overlap the joint between the bottom of the casting and the upper adjustment ring and be continuous to the joint between the lower ring and manhole. The minimum overlap of a manhole joint shall be six (6) inches. The minimum overlap at each casting shall be one (1) inch. The surface of the adjustment rings and all manhole joints shall be primed in accordance with the manufacturer's recommendations

2. Internal Joint Sealing Systems:

Adjustment rings may be sealed with a barrier seal similar to I/I Barrier manufactured by Strike Products (31785 64th Ave, Cannon Falls, MN 55009). Installation shall be in accordance with the manufacturer's recommendation, including the omission on sealant between the I/I Barrier and the bottom adjustment ring.

O. ***Connections to Manhole: All pipe connections to manholes shall be made with flexible gaskets in compliance with paragraph 2510.3.10. and installed as required by the manufacturer.***

2510.7 Manhole Backfilling: Manhole backfilling shall be governed by Section 2507.

2510.8 Restoration: Restoration shall be governed by Section 2508. **2510.9 Manhole**

Testing:

A. **Scope:** This section governs the required testing of manholes and structures not otherwise set forth.

B. **General**: ***All manholes shall be tested for infiltration and inflow.***
C. **Infiltration and Inflow Testing**: ***All manholes shall be vacuum tested in the presence of the Engineer.***

1. Each manhole shall be tested after backfilling to, at least the level of the bottom adjustment ring.

2. The vacuum test shall include testing of the seal between the cast iron frame and the concrete cone, slab or top adjustment ring.

3. All pipes entering the manhole shall be plugged at least eight inches into the sewer pipe. The plug must be inflated at a location beyond the manhole/pipe gasket.

4. All plugs shall be adequately braced to prevent the plug or pipe from being dislodged and drawn into the manhole.

5. A vacuum of at least ten and one-half inches of mercury shall be drawn on the manhole. Shute the valve on the vacuum line to the manhole and disconnect the vacuum line. Open the vacuum line valve and adjust the vacuum to ten inches of mercury.

6. The pressure gage shall be liquid filled having a 3.5-inch diameter face with a reading from zero to thirty inches of mercury. The test equipment shall be capable of having two gages connected. The gage supplied with the test equipment shall match the reading of a gage furnished by the Public Works Department. The gage reading is to be verified on each project.

7. The time for the vacuum reading to drop from ten inches of mercury to nine inches of mercury must be equal to or greater than the following values for the manhole to be considered as passing the vacuum test:

Manhole Depth	*Time (minutes)*
10 feet or less	*2*
10.1 to 15 feet	*2.5*
15.1 to 25 feet	*3*

8. If a manhole fails the vacuum test the manhole shall be uncovered and the leak repaired by patching the exterior of the manhole. The manhole shall then be backfilled and re-tested

9. The vacuum testing of manholes shall be done prior to air testing the sewer lines that enter or exit the manhole.

SECTION 2511 MEASUREMENT AND PAYMENT

2511.1Measurement: The quantities of completed work will be measured in the following units. ***All quantities shall be field measured unless otherwise specified.***

A. **Pipe**:

1. Open Trenched: Measurement of various size, type of depth of pipe will be to the nearest 0.1 foot for each line between structures and made to the inside face of

the connecting structure.

2. Tunneled, Bored or Jacked: Measurement will be to the nearest 0.1 foot for the limits of tunneling, boring or jacking as shown on the plan.

3. Embedment or Encasement :Concrete embedment or encasement will be measured by the lineal foot of each size and type.

4. Manhole: Measurement will be made for the applicable type, size and depth of manhole as listed in the proposal The depth shall be determined by measuring from the top of the casting to the outlet pipe flow line to the nearest 0.1 foot where applicable.

5. Seeding: Measurement will be made in accordance with Section 2403.

6. Sodding: Measurement will be made in accordance with Section 2403.

7. Pavement and Curbing: Measurement will be made in accordance with Section 2210.

8. Driveways and Sidewalks: Measurement will be made in accordance with Section 2310.

2511.2 Payment: Payment will be made at the respective unit or lump-sum price listed in the proposal and shall be full compensation for all labor, materials, and equipment necessary to complete the respective unit in place. There will be no separate measurement or payment for any item of work not specifically identified and listed in the proposal, and all such work shall be considered a subsidiary item with all costs pertaining thereto included in the prices for other items listed in the proposal. At the Engineer's option, partial payment may be made for any lump sum item listed in the proposal, providing that the Contractor is diligently and satisfactorily pursuing full completion of such partially complete item in accordance with the approved job progress schedule

Engineer. All extra material resulting from paving, miscellaneous resurfacing, small area paving, and spot patching shall be confined to the impervious surface of the street R-O-W and removed within 24 hours. Cleanup activities before and after paving, miscellaneous resurfacing, small area paving, and spot patching shall also be confined to impervious surface of the street R-O-W and removed within 24 hours. No debris, including tree branches, shall be placed or remain in "grass" areas, sidewalks, or interfere with ingress/egress of abutting properties. ***All debris generated from performance of execution of this contract shall be confined to the immediate work area; i.e. no more than one (1) block away***.

In regard to 01300 Item C, if clean-up is not complete within 24 hours, the time beyond 24 hours will be added to other penalties accrued, with a minimum of one (1) day added.

Q. Asphaltic Cement Price Index:

This is the method of price adjustment for asphalt concrete materials (covered in this section) used on the Project. Adjustments will be made to the unit prices used to determine payments due the Contractor for any asphalt concrete base or asphalt concrete surface when the monthly average price for the asphalt cement used for the asphalt base or surface has fluctuated from the price determined on the month the project was bid. Adjustment calculations are based on PG64-22, but will apply equally to all grades of asphaltic cement. The calendar month price for the Kansas City metropolitan area shall be obtained from the following:

The monthly average price for the midpoint of the published prices of PG64-22 will be taken from the "Asphalt Weekly Monitor"® Kansas City, Missouri area and St. Louis, Missouri area, published by Poten & Partners Inc. The monthly base price will be the price from the last published "Asphalt Weekly Monitor"® prior to MoDOT's monthly bid opening. This price will be published at http://www.modot.mo.gov/ business/contractor resources/bidOpenIndex.shtml, and will be the price used for asphalt bidding and/or placement during the month following the published price.

1. The price adjustment will be applied to the percent of asphalt binder used in the mix design(s) of the asphaltic concrete approved for the project. The amount of asphalt shall be based on the percentage total of virgin asphalt binder contained in the design mix. The effective asphalt content obtained from the use of recycled asphaltic concrete pavement (RAP) will not be eligible for adjustment. **Asphalt index adjustment will not be applied to work completed under a time-materials basis.**

2. To determine the adjustment for any material specified in this provision the following formula will be used.

   A = (B x C) x (D-E)

   Where: A = Adjustment for mix placed during monthly average index period.
   B = Tons of Mix Placed during the monthly average index period
   C = % total of virgin asphalt binder as listed in the job mix formula in use
   D = Monthly average price at time of mix placement
   E = Monthly average price at time of bid

3. The Engineer will make adjustment payments (or deductions) for the applicable work completed. If the working days or calendar completion date expire, payments (or deductions) will continue to be applied, but the adjustment will be based on the index for the month the project working days or calendar completion date expired or the monthly average price at time of mix placement, whichever is lower.

R. Payment: Payment will be made at the applicable contract price **per ton** for:

(1) Asphaltic Concrete surface, In-place RC Type 5-01
(2) Miscellaneous Overlay, in place-RC Type 5-01
(3) Small Area Paving, RC Type 5-01
(4) Asphaltic Concrete Base in Place - RC Type 2-01R (Non-indexed)
(5) Asphaltic Concrete Surface over Base - RC Type 5-01 (Non-indexed)

Such payment and price shall constitute full compensation for cleaning and tacking of the underlying course, for furnishing all labor, equipment and materials and for the performance of all work necessary to complete the item.

The following pay scale will be utilized for all mix that does not meet the specifications. If test results for true binder grade fall between either 56°C to 64°C on the high side, or between -18°C to -22°C on the low side, the percent of bid price paid will be the lower percentage; i.e. 64-19 =90%, 63-20 =95%, 58-22=90%. All other grades will be rejected; i.e. remove and replace at the contractor's expense:

True Binder Grade	**Percent of bid price paid**
64^{+}-22^{+}	**100% (must meet or exceed both)**
60^{+}-20^{+}	**95% (must meet or exceed both)**
56^{+}-18^{+}	**90% (must meet or exceed both)**

Such payment and price shall constitute full compensation for cleaning and tacking of the underlying course, for furnishing all labor, equipment and materials and for the performance of all work necessary to complete the item.

Reconciliation of tonnage between OWNER and CONTRACTOR shall occur daily.

Tickets shall be furnished to the City, as described in 01010 Summary of Work. by the resurfacing crew foreman or his appointee. Furthermore, it is the joint responsibility of the foreman and the inspector to reconcile the load tickets at the end of each day. ***Any irregularities shall be reported to supervisory staff.***

DIVISION II
CONSTRUCTION AND MATERIAL
SPECIFICATIONS SEWERS

SECTION 2600 STORM SEWERS

APPROVED AND ADOPTED THIS 17th DAY OF APRIL, 1996

KANSAS CITY METROPOLITAN CHAPTER
OF THE AMERICAN PUBLIC WORKS ASSOCIATION

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RESOLUTION

Be it resolved by the Director of Public Works of Kansas City, Missouri that the following listed Section of Division II, Construction and Materials Specifications, approved and adopted April 17th, 1996 by the Kansas City Metropolitan Chapter of the American Public Works Association is approved and adopted as Official Standard Construction and Materials Specifications for the Department of Public Works of Kansas City, Missouri with like section and page numbers, except as modified by the replacement pages of the April 1999 KCMO Supplement, the April 2000 KCMO Supplement, June 2008 KCMO Supplement and hereby further modified by the replacement pages of the attached supplement.

Section 2600 Construction and Material Specifications for Storm Sewers

A copy of said specifications criteria and supplement are attached hereto and incorporated herein by reference.

The criteria shall become effective June 1, 2009 and shall supersede, in whole page format, all previously adopted Standard Specifications having the same section and page numbers as this supplement replaces. The previously adopted KCMO Supplement pages that are not replaced by the attached specifications criteria and supplement shall remain in effect.

Approved and adopted as Official Document No. CS100004
This 12th day of May, 2009.

Stan Harris, P.E.
Director of Public Works
of Kansas City, Missouri

KCMO Supplement

Document No.

CITY OF KANSAS CITY, MISSOURI

SUPPLEMENT TO
APWA STANDARD SPECIFICATIONS AND DESIGN CRITERIA SECTION 2600

This is the Kansas City, Missouri Supplement to Section 2600 of the American Public Works Association, Standard Specifications and Design Criteria. The following pages are approved and adopted as replacement pages to the sections and paragraphs of the Kansas City Metropolitan Chapter's APWA, Standard Specifications and Design Criteria (Metro Chapter Standards) that were adopted by the Chapter on April 17th, 1996. The deletions and additions in the following replacement pages that partially revise and supplement the April 1996 Metro Chapter Standards, the April 1999 KCMO Supplement, and the April 2000 KCMO Supplement become a part of Section 2600 for use within Kansas City, Missouri.

Text that supplements the Metro Chapter Standards text is identified by ***bold italic*** font. Text that is found in the Metro Chapter Standards text and that does not appear in the following replacement pages, is deleted and not adopted. The City of Kansas City, Missouri, Department of Public Works supplement replacement pages are identified in the bottom-left margin by "***KCMO*** *(Adoption-Month Adoption-Year)*" and/or by light-blue stock. The supplement replacement pages are numbered and sectioned so as to follow in sequence with the Metro Chapter Standards.

DIVISION II
CONSTRUCTION AND MATERIALS
SPECIFICATIONS SEWERS

SECTION 2600 STORM SEWERS

SECTION 2601 GENERAL

2601.1 Description: Storm sewer construction shall consist of furnishing all labor, materials, and equipment necessary for the complete installation of storm sewers and appurtenances in accordance with the Standard Drawings, Contract Drawings, General and/or Supplemental Conditions, specifications and standards referenced herein, and these specifications. Unless otherwise noted within these specifications, the word "sewers" shall refer to pipe sewers, box culvert sewers, or open channels.

2601.2 Definitions: The term "Engineer" whenever referred to in these specifications shall mean the representative of the Governing Agency authorized to determine compliance of the Contractor's work with the requirements of the specifications as defined in the General and/or Supplemental Conditions.

2601.3 Specification Modification: It is understood that throughout this section these specifications may be modified or deleted by appropriate items in the Special Provisions or notes on the Contract Drawings.

2601.4 Revisions of Standards: When reference is made to a standard specification (ASTM, AWWA, MCIB, and other technical associations), the specification referred to shall be understood to mean the latest revision of said specification as amended at the time of the Notice to Bidders, except as noted on the Contract Drawings or as provided for in the Special Provisions.

2601.5 Applicable APWA Standards: Work incidental to construction of storm sewers shall be performed in accordance with the following APWA Standard Specifications:

Section 2100 Grading and Site Preparation.

Section 2200 Paving and Curbs.

Section 2306 Maintenance of Traffic.

Section 2400 Seeding and Sodding.

2601.6Cleanup: Cleanup shall follow the work progressively. The Contractor shall remove from the project sit all rubbish, equipment, tools, surplus or discarded materials, and temporary construction items.

Streets to be opened to local traffic at the end of the day's operation shall be cleaned of dirt or mud. All equipment and material stockpiles shall be secured for safe passage of vehicles and pedestrians.

Payment, as described in Section 2606, will be made for completed units of work. A completed unit of work included the cleanup and all the other work necessary to complete the unit for payment.

SECTION 2602 PIPE SEWER CONSTRUCTION

2602.1 Scope: This section governs the construction of pipe storm sewers and appurtenances at the location and to the lines and grades indicated on the Contract Drawings. ***Manning's "n" information for the different pipe materials is available in table 5603-1.***

2602.2 Materials:

A. Reinforced Concrete Pipe:

1. **Pipe:** Reinforced concrete pipe shall conform to the following ASTM Standards and be of the minimum strength designated herein or such higher

strength as may be required by the Contract Drawings or Special Provisions:

a. Round Pipe: ASTM C 76, Class III, Wall B.

b. Elliptical Pipe: ASTM C 507, Class HE-III.

c. Arch Culvert Pipe: ASTM C 506, Class A-III.

2. Joints:

a. Flexible Gasket: Flexible gaskets may be either flat gaskets cemented to the pipe tongue or spigot, O-ring gaskets, or roll-on gaskets. All gaskets shall conform to ASTM C 443.

KCMO 26-2 *(2008)*

2602.2.A.2.c 2602.2.B

B. Corrugated Steel Pipe:

1. Pipe and coupling bands shall conform to the requirements of the following table:

MATERIAL SPECIFICATION (AASHTO)
Aluminum Coated Coils M36 & M274

Circular Culvert Pipe
(2-2/3" x 1/2" corrugations)

Under Roadways or In
Street Right-of-Way Under Railroads Not Under Railroads

Minimum Minimum Minimum Diameter Thickness
Diameter Thickness Diameter Thickness

12-21" .064" 12-18" .079" 12-30" .064" 24-30" .079" 21-24" .109"
36-54" .079" 36-54" .109" 30-36" .138" 60-84" .109" 60-72" .138"
42-84" .168"
84" .168"

2602.2 B 2602.2 B

Circular Culvert Pipe
(3" x 1" and 5" x 1" corrugations)

Under roadways or In Street Right-of-Way		**Not Under Roadways**	
	Minimum Diameter	**Minimum Thickness**	
36-54"	.079"	36-54"	.064"
60-84"	.109"	60-84"	.079"

Circular Culvert Pipe
(¾" X ¾" X 7½" spiral rib)

Under Roadways or in Street Right-of-Way		***Not Under Roadways***	
	Minimum Diameter	***Minimum Thickness***	
12" – 24"	***.064"***	***12" – 42"***	***.064"***
30" – 42"	***.079"***	***48" – 60"***	***.079"***
48" – 66"	***.109"***	***66" – 84"***	***.109"***
72" – 84"	***.138"***		

Arch Culvert Pipe
(2-2/3" x 1/2" corrugations)

Equivalent Minimum Diameter	**Thickness**	**Span***	**Rise***
15"	.064"	17"	13"
18"	.064"	21"	15"
21"	.064"	24"	18"
24"	.079"	28"	20"
30"	.079"	35"	24"
36"	.109"	42"	29"
42"	.109"	49"	33"
48"	.109"	57"	38"
54"	.109"	64"	43"
60"	.138"	71"	47"

*Subject to manufacturing tolerances.

Arch Culvert Pipes
(3" x 1" corrugations)

Diameter	Thickness	Equivalent Minimum Span*	Rise*
36"	.064	40	31
42"	.064	46	36
48"	.064	53	41
54	.079	60	46
60	.079	66	51
66	.079	73	55
72	.079	81	59
78	.109	87	63
84	.109	95	67
90	.109	103	71

* Subject to manufacturing tolerances.

Arch Culvert Pipes
(¾" X ¾" X 7½" spiral rib)

Diameter	*Thickness*	*Equivalent Minimum Span**	*Rise**
18"	*.064"*	*20"*	*16"*
21"	*.064"*	*23"*	*19"*
24"	*.064"*	*27"*	*21"*
30"	*.079"*	*33"*	*26"*
36"	*.079"*	*40"*	*31"*
42"	*.079"*	*46"*	*36"*
48"	*.109"*	*53"*	*41"*
54"	*.109"*	*60"*	*46"*
60"	*.109"*	*66"*	*51"*
66"	*.109"*	*73"*	*55"*

**** Subject to manufacturing tolerances.***

All helical pipe shall have circumferential recorrugated ends with a minimum of 4 recorrugations on each ***end***. ***The maximum cover depth shall be 30 feet.***

2. Joints: All pipes shall be joined using one of the following methods.

a. Fully Corrugated Hugger Band with Flat Gasket: Coupling bands shall be corrugated for the entire width and constructed of the same gauge and material as the pipe. The dimensions of the band and gasket shall meet the manufacturer's recommendations for the size of pipe being used. A 12 inch wide, 3/8inch thick, one piece, flat gasket shall be centered on the pipe joint before the band is installed. When installed, the band corrugations shall line up the with the pipe end corrugations. The gasket shall be closed cell neoprene meeting ASTM D-1056 grade 2C3 requirements.

b. Hugger Band with O-Ring Gaskets: Coupling bands shall have one annular corrugation on each end and be constructed of the same gauge and material as the pipe. The dimensions of the band and gaskets shall meet the manufacturer's recommendations for the size of pipe being used. One o-ring gasket shall be placed in the first annular corrugation on each side of the pipe joint before the band is installed. The band corrugations shall line up with the second annular corrugation on each pipe end. The o-ring gaskets shall meet the requirements of section 6.9 of ASTM C361.

C. Vitrified Clay Pipe: Vitrified clay pipe shall be extra strength vitrified clay pipe and shall conform to ASTM C 700. Compression joints for vitrified clay pipe and fittings shall conform to ASTM C 425. ***Vitrified clay pipe is only to be used for replacing in kind.***

D. Ductile Iron Pipe: Ductile iron pipe shall conform to ANSI/AWWA C151/A21.51 and shall be furnished with standardized mechanical or push on joints conforming to ANSI/AWWA C1 11/A21.11 Minimum wall thickness

shall be Class ***50***.

E. High Density Polyethylene Pipe: ***High density polyethylene (HDPE) pipe and fittings shall conform to ASTM F2306 with annual 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.***

a. Marterials: Virgin 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%.

b. Joints: 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.

F. Type PSM polyvinyl chloride (PVC) Pipe and Fittings (excluding end sections): *Pipe and fittings shall conform to ASTM D2241 except as otherwise specified herein.*

a. ***General:*** *Furnish maximum pipe lengths normally produced by the manufacturer except for fittings, closures and specials.*

b. ***Materials:*** *The pipe shall be made of PVC plastic having a cell classification of 12454 B or 12454 C or 13364 B as defined in ASTM D 1784.*

c. ***Design:*** *Pipe shall have an integral bell and spigot joint. Wall thickness shall conform to SDR 21 for ASTM D 2241 pipe. The maximum cover depth shall be 30 feet.*

d. ***Joints:*** *Joint tightness shall conform to ASTM D 3212. Joints shall be push-on type only with the bell-end grooved to receive a gasket. Elastomeric seal (gasket) shall have a basic polymer of synthetic rubber conforming to ASTM F477. Natural rubber gaskets will not be used.*

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2602.2.G 2602.2.G

G. Type Polyvinyl Chloride (PVC) Corrugated Pipe with a Smooth Interior: ***Pipe and fittings shall conform to ASTM F949 except as otherwise specified herein.***

a. General: Furnish 12" – 36" diameter pipe in maximum pipe lengths (13' or 20' sticks) normally produced by the manufacturer except for fittings, closures, and specials.

b. Materials: The pipe shall be made of PVC plastic having a cell classification of 12454 as defined in ASTM D1784.

c. Design: Pipe shall have an integral bell and spigot joint. Pipe shall be manufactured to 46 psi stiffness when tested in accordance with ASTM D2412.

d. Joints: Joint tightness shall conform to ASTM D3212. All joints shall be made with integrally-formed bell and spigot gasketed connections. Elastomeric seals (gaskets) shall meet the requirements of ASTM Designation F477.

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2602.2.H 2602.2.I.2.a.1

H. Granular Bedding Material: Granular bedding material shall be crushed *clean limestone aggregate meeting one of the following gradations:*

Bedding Material Gradation Limits, % Passing

Sieve Size	*3/4”*	*1/2”*	*3/8”*
1”	*100*		
3/4”	*90-100*	*100*	
1/2”	*80-100*		
3/8	*20-55*	*40-70*	*100*
No. 4	*0-10*	*0-15*	*30-40*
No. 8	*0-5*	*0-5*	*0-4*

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.

I. 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.*

2602.2.I.2.a.2 2602.2.I.3

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 200 psi and 75 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.

3. Mixture Design:

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.

The CLSM shall be composed of the proportions as hereinafter provided, or an acceptable mix as approved by the Engineer.

Design Mix	Type A	Type B	Type C
Type 1 Cement	***150 lbs.***	***50 lbs.***	***0 lbs.***
Water	***460 (55 gal.)***	***500 (60 gal.)***	***542 (65 gal.)***
Sand	***3085 lbs.***	***2817 lbs.***	***2649 lbs.***
Class C Fly Ash	***0 lb.***	***250 lbs.***	***350 lbs.***

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.

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2602.3 Construction Details:

A. Trench Excavation: Prior to excavation of the sewer 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 sewer 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 2602.3.C*. 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 2102.5 entitled "Undergrading."

7. **Protection of Property:** The Contractor shall satisfactorily shore, support, and protect any and all structures and all pipes, sewers, drains, conduits, and other facilities, and shall be responsible for any damage resulting thereto. The Contractor shall not be entitled to any damages or extra pay on account of any postponement, interference, or delay caused by any such structures and facilities being on the line of work, whether or not they are shown on the Contract Drawings; specifically, but not limited to, damage due to delay in utility relocation.

B. Laying and Jointing:

1. **Handling and Protection:** All pipe shall be protected during installation against shock and free fall, and be installed without cracking, chipping, breaking, bending, or damage to coating materials. Damaged pipe materials shall be replaced with new materials except as may be permitted by the Engineer.

2. **Grade Control:** Maximum deviation from indicated alignment of any pipe after installation and backfilling shall not be greater than 0.1 foot. All pipe shall have a continuous slope free from depressions that will not drain. The Contractor shall establish such grade control devices as are necessary to maintain the above tolerances.

3. **Laying:** The laying of pipe in finished trenches shall commence at the lowest point, and pipe shall be installed with the bell end forward or upgrade. All pipe shall be laid with ends abutting and true to line and grade. Pipe shall be carefully centered to form a sewer with a uniform invert.

4. **Bedding:** The class of bedding required shall be as indicated on the Contract Drawings or standard details except that as a minimum the bedding shall be granular bedding material placed to the requirements of Section 2602.3.C. Bedding shall be rodded, spaded, and consolidated as necessary to provide firm uniform support for the pipe, and not subject pipe to settlement or displacement.

5. Jointing: Preparatory to making *filled, bonded, and watertight sealed* pipe joints, all surfaces of the portions of the pipe to be jointed shall be clean and dry. Lubricants, primers, adhesives, and other substances that are used shall be compatible with the jointing material recommended or specified.

Other than for trimming sewer pipe to be flush with the inside walls of storm sewer structures, no pipes may be trimmed unless ordered by the Engineer. Pipes having defects that do not cause their rejection shall be so laid as to place these defects where they will be of least consequence.

Trenches shall be kept water-free and as dry as possible during bedding, laying, and jointing, and for as long a period as required to protect the pipe joints and concrete in structures.

As soon as possible after the joint is made, sufficient bedding material shall be placed alongside each side of the pipe to offset conditions that might tend to move the pipe off line and grade.

a. Concrete Pipe Flexible Gaskets: Flat gaskets may be cemented to the pipe tongue or spigot. O-ring gaskets shall be recessed in a groove on the tongue or spigot and confined by the bell or groove after the joint is completed. Roll-on gaskets shall be placed around the tongue or spigot and rolled into position as the joint is assembled. Flat gaskets and O-ring gaskets shall be lubricated as recommended by the manufacturer.

i. Flat gasket: *Flat flexible gaskets shall conform to ASTM C 443. If there is no recess provided for the gasket, the surface of the tongue shall be cleaned and rubber adhesive applied. Using quick-drying adhesive, gaskets may be applied ahead of the laying operation or in the plant.*

ii. O-ring gasket: *O-ring or roll-on flexible gaskets shall conform to ASTM C 361, Section 4.10. The entire surface of the bell that comes in contact with the rubber gasket shall be well lubricated with a soap lubricant. The entire gasket shall be greased with soap. Only the soap lubricant supplied by the pipe manufacturer shall be used. Adhesive type cements shall not be used.*

b. Corrugated Steel Pipe: Corrugated steel pipe shall be assembled and installed in accordance with the manufacturer's instructions and in

conformance with the latest edition of Section 26, entitled "Metal Culverts," Division II, AASHTO Standard Specifications for Highway Bridges. In case of a discrepancy between this specification and AASHTO Section 26 or the manufacturer's instructions, this specification shall govern.

Canvas or nylon slings (or something comparable that will not damage the pipe coating, i.e., appropriate lifting lugs) shall be used for all pipe handling. Pipe shall not be rolled or dragged over gravel or rock and shall be prevented from striking rock or other hard objects during placement in trench or on bedding.

Corrugated steel pipe shall be placed on the bedding material starting at the downstream end. Pipes with circumferential seams shall be installed with their inside circumferential sheet laps pointing downstream.

Gaskets shall be furnished in accordance with *these specifications,* Contract Drawings and Special Provisions.

In addition to this and prior to acceptance, the culvert shall be free of any dents greater than ½ inch and shall pass a deformation test. This test shall be performed by the Contractor to ensure that the geometric inner specified dimensions of the entire culvert are not deformed by more than 5%. Any part of the culvert that does not meet these requirements shall be replaced or repaired by the Contractor at no additional cost to the City.

Corrugated steel pipe shall not be placed under arterial streets as defined in section 5202.

Corrugated steel pipe 60" or larger placed under collector streets shall not be placed in more than 6' of fill. Collector streets are defined in section 5202.

Corrugated steel pipe shall not be placed in permanent dams. A dam is defined in 5603.3.

For pipe sizes 48 inches and larger, during pipe installation, including placement and consolidation of the rock bedding and backfill to a point 4 feet above the top of the pipe, full time inspection shall be provided by a qualified inspector working under the supervision of a professional engineer. After installation and prior to acceptance, certification by a Missouri Registered Professional Engineer is required and shall state that the installation and backfill conforms to the pipe manufacturers recommendations and the Standard Specifications and Design Criteria

of the City of Kansas City, Missouri. Cost of this inspection and certification shall be borne by the Contractor.

During construction of the project in areas subjected to heavy construction equipment traffic, pipe sizes 12 - 42 shall have a minimum cover of 3 feet, and pipe sizes 48 -120 shall have a minimum cover of 4 feet. Full time inspection for this fill shall be provided by a qualified inspector working under the supervision of a professional engineer who is registered in the State of Missouri. Certification shall be provided as explained in the previous paragraph.

c. HDPE Pipe: HDPE pipe shall be assembled and installed in accordance with the manufacturer's instructions. For pipe sizes 48 inches and larger, during pipe installation, including placement and consolidation of the rock bedding and backfill to a point 4 feet above the top of the pipe, full time inspection shall be provided by a qualified inspector working under the supervision of a professional engineer. After installation and prior to acceptance, certification by a Missouri Registered Professional Engineer is required and shall state that the installation and backfill conforms to the pipe manufacturers recommendations and the Standard Specifications and Design Criteria of the City of Kansas City, Missouri. Cost of this inspection and certification shall be borne by the Contractor.

During construction of the project in areas subjected to heavy construction equipment traffic, pipe sizes 12 - 42 shall have a minimum cover of 3 feet, and pipe sizes 48 -120 shall have a minimum cover of 4 feet. Full time inspection for this fill shall be provided by a qualified inspector working under the supervision of a professional engineer who is registered in the State of Missouri. Certification shall be provided as explained in the previous paragraph.

2602.3.B.5.d 2602.3.B.5.e

d. Structure Connections: Pipes connected to structures shall be cut parallel with the inside face of the structures. Projection of the pipe beyond the inside face shall not exceed 1 inch (measured at the springline for structures having curved walls.)

e. Polyvinyl Chloride (PVC) Corrugated Pipe with a Smooth Interior: Pipe shall be assembled and installed in accordance with the manufacturer's instructions, AASHTO Section 30, and AASHTO Section 12.

During construction of the project in areas subjected to heavy construction equipment traffic, all pipe shall have a minimum cover of 3 feet. Full time inspection for this fill shall be provided by a

qualified inspector working under the supervision of a professional engineer who is registered in the State of Missouri. Certification shall be provided as explained in section 2602.3.B.5.c.

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2602.3.C 2602.3.C **C. 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 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.

1. Backfilling under street and alley pavements where heavy compaction equipment is utilized.

Backfilling shall be placed as shown in ***Figure 1***.

PAVEMENT

D

W C

12” B

MINIMUM

H

H

2 A

2” IN EARTH (MINIMUM) 6” IN ROCK (MINIMUM)

ALL CULVERT TYPES

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

(Sewer Lines Using Earth Compaction Equipment)

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2602.3.C.2 2603.2.C.2

2. The following cross-sectional view of typical storm sewer trench construction under street and alley pavements, Figure 2, shall apply to all storm sewer backfill areas where trenches are not widened to allow heavy roadway compaction equipment.:

Backfilling shall be placed as shown in ***Figure 2***.

PAVED AREA

C

12 MINIMUM,
NO MAXIMUM

B

H

SPRINGLINE

H
2

A

ALL CULVERT TYPES

2 IN EARTH (MINIMUM)
6 IN ROCK (MINIMUM)

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)

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2602.3.C.3 2602.3.C.3

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.***

SOIL COVER, OR PAVEMENT

D

H

2

12 C
MAXIMUM

B

SPRINGLINE

A

ALL CULVERT TYPES

2" IN EARTH (MINIMUM) 6" IN ROCK (MINIMUM)

H

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**,** *except in the Central Business District, as defined in section 2209.2, where untreated compacted aggregate shall not be used. 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)

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SECTION 2603 BORING AND JACKING

2603.1 Scope: This section governs construction of steel casings, complete with bulkheads and sand fill, by boring and/or jacking at the locations and to the line and grades indicated on the Contract Drawings, or where constructed at the Contractor's option, when approved, to bypass obstructions without open cutting.

2603.2 Materials:

A. Steel Casing:

1. Steel casing for bored or jacked construction shall conform to ASTM A 139.

2. Steel shall be grade B under railroads and grade A for all other uses.

3. Minimum wall thickness for steel casing shall be in accordance with the following table:

Diameter of Casing	Under Railroads	All Other Uses
24	0.406	0.281
26	0.438	0.281
28	0.469	0.312
30	0.469	0.312
32	0.500	0.312
34	0.500	0.312
36	0.500	0.344

4. Casing joints shall be welded by a certified welder in accordance with ANSI/AWWA C 206.

B. End Seals: End seals shall be brick conforming ***to*** Section 2604.2.F of these specifications. Mortar shall comply with Section 2604.2.G of these specifications.

C. Sand Fill: Sand fill shall comply with ASTM Designation C 33 or MCIB Section 1 Concrete Materials, Fine Aggregate. Moisture content of the sand shall not exceed 0.5%.

2603.3 Construction Details:

A. Boring and Jacking:

1. Prior to starting to work, complete details of the methods and the liner material to be used shall be submitted to the Engineer for approval.

2. The maximum allowable deviation from indicated alignment and grade shall be as follows except when altered by the Contract Drawings or Special Provisions:

a. Alignment.....1.0%

b. Grade.....1.0% **B.**

Casing Installation:

1. The steel casing shall be advanced in a continuous operation without interruption. Sections of the casing pipe shall be welded together to form a continuous conduit capable of resisting all stresses, including jacking stresses. the casing in its final position shall be within alignment and grade tolerances specified in Section 2603.3.A.2. There shall be no space between the earth and the outside of the casing. Any voids which do occur shall be filled by pressure grouting.

2. Boring operations shall be performed by experienced crews using a rotary type boring machine designed especially for this purpose. Boring shall be performed in a manner to prevent disturbing the overlying and adjacent materials.

3. Jacking:

a. Jacking frame, guides, blocking, head, and reaction devices shall be arranged to apply uniform pressure about the casing circumference without damage to the casing material, and to maintain alignment within specified tolerances.

b. Jacking reaction device shall provide adequate resistance to withstand 200 percent of the maximum jacking pressure.

c. Provide jacks of adequate number and size for the required jacking pressure; but not less than two jacks.

d. Maintain jacking pit and pipe installation in such condition that drainage does not accumulate. Control and disposition of surface and subsurface water at the site of jacking operations shall be the Contractor's responsibility.

e. Excavation at the heading shall not be extended more than 1 inch outside the top and sides (upper 300-degree sector) of the casing and shall be true to grade at the invert (lower 60-degree sector).

f. Once jacking begins, it shall proceed without interruption until installation of the entire length of the jacked casing is complete.

4. **Excavation in Jacked Casings:** Perform excavation within jacked casings by hand or machine methods as necessary to remove the materials encountered without disturbing the overlying material. The jacked casing shall be advanced a sufficient distance ahead of the excavation face and/or shield used as necessary to protect the workman and the work, and to prevent the uncontrolled entry of unstable materials into the casing.

5. **Unstable Materials:** If materials are encountered during casing installation that cannot be excavated safely or without creating voids around the exterior of the casing, the Contractor shall discontinue casing installation and stabilize such materials by dewatering, chemical soil stabilization, grouting, or other methods, and/or modify equipment and procedures as necessary to complete the casing installation.

C. Sewer Pipe Installation:

1. Pipe shall be placed inside the casing to the indicated line and grade by the use of wood skids or other equivalent methods. The wood shall be pressure treated with creosote, pentachlorophenol, or salt-type preservative in accordance with AWPA C2. Cut surfaces shall be given 2 heavy brush coats of the same preservative. The wood skids shall be securely fastened to the sewer pipe with steel straps.

2. End seals shall be constructed after the sewer pipe is installed and approved.

3. The annular space between the casing and sewer pipe shall be filled with sand blown-in so that all space is filled without disturbing the alignment and grade of the sewer pipe. *Flowable fill of mix design meeting Section 2602.3, Type A, B, or C may be substituted in lieu of sand fill.*

2604.1 Scope: This section governs the performance of all work necessary for construction of cast-in-place and precast concrete structures for inlets, manholes, junction boxes, box culverts, headwalls, and incidental structures. Masonry structures shall not be allowed under these Specifications.

2604.2 Materials:

A. **Concrete Mixes:** Concrete shall be MCIB Mix Number A564-3/4-4 or A543-1-4 at the Contractor's option; except concrete used for soil stabilization, pipe cradles, filling, leveling courses, and other similar purposes may be either MCIB Mix Number A440-3/4-4 or A473-1/2-4. *Using a mechanical mixer, concrete may be prepared on-site to construct inverts only for pre-cast structures having developed bases. Concrete may be either MCIB Mix Number 495-3/4-4 or 527-1/2-4 at the Contractor's option. A maximum of 7 gallons of water per sack of cement is in the design for both of these mixes.*

B. Concrete Materials:

1. Concrete materials shall conform to MCIB Section 1 Concrete Materials, except that total shale, coal, and lignite content shall not exceed 0.5 percent by weight, and clay content shall be zero.

2. Concrete shall conform to all requirements of MCIB and the compressive strength of each mixture shall be as designated therein.

C. Reinforcing Steel: Reinforcing bars shall conform to ASTM C 615, Grade 60. Welded steel wire fabric shall conform to ASTM A 185.

D. Precast Concrete Structures:

1. Manholes: Precast manholes shall conform to ASTM C 478. *Manholes are classified by their inside diameter dimension, and shall conform to the dimensions indicated on the Contract Drawings.*

2. End Sections: End sections for concrete pipe shall be flared end sections of the pipe manufacturer's standard design, and shall meet all applicable requirements of ASTM C 76 for Class II or higher classes of pipe.

3. Rectangular Structures: Rectangular structures shall conform to the dimensions indicated on the Contract Drawings and be designed for the following loads:

2604.2.D.3.a 2604.2.D.4.b ***KCMO*** *(2008)*26-20

a. H-20 live load for all structures in/or under pavement, shoulders, driveways, and other traffic areas.

b. 2,000-lb wheel live load for curb opening inlets and junction boxes in non-traffic areas.

c. 50-pcf equivalent fluid pressure for soil pressure on vertical walls.

d. 120 pcf for unit weight of soil cover on top slabs.

4. Joints: Joints between concrete structures shall be *filled* with plastic joint compound or preformed plastic compound *as stated herein.*

a. ***Barrel Sections:*** Minimum cross sectional area of preformed

compound between concrete *barrel* sections shall be 1 inch square or 1.25 inches diameter. *Minimum cross-sectional area of the preformed compound between the concrete adjustment ring and the cone barrel section shall be two beads of either 1 inch square or 1.25 inches in diameter.*

b. ***Manhole Adjustment Rings:*** *Rings shall be constructed of concrete, HDPE, or recycled rubber.*

If HDPE adjustment rings are used, they shall be injection molded-recycled HDPE - as manufactured by LADTECH, Inc. or approved equal. They shall be bolted to the manhole cone section and otherwise installed as per manufacture's recommendations.

If recycled rubber adjustment rings are used, they shall consist of no less than 80%, by weight, recycled rubber and no less than 10% by volume shredded fiber as manufactured by GNR Technologies or approved equal. They shall be installed as per manufacture's recommendations.

The top and bottom of all adjustment rings shall be sealed using a mastic filler meeting the requirements of 2510.3.11 or an epoxy paste. The epoxy paste shall be a two component, moisture insensitive, containing no solvents, and compableof bonding with all materials it is to be used on, like Epoxytec Micor C.P.P or approved equal . Minimum cross-sectional area of preformed compound between concrete adjustment rings shall be two beads of either 1 inch square or 1.25 inches in diameter.

c. Manhole Ring and Covers: *Minimum cross-sectional area of preformed compound between the djustment ring and the manhole casting shall be two beads of either 1 inch square or 1.25 inches in diameter.*

d. **Internal Manhole Chimney Frame Seal**: Internal frame seal shall consist of a flexible rubber sleeve, interlocking adjustment extension(s), and stainless steel compression bands. The flexible rubber sleeve and extension shall be extruded or molded from a high grade rubber compound conforming to the applicable requirements of ASTM C 923 with a minimum tensile strength of 1500 psi and minimum elongation at break of 350%. At a minimum, the compression bands shall be 16-gauge stainless steel conforming to ASTM A 240, Type 304, with a minimum width of one inch. Screws, nuts, and bolts shall be stainless steel conforming to ASTM F 593 and 594, Type 304. The compression bands shall have the capacity to tighten with enough pressure to make

a watertight seal around the rubber chimney sleeve.

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E. Air Entrainment: All concrete, *unless otherwise stated in* Section 2604.2.A *or 2602.2G*, shall be air entrained. Minimum strength requirements shall be as specified in Section 2604.2.B.2 above.

F. Manhole Castings:

1. Rings and Covers: Castings shall be gray iron conforming to ASTM A 48, Class 35B. Castings *of rings and covers* shall be of the shape, dimension, minimum weight, *and type as* indicated on *Standard Drawing "MH-RC (M),"* and be free from manufacturing defects. *All curb inlet castings shall have cam locks.* If requested by special order, castings shall be cleaned and painted with one coat of tar prior to delivery. Bearing surfaces between all rings and covers for installation in all areas shall be machined to provide even seating *and interchangeability of like pieces*.

All manhole rings and covers placed in paved areas or as directed by the Water Services Department Engineer shall be adjustable to meet any slope and grade of the roadway, from 0 to 17%, and shall be

able to be raised or lowered in ¼ inch increments, up to 2¾ inches. Ring height must be adjustable after installation without disturbing the surrounding pavement. The ring and lid shall be rated for H20 traffic. Cam lock covers shall not be placed in roadway pavement unless shown on the plans or directed by the engineer. All covers shall have provisions for opening, such as concealed pick holes.

2. Steps: *All steps shall comply with Section 2510.3.8.b(2) and the most recent Supplement to Section 2500. Cast iron steps shall not be used.*

G. Steel End Sections: Steel end sections shall be fabricated from galvanized *or aluminized* base metal as specified in Section 2602, and shall be flared end sections of the metal pipe manufacturer's standard design. End sections shall be furnished with a steel toe plate. Bituminous coating is not required.

H. Toe Walls: Flared end sections for concrete and steel pipe shall be set on a concrete toe wall centered on the end of the section. Toe walls shall be 8 inches thick by 24 inches deep by the width of the *bottom of the cut trench.*

Section 2604.3 Construction Details:

A. Concrete Structures: Concrete construction shall conform to the MCIB Standard Specifications.

1. Precast Structures: The Contractor may, at his option, construct precast concrete inlets, junction boxes, and box culverts, in lieu of the cast-in place structures indicated on the Contract Drawings; except that all concrete base slabs for pre-cast inlets, manholes, and junction boxes may be cast-in-place. Solid concrete brick or block shall be used to block inlets and similar structures to grade during placement of base slab concrete.

Precast concrete box culvert sections shall be installed on a 4-inch leveling course of untreated compacted aggregate conforming to Section 2202. Leveling courses shall extend 1 foot past the line of the box section, and be finished to a true plane surface to provide uniform bearing for the precast section.

2. **Finishing:** *Exposed edges of all slabs, walls, and other concrete structures shall be beveled 3/4 or edged with a 1 1/4 radial tool.*

a. Formed Surfaces: Immediately following removal of forms, fins and irregular projections shall be removed. Form tie connections, holes, honeycomb spots, and other defects shall be chipped to ensure the voided area is exposed, and shall be chipped back to solid material. These areas shall be thoroughly cleaned, saturated with water, and pointed with a grout approved by the Engineer. The repaired surfaces shall be cured in accordance with MCIB Specifications.

b. Exposed Slabs: Finish for exposed slabs shall be wood float texture in accordance with MCIB Specification.

2604.3.A.3 2604.3.C

3. Form Removal: Forms shall remain in place until the concrete has attained sufficient strength to support loads imposed by backfilling, construction, and traffic. *Within 24 hours of form removal, small holes and pockmarks of exposed walls shall be filled with Portland cement grout and rubbed smooth. Concrete voids and honeycombs shall be chipped open with a light hammer to expose weak areas for inspection. At the direction of the Engineer, expansive repair grout shall be used for partial*

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reconstruction of otherwise sound structures.

a. Walls: Forms shall remain in place until the concrete reaches a minimum strength of 2000 p.s.i.

b. Slabs: Forms shall remain in place until the concrete reaches a minimum strength of 3000 p.s.i.

4. Manhole Riser Adjustments: Manhole rings and covers shall be adjusted to match the slope and height, or grade, of pavements. In no case shall the surface pitch of the manhole ring and cover mismatch the pavement slope by more than ¼ inch. The difference in height between the top of manhole cover and the top of precast cone shall not exceed 24 inches.

a. In lieu of replacing concrete adjustment rings that are properly seated and structurally sound but have a small fracture, an external rubber chimney may be fitted to secure a watertight seal between the casting (manhole ring and cover) and the concrete cone barrel section.

B. Invert Channels: Form concrete invert channels in manholes, inlets, and junction boxes to make changes in direction of flow with smooth curves of as large a radius as permitted by the inside dimension of the structure. Grade changes and transitions shall be smooth and uniform, and all parts of the invert channel and adjacent floor shall slope to drain. Channel bottom shall be finished smooth without roughness or irregularity. Invert channels for precast concrete structures may be cast integrally with the structure base slabs at the Contractor's option.

C. Excavation: All excavation shall be done in conformance with Section 2102 entitled "Grading."

Excavation for structures shall be carried a sufficient distance, but not less than 18 inches outside the limits of the structure, to permit efficient erection and removal of forms and laying of masonry units, and shall be sloped, stepped, or braced as required for stability. Unsuitable soils encountered at the bearing elevation of the structure shall be removed and replaced with either fill concrete or compacted granular material at the Contractor's option. Over excavation shall be corrected in like manner. The Contractor shall maintain the excavation free of standing water until backfilling is complete.

D. Backfill of Structures: All excavations of structures, such as cast-in-place and precast concrete structures for inlets, manholes, junction boxes, box culverts, and headwalls, shall be backfilled with suitable material placed and compacted in conformance with section 2602.3.C of these specifications.

SUBGRADE, BEDDING, AND FILL - IN ACCORDANCE WITH 2602.3.C

(12 MIN) ***SUBGRADE***

SOIL COVER

4 WEEP HOLE

IN ACCORDANCE
WITH 2602.3.C

PC CONCRETE

Note: Weep hole shall be backed by filter fabric or hardware cloth, 3 cubic feet of granular material and.

FIGURE 4

(Structures Adjacent to Street Pavements)

KCMO *(2008)* 26-23.1

2604.3.D.1 2604.3.D.3.d

1. ***Street Right-of-Way Areas:*** *The trenched backfill areas around all storm sewer inlets, junction boxes, and manholes shall be backfilled with removable flowable-fill (CLSM) to a level flush with the bottom of pavement subgrade for paved areas or twelve-inches below finish grade for non-paved areas. In non-paved areas, the top twelve inches shall be consolidated soil; the top six inches shall be topsoil.*

   The external opening surfaces of weep holes shall be covered with hardware cloth and surrounded with a minimum of three cubic feet of consolidated granular bedding material. The configuration of materials properly placed shall be as shown in Figure 4.

2. ***Areas other than Street Right-of-Way:*** *The trenched backfill areas around all City-maintained storm sewer inlets, junction boxes, and manholes located within the pavements of private streets, driveways, and parking lots shall be backfilled as specified for the paved areas in Figure 4 and Section 2604.3.D.1 (above). City-maintained storm sewer structures that are located in non-paved areas shall be backfilled with removable CLSM, untreated compacted aggregate, consolidated granular bedding material, or compacted soil to a level twelve inches below finish grade. In non-paved areas, the top twelve inches shall be consolidated soil; the top six inches shall be topsoil.*

3. **Backfilling:** Backfilling shall conform to the requirements of Section 2602.3.C and as follows:

   a. No backfill shall be placed over or around any structure until the concrete or mortar therein has attained a minimum strength of 2000 p.s.i. and can sufficiently support the loads imposed by the backfill without damage.

   b. The Contractor shall use utmost care to avoid any wedging action between the

side of the excavation and the structure that would cause any movement *or floating* of the structure. Any damage caused by premature backfill or by the use of equipment on or near a structure will be the responsibility of the Contractor.

c. Backfill shall be placed and compacted on all sides of the structure simultaneously, and operations shall be so conducted that the backfill is always at approximately the same elevation on all sides of the structure.

d. No excavated rock larger than 4 inches maximum dimension shall be placed within 1 foot of the exterior surface of any structure.

2605 2605.1.B (THIS SPACE

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SECTION 2605 OPEN CHANNELS

2605.1 Scope: This section includes all work for construction of open channel lining at the location, and to the lines, grades, and dimensions indicated on the Contract Drawings. Grading shall have been previously completed in accordance with Section 2100, “Grading and Site Preparation.”

2605.1 Materials:

A. Concrete: Concrete shall be MCIB Mix Number A511-3/4-2. Reinforcing steel shall conform to ASTM A 615, Grade 60. Welded steel wire fabric shall conform to ASTM A 185.

B. Stone: Stone for riprap, grouted riprap, and gabion linings shall consist of quarried rock and be sound, durable, and angular in shape. No more than 10 percent shall have an elongation greater than 3:1, and no stone shall have an elongation greater than 4:1. Material shall be free from cracks, seams, or other defects. Shale and stone with shale seams are not acceptable.

1. The minimum unit weight of the stone shall be 155 pounds per cubic foot as computed by multiplying the specific gravity times 62.4 pounds per cubic foot.

2. Not more than 10 percent of the stone shall exhibit splitting, crumbling, or spalling when subject to 5 cycles of the sodium sulfate soundness test in accordance with ASTM C 88.

3. Riprap and Grouted Riprap: Stone shall be of the following gradations:

Riprap and grouted riprap shall have a minimum thickness of 15 inches, or 1.5 times as thick as the larger stones, whichever is greater. At least 60 percent of the mass shall be of pieces having a volume of one cubic foot or more and the pieces shall be well graded. No more than 6 percent of the stones shall weigh less than 10 pounds.

4. Gabion Fill Stone: Stone shall be of the following gradations:

U.S. Standard Square Mesh Sieve	**Percent Passing by Weight**
10	100
8	85 - 100
6	0 - 15
4	0 - 10
3	0

Stone shall be graded within the above limits as required to provide a unit weight in-place of 100 pounds per cubic foot or greater.

C. Filter Blanket: Filter blanket may be either of the following types at the Contractor's option.

1. Granular Filter: Granular filter material shall consist of sound durable rock particles conforming to the following gradation:

Cumulative Percent	**Sieve Size Passing By Weight**
1	100
½	70 - 100
No. 4	50 - 85
No. 10	35 - 70
No. 40	20 - 50
No. 100	15 - 40

2. Filter Fabric: Filter fabric shall consist of woven or nonwoven fabric. The synthetic fiber of either the woven or nonwoven fabric shall consist of polypropylene, nylon, or polyester filaments. The percent open area shall be not less than 4 percent nor more than 10 percent. The cloth shall provide an Equivalent Opening Size (EOS) no finer than the U.S. Standard Sieve No. 100. In addition, filter fabric shall meet the following physical requirements:

a. Tensile Strength: Minimum grab tensile strength, both warpwise and fillingwise, shall be 200 pounds when tested in accordance with ASTM D 5034, using a 4-inch by 6-inch specimen and a jaw speed of 12 inches per minute.

b. Elongation: Grab elongation shall be not less than 15 percent nor more than 60 percent, both warpwise and fillingwise, when tested in accordance with ASTM D 5034.

c. Tear Strength: Minimum trapezoid tear strength shall be 100 pounds, both warpwise and fillingwise. Method of test for woven fabrics shall be in accordance with ASTM D ***4533***.

d. Bursting Strength: Minimum bursting strength shall be 400 psi when tested in accordance with ASTM D 3887.

e. Seam Strength: Woven fabric shall have a minimum seam-breaking strength of 180 pounds when tested in accordance with ASTM D 1683, using a jaw speed of 12 inches per minute.

f. Width: Filter fabric shall be furnished in widths of not less than 6 feet.

D. Gabion Baskets: Baskets shall be of the dimensions indicated on the drawings and be fabricated using hexagonal triple-twist wire mesh.

1. Wire: Wire shall be galvanized steel having a minimum tensile strength of 60,000 psi, and shall be zinc coated in accordance with ASTM A 641 Class 3.

2. Wire Mesh: Maximum dimension of the mesh opening shall be 4-1/2 inches or less, and the maximum area of the mesh opening shall not exceed 12 square inches. Wire shall be 0.120-inch (minimum) diameter.

3. Selvedge Wire: Selvedge wire shall be 0.1535-inch (minimum) diameter. All perimeter edges so the joints formed by typing the selvedges have a strength equal to or greater than the body of the basket.

4. Lacing and Stay Wire: Wire shall be 0.0866-inch diameter or larger. Other connections methods, such as stainless steel clips, may be substituted with approval of the Engineer.

5. Diaphragms: Gabions shall be divided into cells not greater than 4 feet in width by wire mesh diaphragms. Diaphragms shall be factory secured to the base of the basket by continuous spiral wire.

6. PVC (Polyvinyl Chloride) Coating: Where in the Contract Drawings, all wire used in the fabrication of the baskets and in the wiring operations during construction shall, after zinc coating, have an extruded coating of PVC. The coating shall be gray in color ranging between series 26187 and 26293 or between series 26373 and 26375, semigloss, as per Federal Standard 595B. The PVC coating shall be a nominal thickness of 0.02165 inches and shall nowhere be less than 0.015 inches in thickness. The coating shall be resistant to the destructive effects of immersion in acidic, salt or polluted water, exposure to ultraviolet light, and abrasion and shall retain these characteristics after a period of not less than 3,000 hours under test in accordance with ASTM G-23.

E. Grout: Grout for grouted riprap shall be a sand/cement mixture containing 420 pounds of cement per cubic yard with 6 percent air entrainment. It shall have a consistency thin enough to permit thorough penetration of the grout into the joints and voids between the stones.

F. Sod: Sod shall conform to the requirements of *Section 2405.1*. 26-27

2605.2 G 2605.3 C.2..b

G. Seed: Seeding shall conform to the requirements of Section *2404.2*. *Mix #1* seed shall be used.

2605.3 Construction Details:

A. Foundation Preparation: After completion of grading in accordance with Section 2100, the area to receive channel lining shall be trimmed and dressed to conform o the cross sections indicated on the drawings within a tolerance of plus or minus 1 inch from the theoretical slope lines and grades. All deleterious materials shall be removed from the foundation area.

B. Concrete Lining:

1. **Preparation:** Subgrade shall be moistened by sprinkling. Forms shall be securely staked, braced, and set to line and grade. Reinforcement and tie bars shall be held in position by bar chairs, concrete brick, or other approved devices.

2. **Placing and Finishing:** Place, consolidate, and strike off concrete to the thickness indicated on the drawings. concrete shall be tamped or vibrated to eliminate all voids and bring sufficient mortar to the top for finishing. Surface finish shall be a wood-float finish. Round all edges and joints with a 1/4 inch radius edging tool, except contraction joints may be sawed to a depth of 30 percent of the thickness of the concrete lining after concrete has hardened but before uncontrolled cracking occurs. Apply curing membrane as specified in Section 2208.2.F.

C. Filter Blanket:

1. **Granular Filter:** Place granular filter to its full thickness in a single operation. Construction methods shall be such that the materials is placed without segregation. Compaction of granular filter material is not required.

2. **Filter Fabric:** Place filter fabric with its long dimension horizontal and lay free of tension, stress, folds, wrinkles, or creases.

   a. Place to provide 18 inches minimum overlap at each joint and anchor to prevent dislocation during construction of overlaying material.

   b. Fabric shall not be left exposed more than two weeks prior to placement of overlaying material. Tracked or wheeled equipment or vehicles shall not be operated on the fabric.

D. Riprap Placement: Riprap shall be placed on the prepared foundation in a manner which will provide a reasonably well-graded mass of stone with the minimum practicable percentage of voids. The entire mass of stone shall be placed so as to be in conformance with the lines, grades, and thickness indicated. A filter blanket of filter fabric conforming to Section 2605.2 C.2. shall be constructed under all riprap, grouted or ungrouted. Riprap shall be placed to full-course thickness in one operation and in such a manner as to avoid displacing the fabric. The Contractor shall place the riprap in such a way as to not tear, puncture, or shift the fabric. Riprap shall not be dropped more than 3 feet when being placed directly on the fabric. Tears or rips in the fabric shall be repaired with fabric lapped a minimum of 12 inches in all directions.

1. **Placing:** Placing of riprap in layers, or be dumping into chutes, or by similar methods likely to cause segregation will not be permitted.

2. **Distributing:** The larger stones shall be well distributed and the entire mass of stone shall conform to the specified gradation. All materials shell be so

placed and distributed that there will be no objectionable accumulations of either the larger or smaller sizes of stone.

3. Hand Placing: It is the intent of these specifications to produce a fairly compact riprap protection in which all sizes of material are placed in their proper proportions. Hand placing or rearranging of individual stones by mechanical equipment may be required to the extent necessary to secure the specified results.

E. Grouted Riprap: Riprap shall be placed in conformance with Section 2605.3.D (Riprap Placement). Grout shall be placed in such a manner to produce a securely bound solid mass with the voids completely filled.

After the voids have been completely filled, the surface shall be swept clean with a stiff bristle broom and water to expose the stone surface and natural color of the stone. Most stones should protrude 1 to 3 inches above the grout unless otherwise specified on the Contract Drawings.

The grout shall be cured by any of the methods specified for concrete sidewalks and driveways in Section 2301.5.C, except that transparent membrane shall be used in lieu of white pigmented membrane.

During cold weather, the limitations and protection requirements of concrete as specified in the most current MCIB Standard Concrete Specifications shall apply to the grouting.

A toewall shall be constructed at the upstream and downstream ends of all grouted riprap unless another permanent lining materials is constructed to co continue the channel. The toewall shall be constructed across the entire section and shall be a minimum of 18 inches deep below the bottom of the grouted riprap and 12 inches wide. The toewall material shall be grouted riprap.

F. Gabion Lining:

1. Assembly: Assemble each gabion unit be binding all vertical edges together with a continuous piece of connecting wire stitched around the vertical edge with coils spaced at 3 inches or less. Set empty units to line and grade and joining units by stitching with connecting wire along adjoining edges. Install and securely fasten internal tie wires in each cell if necessary to retain the shape of the cell during filling operations.

2. Filling: Fill gabion cells with stone carefully by hand or machine to provide a minimum of voids and avoid bulges and distortions of the gabion. After filling, secure the lid to the sides, ends, and diaphragm by stitching with connecting wire.

3. Filter Fabric/Gabion Unit Placement: A filter blanket of filter fabric

conforming to Section 2605.2.C.2 shall be constructed under all Gabion Linings. The Contractor shall place the gabions in such a way as to avoid tearing, puncturing, or shifting the fabric. Tears or rips in the fabric shall be repaired with fabric lapped a minimum of 12 inches in all directions.

G. Sod: Sod shall be *installed* as specified in Section *2406*, except all sod placed in drainage channels or ditches, including both the side slopes and bottom, shall be anchored as specified in Section*2406.4.D.4*, Anchoring Sod.

SECTION 2606 MEASUREMENT AND PAYMENT

2606.1 Measurement: The quantities of accepted work will be measured in the following units. All measurements will be plan measure except for authorized changes.

A. Pipe: By the lineal foot of each size and type. Measurement will be to the nearest 0.1 foot for each line between structures, and made to the inside face of the connecting structure. Precast or prefabricated end sections will be excluded from the pipe measurement.

B. Prefabricated or Precast End Sections: By the number of each size and type.

C. Concrete Box Culverts: By the lineal foot of each size and type. Measurement will be along the centerline of the culvert between the back faces of the headwalls. Headwalls will be measured separately as "Structures."

D. **Structures:** Inlets, manholes, headwalls, endwalls, *curb inlets, field inlets*, and other similar structures will be measured by their number of each size and type*, as* listed in the *Contract Documents*.

E. Casings: Casings for pipe installation by boring and/or jacking methods will be measured by the lineal foot of each size and type.

F. Pipe Encasement: Pipe encasement will be measured by the lineal foot of each size and type.

G. Concrete Channel Lining: By the square yards of surface area. Measurement will be parallel to sloping surfaces.

H. Filter Blanket: *Unless otherwise stated in the Agreement, there will be no separate measurement or payment for filter blanket. All costs for such work shall be included in the price of the related item.*

I. **Riprap:** *By the square yards of surface area. Measurement will be parallel to*

sloping surfaces. The thickness of the riprap shall conform to the plan dimension. Measurement and payment of the filter fabric shall be included in the cost per square yard of the riprap.

J. Grouted Riprap: By the square yards of surface area. Measurement will be parallel to sloping surfaces. The thickness for grouted riprap shall be measured from the top of the grout line to the bottom of the riprap and shall conform to the plan dimension. Measurement and payment of the filter fabric shall be included in the cost per square yard of the grouted riprap.

K. Gabion *Baskets*: By the cubic yard on the basis of plan dimensions.

L. Sodding: Measurement shall be by the lineal foot of pipe over which sod is placed or by the lineal foot of sodded ditch unless otherwise specified. For lined (riprap, grouted riprap, or concrete) channels, sod placement and/or repairs shall be incidental to the cost of placement of the lining material.

M. Seeding: *Measurement shall be by the lineal foot of pipe over which seed is placed or by the lineal foot of seeded ditch unless otherwise specified. For lined (riprap, grouted riprap, or concrete) channels, seed placement and/or repairs shall be incidental to the cost of placement of the lining material.*

2606.2 Payment: Payment will be made at the respective unit of lump sum price listed in the Agreement, and shall be full compensation for all labor, materials, and equipment necessary to complete the respective unit in place. There will be no separate measurement or payment for any item of work not specifically identified and listed in the Agreement, and all such work shall be considered a subsidiary item with all costs pertaining thereto included in the prices for other items listed in the Agreement. At the Engineer's option, partial payment may be made for any item listed in the Agreement, providing that the Contractor is diligently and satisfactorily pursuing full completion of such partially complete item in accordance with the approved job progress schedule.

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

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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

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

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 µm) 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:

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/m³)	683 (405.2 K/m³)
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

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

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 m^3), 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.

DIVISION II
CONSTRUCTION AND MATERIAL SPECIFICATIONS
SECTION 2800 STREET LIGHTING

Approved and Adopted this 24th day of May, 2019
by Ordinance 190475

KANSAS CITY METROPOLITAN CHAPTER
OF THE AMERICAN PUBLIC WORKS ASSOCIATION

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CONSTRUCTION AND MATERIAL SPECIFICATIONS
SECTION 2800 STREET LIGHTING

SECTION 2801 GENERAL

2801.1 Scope: This section governs the method of construction, standard materials and equipment for the installation and testing of a complete, operational streetlight system in accordance with the approved plans, special provisions, standard drawings and contract documents.

2801.2 Referenced Standards: The following standards are referenced directly in this specification. The latest published version or the current adopted version of these standards shall be used. If conflicting standards are referenced, the most restrictive standard shall apply.

AASHTO

- LTS-6 Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals
- M-31 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- M232 Standard Specification for Zinc Coating (Hot-Dip) On Iron and Steel Hardware
- M284 Standard Specification for Epoxy-Coated Reinforcing Bars: Materials and Coating Requirements
- M298 Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

ACI - ACI 301 Specifications for Structural Concrete

ANSI

- B18.2 Fasteners
- C136.10 Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing
- C80.1 Electrical Rigid Steel Conduit
- C80.4 Fittings for Rigid Metal Conduit & Electrical Metal
- 05.1 Stand Specifications for Wood Poles
- ICEA S-76-474 Neutral-Supported Power Cable Assemblies with Weather-Resistant Extruded Insulation Rated 600 Volts
- SCTE 77 Specifications for Underground Enclosure Integrity

ASTM

- A 36 Standard Specification for Carbon Structural Steel
- A 53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- A 123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products ▪ A 153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware ▪ A 252 Standard Specification for Welded and Seamless Steel Pipe Piles
- A276 Standard Specification for Stainless Steel Bars and Shapes
- A 307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
- A575 Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades ▪ A 615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- A635 Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability
- A 775 Standard Specification for Epoxy-Coated Steel Reinforcing Bars
- B26 Standard Specification for Aluminum-Alloy Sand Castings
- B429 Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube ▪ B 695 Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

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- D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3(600 kN-m/m3))
- D 2683 Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing
- F 436 Standard Specifications for Hardened Steel Washers Inch and Metric Dimensions

AWPA - U1 Use Category System: User Specification for TreatedWood

CRSI - Concrete Reinforcing Steel Institute Manual of StandardPractice

FHWA - Manual on Uniform Traffic Control Devices for Streets and Highways

MCIB - MCIB Mid-West Concrete IndustryBoard Concrete Specifications-Concrete Pavement Reference the December 2000 specifications if the most recent version does not contain specified mix designs.

NEMA

- TC-2 Electrical Polyvinyl Chloride (PVC) Conduit
- TC-3 Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing ▪ TC-7 Smooth-Wall Coilable Electrical Polyethylene Conduit
- 250 Enclosures for Electrical Equipment (1000 Volts Maximum)

NFPA

- NFPA 70 National Electrical Code (NEC)
- NFPA 70E Standard for Electrical Safety in the Workplace

OSHA - 29 CFR - Standards

UL

- 6 Electrical Rigid Metal Conduit – Steel
- 360 Standard for Liquid-Tight Flexible Metal Conduit
- 514 Metallic Outlet Boxes, Conduit, Tubing, and Cable Fittings
- 514B Conduit, Tubing, and Cable Fittings
- 651A Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit

2801.3 Pre-Construction and Post-Construction Audio/Video Taping: The contractor shall provide for the video/audio taping of the pre-construction and post-construction videos on the project, which shall become the property of the City.

2801.4 Permits: The contractor shall obtain all necessary permits from any involved agencies to work within their right-of-way (traffic control, excavation, pole attachment, etc.). The contractor shall be responsible for the cost of obtaining the necessary permits and shall be responsible for all the coordination necessary during the construction.

2801.5 Utility Locates: the Contractor shall order all utility locates. The City shall approve, prior to construction, any changes to the plan due to utility or other conflicts.

2801.6 Easements: The street lighting system shall be constructed within the existing easements and right-of-ways.

2801.7 Construction Notification: The contractor shall coordinate the construction with local residents and/or businesses by written communication or door-to-door signage. The contractor shall be responsible for providing and distributing the notifications at least 24 hours prior to start of construction activities.

DIVISION II
CONSTRUCTION AND MATERIAL SPECIFICATIONS
SECTION 2800 STREET LIGHTING

2801.8 Equipment and Material Requirements: All lighting equipment and material shall be of new stock unless the contract provides for relocation of existing units or use of units furnished by others. New equipment and material shall meet all applicable standards and shall meet the approval of the City. Before commencing the installation of the system, the contractor shall submit a complete schedule of materials and equipment proposed for installation to the City for approval. This schedule shall include catalog cuts, diagrams, shop drawings, and other such descriptive data. Orders for equipment shall not be placed until written approval shall be obtained from the City.

If spare equipment is included in the contract, it shall conform to these specifications, approved plans, special provisions, standard drawings and contract documents. Spare equipment shall be delivered to the jurisdictional agency at a place and time outlined by the City.

2801.9 Exceptions to Specification: Sections within this specification may be modified or deleted by notes or details in the specifications, approved plans, special provisions, standard drawings or contract documents. Where a specific requirement and a general requirement are in conflict, the specific requirement shall govern. Where this specification and the plan or contract document requires different materials, methods of construction or other requirements, the most restrictive shall govern.

2801.10 Appurtenances: All appurtenances shall be installed as shown on the approved plans, special

provisions, standard drawings and contract documents. Any deviations must be established by the contractor and approved by the City. No additional payments will be made for appurtenances unless agreed to by the City in writing.

2801.11 Incidental Work and Parts: Work incidental to the installation of a street lighting system that is not covered in these specifications shall be performed in accordance with the approved plans, special provisions, standard drawings and contract documents. All incidental parts, which are not shown on the approved plans, special provisions, standard drawings and contract documents and which are necessary to complete the street lighting system, shall be supplied and installed by the contractor to the satisfaction of the City. No additional payments will be made for incidental work or parts unless agreed to by the City in writing.

2801.12 Safety: Applicable safety standards shall be maintained per OSHA and NFPA 70E.

2801.13 Existing Lighting: Existing lighting shall be maintained in effective operation by the contractor except for necessary situations that have been pre-approved by the City. The contractor shall take all precautions necessary to minimize the interruption of the existing street lighting systems to be modified.

2801.14 Electrical Service: The contractor is responsible for contacting the electrical utility company in advance to determine availability of service connection and schedule delivery of service to each power supply.

2801.15 Maintenance Work: The contractor is responsible for making all repairs and replacements for purposes of maintenance or damage to the street light system, regardless of the cause or responsible party, until the entire project is complete and accepted by Street Lighting.

2801.16 Testing: The Contractor shall submit certified copies of all test data if requested by the City.

2801.17 Global Positioning System Locations: The contractor is responsible to provide the GPS locations for all poles, junction boxes and service locations to the City. The locations shall be in decimal degree format to eight decimal places.

2801.18 Pole Loading Structural Analysis for Non-Lighting Attachments: Upon request, the contractor shall provide a structural analysis of a pole where deemed by the City to be reasonably necessary to verify adequate support. The analysis shall account for the soil, foundation, pole and all attachments. The pole shall not exceed 80% of its structural capacity per AASHTO LTS-6.

2801.19 Pole Attachments: Attachments to City streetlight poles in the City right-of-way may be permitted and is subject to all applicable ordinances, standards, agreements, and specifications. Attachments shall be constructed in accordance with City approved plans.

2801.20 Surface Restoration: Disturbed areas shall be restored to a condition equal to or better than that existing prior to construction. Sidewalk and street cuts shall be restored in accordance with current Public Works Design and Construction Standards.

SECTION 2802 MATERIALS AND EQUIPMENT

2802.1 Scope: This section governs the materials and equipment required to complete the work as shown on the approved plans, special provisions, standard drawings and contract documents.

2802.2 Concrete Foundations: All concrete foundations, whether reinforced or non-reinforced, shall be

MCIB Mix No. A558-1-2 or A618-1-4, unless otherwise specified on the approved plans, special provisions, standard drawings and contract documents. Concrete construction shall be in accordance with ACI 301 Standard Specifications for Structural Concrete.

2802.3 Reinforcing Steel: Grade 40 or 60 deformed reinforcing steel shall be placed as shown on the approved plans, special provisions, standard drawings, contract documents and shall conform to ASTM A615 or AASHTO M-31 for plain or ASTM A775 or AASHTO M284 for epoxy coated. Upon request, the contractor shall provide documentation for reinforcing steel that shall include the steel manufacturer has certified mill test report showing complete chemical and physical test results.

2802.4 Anchor Bolts/Mounting Bolts: Anchor bolts or mounting bolts shall be the size, length and deformation shown on the approved plans, special provisions, standard drawings, contract documents and shall conform to ASTM A307, AASHTO M232, Class C (ASTM A153), or mechanically galvanized in accordance with AASHTO M298, Class 55 (ASTM B695). Nuts, washers and no less than the top eight inches of the bolts shall be galvanized as specified by ASTM A153. Nut dimensions shall conform to the requirements of ANSI B18.2 for heavy semi-finished hex nuts. Washer dimensions shall conform to ASTM F436.

2802.5 Screw Anchor Foundations: Screw anchor foundations shall be fabricated of new steel and mill traceable. The length and diameter shall be as shown on the approved plans, special provisions, standard drawings and contract documents. The foundation shall be capable of withstanding 10,000 ft./lbs. of installation torque applied about the axis. The base plate steel shall be perpendicular to the shaft and conform to ASTM A36. Mounting holes shall be radially elongated. Base plate shall be permanently labeled with the name of the manufacturer. The shaft shall be steel pipe conforming to ASTM A252, Grade 2 or type E or S, Grade B steel pipe in accordance with ASTM A53. The helix shall be hot rolled steel and meet the requirements of ASTM A635. The pilot point shall be steel bar complying with ASTM A575. The conduit access slot shall be saw cut or flame cut and edges of the conduit access slot shall be smooth and clean to prevent damage to the conduit. The conduit access slot shall be large enough for entry of three, two-inch diameter conduit. After fabrication, the foundation shall be hot dip galvanized conforming to ASTM A123. Mounting bolts shall be one-inch diameter and bolts, nuts, lock-washers and washers shall conform to Section 2802.4.

2802.6 Backfill: Wood poles shall be backfilled with AB-3 containing a minimum 7% moisture content. Backfill shall be installed in 6" lifts and compacted with a compaction rammer to achieve a minimum of 95% compaction per ASTM D698. Concrete and screw anchor foundations shall be installed in undisturbed soil except where fill soils have been designed, installed and tested in accordance with accepted engineering practice and are capable of accommodating all loads. Contractor must provide design and testing documentation when requested by the City.

2802.7 Cable Retainers: Cable retainers shall be installed as indicated on approved plans, special provisions, standard drawings and contract documents. The retainer shall secure the distribution conductors at the base of the pole. The method of securing the conductors shall not be accessible from the hand hole preventing theft. The securing mechanism shall not cause damage to the conductor'sinsulation.

2802.8 Breakaway Supports/T-Bases: Breakaway supports, when required, shall be installed per approved plans, special provisions, standard drawings and contract documents. Breakaway supports shall conform to AASHTO LTS-6 and must be approved by MoDOT.

2802.9 Conduit: Conduit shall be listed and labeled as required by NFPA 70 (NEC). The location, size and type of conduit shall be as shown on the plans. At his own expense, the contractor may use a larger size conduit if desired, as approved by the City. Where larger size conduit is used, it shall be for the entire length of the run from outlet to outlet. Reducing couplings will not be permitted. The conduit specified may be

polyvinyl chloride (PVC), high-density polyethylene (HDPE) or nonmetallic underground conduit with conductors (NUCC) for the distribution system. Rigid metal conduit (RMC) shall be used where conduit is to be installed externally on a structure.

A. **Polyvinyl Chloride (PVC):** Polyvinyl Chloride (PVC) Conduit shall be minimum 2 inch, schedule 40 and shall conform to NEMA Standard TC-2 and NEMA TC-3. Fittings for PVC conduit shall be in accordance with UL 514. Cement used for the fittings shall be in accordance with the conduit manufacturer's recommendations.

B. **High Density Polyethylene (HDPE):** High-Density Polyethylene (HDPE) Conduit shall beminimum 1 inch, schedule 40. The conduit shall be smooth walled inside and out and shall be gray or black in color. The conduit shall be intended for underground use and be manufactured and coiled or reeled in continuous transportable lengths and uncoiled for further processing and/or installation without bending, kinking or adversely affecting its properties of performance. The conduit shall be manufactured to NEMA Standard TC-7 and ANSI/UL 651A specifications. The conduitshall be clearly and durably marked at least every 10 feet with the material designation, UL markings, nominal conduit size, and the name and/or trademark of the manufacturer. Fittings for HDPE conduit shall be in accordance with ASTM D2683. Epoxy used for the fittings shall be in accordance with the conduit manufacturer's recommendations. An approved factory coupling shall be used for connection of the HDPE conduit to a 90° factory PVC elbow or between two lengths of HDPE conduit. The coupling shall be of high-density polyethylene material. The coupling shall provide an airtight and watertight lock connection.

C. **Nonmetallic Underground Conduit with Conductors (NUCC):** Nonmetallic Underground Conduit with Conductors (NUCC) shall be minimum 1 inch PVC or HDPE, schedule 40. The conduit shall be smooth walled inside and out and shall be gray or black in color. The conduit shall be intended for underground use and be manufactured and coiled or reeled in continuous transportable lengths and uncoiled for further processing and/or installation without bending, kinking or adversely affecting its properties of performance. The conduit shall be manufactured to NEMA Standard TC-7 and ANSI/UL 651A specifications. The conduit shall be clearly and durably marked at least every 10 feet with the material designation, UL markings, nominal conduit size, and the name and/or trademark of the manufacturer. Fittings for HDPE conduit shall be in accordance with ASTM D2683. Epoxy used for

the fittings shall be in accordance with the conduit manufacturer's recommendations. An approved factory coupling shall be used for connection of the HDPE conduit to a 90° factory PVC elbow or between two lengths of HDPE conduit. The coupling shall be of high-density polyethylene material. The coupling shall provide an airtight and watertight lock connection. Conductors must meet all requirements of section 2802.10.

D. **Rigid Metal Conduit (RMC):** Rigid Metal Conduit shall be corrosion resistant galvanized steel manufactured in accordance with ANSI C80.1 and UL Standard 6. The conduit shall be hot-dipped galvanized on the inside and outside surfaces and all threaded ends. All metal conduit ends shall be provided with a bushing to protect the conductors from abrasion. Fittings shall be in accordance with ANSI C80.4. A sufficient number of conduit hangers shall be supplied to attach the conduit to a structure, as recommended by the manufacturer. RMC Conduit shall be bonded as required by NFPA 70 (NEC).

E. **Liquid-Tight Flexible Metal Conduit (LFMC):** Liquid-tight flexible metal conduit may be used only in locations approved by the City and meet all requirements of NFPA 70 (NEC). Liquid-tight Flexible Metal Conduit shall meet the requirements of UL 360 and all fittings shall conform to UL514B.

2802.10 Conductors/Cable: All conductors/cable shall be listed and labeled, rated 600 volts, and meet all applicable requirements of NFPA 70 (NEC).

A. **Service:** Conductors for service shall be sized for a minimum 100 Amp service per NFPA 70 (NEC) and meet all utility requirements.

B. **Underground Distribution:** Cable must be type USE or USE-2. Conductors shall have an insulation of type RHW, USE, XHHW, RHW-2 or XHHW-2 or as approved by the City. All cable or conductors shall be installed in conduit as shown on the approved plans, special provisions, standard drawings and contract documents. All conductors shall be stranded copper wire, and shall be the AWG size listed on the plans (minimum #8). All conductors shall be plainly marked on the outside as required by NFPA 70 (NEC). Each ungrounded conductor shall be color coded with a continuous outer finish (red or black). Each grounded conductor shall be color coded white or grey with a continuous outer finish. Each grounding conductor shall be color coded green with a continuous outer finish or shall be bare.

C. **Overhead Distribution:** Overhead cable shall be aluminum DUPLEX or TRIPLEX Service Drop Cable, insulated with cross-link polyethylene (XLP) and sized according to the plans (minimum #6). Cable shall conform to ANSI/ICEA Standard S-76-474 or the latest applicable standards. The messenger (neutral for duplex, ground for triplex) shall serve as the supporting structure and shall be bare ACSR the same AWG size as the insulated conductors. Supporting hardware shall be 5/8 inch or 16,000 pound, standard pole line hardware. Cable color-coding shall meet NFPA 70 (NEC) requirements.

D. **Pole and Bracket Arm:** Cable must be SE with conductor insulations of type RHW, RHW-2, XHHW, XHHW-2, THWN, or THWN-2. Individual conductors shall be type THW, THW-2, THHW, THWN, THWN-2, XHHW, or XHHW-2. All conductors shall be minimum #10, stranded copper wire and shall be the AWG size listed on the plans. Each ungrounded conductor shall be identified by line and color coded with a continuous outer finish (red or black). Each grounded conductor shall be color coded white or grey with a continuous outer finish. Each grounding conductor shall be color coded green with a continuous outer finish or shall be bare.

2802.11 Splices: Splices shall only be permitted at the pole and in junction boxes and shall be indicated on approved plans, special provisions, standard drawings or contract documents. Splices shall meet the requirements of NFPA 70 (NEC) Article 110. Mechanical connections shall be listed and labeled for the use intended and be installed as recommended by the manufacturer. No twist on type connections shall be permitted. Connectors and bare parts of conductors shall be reinsulated by listed means.

2802.12 Pull or Junction Boxes: Pull and junction boxes shall be placed as shown on the approved plans, special provisions, standard drawings and contract documents. Boxes shall be installed as recommended by the manufacturer. Pull and junction boxes shall be either 18” L x 11” W x 12” D or 12” L x 12” W x 12” D and meet the fill and bending radius requirements of NFPA 70 (NEC). Pull and junction boxes shall be heavy duty, precast polymer concrete, and shall meet the latest revision of ANSI/SCTE77 with Tier 8 performance specification requirements for both box and cover. Covers for pull boxes shall have textstating 'STREET LIGHTING' and indicate the tier designation of the box. In joint use boxes, conductors shall be clearly and permanently tagged as streetlight conductors. Additional pull boxes may be installed when approved by the City. It is not recommended pull and junction boxes be installed in driveways, sidewalks or other areas where surrounded by concrete, asphalt, or on a drive able surface. Pull and junction boxes installed in these areas shall be rated for traffic use.

To avoid conductor theft, a conductor run shall not terminate in a pull or junction box at both ends. Covers shall be secured with vandal-resistant bolts.

2802.13 Lighting Control Cabinet: The street lighting controller shall be in accordance with the approved plans, special provisions, standard drawings, contract documents and shall meet the utilities latest standards for service equipment. The cabinet and all components must be listed and labeled. The cabinet shall be aluminum or corrosion resistant, zinc coated steel and be NEMA 250, 3R rated enclosure with a side hinged weatherproof door with padlock latch. The cabinet shall be rated at a minimum of 100 amps and all applicable components shall have a short circuit current rating (SCCR) of at least 10,000 amps.

2802.14 Circuit Breakers, Contactors and Terminal Blocks: Circuit breakers, contactors and terminal blocks shall be as specified on the approved plans, special provisions, standard drawings and contract documents.

2802.15 Breakaway Fused and Non-Fused Connectors: Fuses and fuse holders shall be as specified on the approved plans, special provisions, standard drawings and contract documents. All poles shall be equipped with fuse holders at the base of the pole. Fuse holders shall be in-line, water resistant, breakaway, set-screw (load and line sides) type with insulated boots and a non-load-break disconnect. Minimum fuse size shall be a Class CC, fast-acting, branch circuit, rejection-type 10 Amp fuse. The system ground fuse holder shall have a solid copper slug. Fuse holders must be installed so the fuse remains in the load sideof the holder upon separation. The solid slug in the ground fuse holder shall remain in the line side of the holder upon separation.

2802.16 Photoelectric Controls: The photoelectric control shall meet or exceed the requirements of ANSI C136.10. The cover of the photoelectric control shall be gray and of an ultra-violet, light-resistant material with an impact resistance of greater than 1.0 ft-lb over the intended operating temperature range of the device. The photoelectric control must be capable of withstanding a drop of 3 feet to a concrete floor without causing damage to the housing or changing electrical operation. The diameter of the photoelectric control skirt shall be a minimum of 3 inches and the plug blades shall be made of brass. The control shall be marked on the base with the month and year of manufacture, individual serial numbers, complete model description, operating voltage range, load rating, and provision for marking installation and removal dates. Each control shall have an eight-year warranty providing a one for one control replacement.
The control shall operate at a line voltage range from 105 volts to 285 volts AC at 60 hertz. The control shall be equipped with surge protection that shall be in the form of a metal oxide varistor (MOV) wired line to neutral. The MOV shall be a minimum of 160 joules. Each unit must be calibrated in production using a photometer whose accuracy is traceable to the National Institute of Standards and Technology (NIST). A 100% quality control inspection must be performed after calibration and final assembly.

The cell shall be cadmium sulfide and be sealed to prevent moisture and contamination damage. A conformal coating or epoxy encapsulation may accomplish this. The control shall be adjusted to turn the fixture on at 1.5 ± 0.3 foot-candles, as measured in accordance with the standard. The fixture shall turn off at a maximum ratio between turn off to turn on of 1.5:1. Control must have essentially instantaneous “on” response to allow for easy testing. A two to five second 'OFF' delay is required. Contact 'chatter' on opening of contacts (turn OFF photoelectric control) shall not exceed five milliseconds. Operating temperature shall have minimal effect on time delay duration. The control shall be designed so that if it fails, the system is energized (fail on).

2802.17 Smart Controls (Smart Nodes): The use of smart technology with streetlights to enhance operations and maintenance may be considered with the following system requirements and criteria.

A. The manufacturer shall host the Central Management System (CMS) portal for administration of the system and provide all backhaul of data between the nodes and their servers.

B. Each smart node shall be able to communicate back to the CMS, either directly or through gateways.

C. The node attribute and fault data shall be available in XML format for the City to download on a daily basis.

D. The smart node shall have the capacity to turn on and off the fixtures manually.

E. The smart node shall have the capacity to report on energy usage with meter-grade accuracy of ± 2% or less

F. Each smart node shall have integrated GPS location determining capability.

G. The smart node shall have the ability to report on lighting faults, day burners, low wattage, power issues, etc.

H. The smart node shall have the capability to be coordinated with an LED fixture for dimming purposes.

I. The smart node shall be externally mounted using an ANSI/NEMA C136.10/C136.41 twist lock connection.

J. The smart node shall have an integrated PE cell for measuring light levels and turning fixtureson/off.

K. All asset information shall be collected by the installation contractor, provided to manufacturer for commissioning, and entered into CMS.

L. Once the smart node is commissioned and entered into CMS, it shall be listed with KCMO's unique asset identification number.

2802.18 Poles and Arms: All tapered aluminum or square steel (painted or unpainted), anodized aluminum (in any color), and octo-fluted poles (painted or unpainted) between 25 ft and 40 ft are standard poles. Non-standard poles and/or arms may be allowed in rare circumstances with Cooperative Maintenance Agreements and Maintenance Bonds. The type and length of pole and arm shall be specified on approved plans, special provisions, standard drawings and contract documents. New installations shall match with existing equipment (pole material, pole height, color or finish, etc.). Hand hole minimum size shall be clear 4" x 6". Poles shall be fully assembled by the manufacturer and no field modifications will be permitted. All poles shall have permanent labels with the following information:

- Manufacturer's name
- Date of manufacture
- Part/order number

A. **Aluminum poles and arms:** The pole shaft shall be a seamless, round, tapered tube of 6063-T6 aluminum alloy per ASTM B429. The pole base flange shall be a one-piece casting of aluminumalloy

356 per ASTM B26 and be attached to the shaft by a continuous circumferential weld. The pole shall be furnished with an internally mounted damper to dampen wind induced harmonic vibration. The shaft, base, anchor bolt covers and arm shall have a natural color satin finish, unless otherwise specified on the plans or contract documents. All finishes must be applied by the manufacturer.

Anchor bolt covers of aluminum alloy 356 and hex socket attachment screws of 300 series stainless steel per ASTM A276 shall be provided.

A hand hole shall be provided near the base for wiring access. The hand hole shall be positioned 90 degrees from the luminaire mounting arm. The hand hole cover shall be secured with hex socket attachment screws of 300 series stainless steel. A ground connector capable of accepting six AWG wire shall be provided inside the pole, convenient to the hand hole.

The pole shall mount on the bolt circle diameter specified on the plans. The top of the pole shall be equipped with a removable cap. The pole and arm, when equipped with the specified luminaire and installed on a standard foundation, shall comply with AASHTO LTS-6.

The arm shall be of 6063-T6 aluminum alloy, of the length specified, and provide a two-inch NPS luminaire mount.

B. **Steel pole and arms:** The shaft shall be round, tapered, and fabricated from cold rolled open hearth, basic oxygen or electric furnace steel per ASTM A595. The shaft shall be one piece for lengths to 50 feet and may be two pieces for lengths exceeding 50 feet. The two-piece shaft shall be field assembled by a slip joint, the minimum length of which is one and one half times the diameter of the shaft at the joint. The field-assembled pole must not require a weld to develop full strength. All welds in the fabrication of the shaft shall be continuous and longitudinal. The pole base flange shall be of caststeel or fabricated steel plate. It shall telescope the shaft and be secured top and bottom, by continuous circumferential welds. It shall be designed to avoid stress risers under dynamic loading.

The anchor bolt covers shall be formed forged or cast and shall be attached to the base with hex socket

threaded fasteners.

A hand hole shall be provided near the base for wiring access. The hand hole shall be positioned 90 degrees away from the mounting arm. The hand hole cover shall be secured with hex socket threaded fasteners. A ground connector capable of accepting six AWG wire shall be provided inside the pole convenient to the hand hole.

The steel pole, arm, and all incidental parts shall be finished with hot dip galvanizing in accordance with ASTM A123. All color finishes for new installations, as required by plans, must be applied by the manufacturer after galvanizing. All fasteners shall be of 300 series stainless steel per ASTM A276 or of carbon steel galvanized in accordance with ASTM A153.

The pole shall mount on the bolt circle diameter specified on the approved plans, special provisions, standard drawings and contract documents. The top of the pole shall be equipped with a removable cap. The pole and arm, when equipped with the specified luminaire and installed on a standard foundation, shall comply with AASHTO LTS-6.

The arm shall be of the same material and finish as the pole, the length specified, and shall provide a two-inch NPS luminaire mount.

C. **Wood poles:** New wood poles shall be preservative-treated in conformance with AWPA U1. Wood poles shall be fabricated in conformance with ANSI 05.1. Poles shall be marked or have other documentation to confirm compliance with this requirement as well as the class designation as defined in the referenced standard. Poles shall be in good condition as acceptable by the City and shall be in conformance with ANSI 05.1 requirements for sweep, crook, defects and mechanical damage. Poles deemed unacceptable by the City should be removed from the job site. Hardware shall include cable hardware as well as pole hardware including insulators, cable supports, guy anchors, guy wires and the

like. Hardware shall be indicated on the approved plans, special provisions, standard drawings and contract documents. Hardware shall also be made available for inspection by the City, and hardware deemed defective by the City shall be removed from the job site. As a minimum, pole guying shall be provided where indicated on the plans, at every dead-end pole, and at any pole having non-offsetting cable support stresses, i.e. non-symmetrical cable attachments.

2802.19 Luminaires: All new installations shall be light emitting diode (LED) cobra-head or curvilinear style luminaires and meet the Public Works or Parks & Recreation design and construction standards.

Existing High Intensity Discharge (HID) such as high-pressure sodium vapor (HPSV) and metal halide (MH) luminaires may be replaced with new HID luminaires as required for maintenance and replacements or as approved by the City.

These specifications cover the City of Kansas City, Missouri's requirements for LED and HID luminaires for roadway lighting. Luminaires for underpass lighting shall be wall, pier, or ceiling mounted.

A. **Cobra Head Luminaires (LED):** All cobra head light emitting diode luminaires shall be KCMO approved and meet the latest *KCMO Performance Specification for LED Roadway Luminaires*.

B. **Cobra Head Luminaires (HPSV and MH):** All cobra head high-pressure sodium vapor and metal halide luminaires shall be KCMO approved and meet the latest *KCMO Performance Specification for High Intensity Discharge (HID) Roadway Luminaires*

C. **Underpass Luminaires (LED, HPSV, and MH):** All underpass luminaires shall be KCMO approved and meet the latest KCMO LED and HID photometric, electrical, and materialspecifications.

D. **Decorative Luminaires (LED, HPSV, and MH):** In rare circumstances, ornamental or pedestrian style luminaires may be allowed with cooperative Maintenance Agreements and Maintenance Bonds. Decorative luminaires shall be KCMO approved and meet the latest LED and HID photometric, electrical, and material specifications.

2802.20 Identification Labels: Identification labels shall consist of three letters and four numerals in vertical orientation with the letters at the top to read downward. Legend shall be 2-inch series "C" upper case black characters on silver retro-reflective sheeting with pressure sensitive adhesive backing, as prescribed for use on standard highway signs in the FHWA Manual on Uniform Traffic Control Devices for Streets and Highways.

Supplied labels shall bear the luminaire/cabinet number shown on the streetlight plan or as directed by the City.

2802.21 Wood Pole Ownership Tags: Tags shall be industry standard aluminum discs used to identify wood pole ownership and shall read "KCMO".

SECTION 2803 CONSTRUCTION MEANS AND METHODS

2803.1 Scope: This section governs the means and methods of construction for the installation and testing of a complete, operationalstreetlight system in accordance with the approved plans and contract documents.

2803.2 Concrete Foundation Construction: All concrete foundations shall be the size, type and materials shown on the approved plans, special provisions, standard drawings and contract documents.

A. **Location:** Streetlight foundations shall be placed as shown on approved plans. The contractor shall stake the location of all street lighting foundations to be installed and shall allow the City to inspect the staking prior to any excavation and/or construction. Minor relocation of equipment to avoid conflicts may be allowed with the approval of the City. The contractor is responsible for verifying the correct

line and elevations of all concrete bases prior to installation. The top of the foundation for street light poles, except raised foundations, shall be level with finished grade, or as directed by the City. The bottom of all concrete bases shall be free of standing water and rest on firm ground.

B. **Concrete:** Forms shall be rigid and securely braced in place. Both forms and ground that will contact the concrete shall be thoroughly moistened before placing concrete. Pole foundations shall be poured monolithic and shall be consolidated by an internal type vibrator. The concrete shall be cured with an approved moisture barrier for a period of 72 hours. Cold weather curing shall be such that the concrete temperature shall be maintained above freezing for the entire curing period. Forms shall not be removed until the concrete is thoroughly set. The exposed portions of the foundation shall be finished to present a neat appearance. Finishing should be done with the positioning jig in place and left in place throughout the curing period. Prior to installing the pole, the positioning jig shall be removed and loose concrete cleaned from around the anchor bolts and conduits.

C. **Reinforcing Steel:** Reinforcing steel for concrete bases shall be accurately cut and bent to the dimensions and shapes shown on the approved plans, special provisions, standard drawings and contract documents. Cutting and bending tolerances for reinforcing steel shall be in accordance with the Concrete Reinforcing Steel Institute's Manual of Standard Practice. When placed in the work and before concrete is placed, reinforcing steel shall be free from dirt, oil, paint, grease, loose mill scale, thick rust, any dried mortar and other foreign substances. Reinforcing bars shall be positively secured against displacement. The bars shall be firmly tied at alternate crossings or as required by the designer. The steel shall be spot welded or tied in the correct position with proper clearance maintained between the bare earth or forms and the reinforcement. Measurements to reinforcing steel will be made to the centerline of bar, except where the clear distance from face of concrete is shown on the plans. Splicing of bars shall not be allowed.

D. **Anchor Bolts:** Anchor bolts shall be placed in proper position, to proper heights, and held in place by means of a template until the concrete sets.

E. **Conduit:** Conduit and conduit bends should be set in the forms for concrete bases. Pole foundations shall

have separate conduits for exiting/entering conductors and a separate conduit for the grounding electrode conductor. The direction of the exiting conduits shall be as shown on the plans. Conduit set in concrete bases shall be flush with the top of the base vertically and a minimum of 3 inches outside the base horizontally underground. Conduits shall be placed in proper position, to proper heights, and securely held in place during concrete placement. Conduit shall be covered before concrete is poured to prevent concrete from entering the conduit.

F. **Expansion Joints:** Expansion joints shall be provided where a concrete pole foundation is adjacent to concrete. After concrete has cured a minimum of seven days, the joint shall be cleaned, filled and sealed as shown on the approved plans, special provisions, standard drawings and contract documents.

2803.3 Screw Anchor Foundations: Streetlight foundations shall be placed as shown on approved plans, special provisions,standard drawings and contract documents. The Contractorshallstake the location of all street lighting foundations to be installed and shall allow the City to inspect the staking prior to any excavation and/or construction. Minor relocation of equipment to avoid conflicts may be allowed with the approval of the City. The Contractor is responsible for verifying the correct line and elevations of all foundations prior to installation. The top of the foundation for street light poles shall be level with finished grade, or as directed by the City. Screw anchor foundations shall be installed in firmground.

Pre-drilling of holes for the screw anchor foundation is not allowed except for a depression to improve location accuracy. If screw anchor foundations cannot be used for any reason, concrete foundations shall be installed. During installation, the anchor shall be plumb and the steel base plate shall be at the proper elevation and properly oriented to receive the shoe base. Minor leveling adjustments may be made with the use of leveling shims or washers. Shims and washers shall be galvanized or cadmium-plated steel nomore

than one-quarter inch (0.25”) thick. Only one shim or washer will be allowed at any one anchor bolt. The installing torque for screw anchor foundations shall be between the maximum and minimum torque ratings per the manufacturer’s recommendations. Conduit shall be installed into all screw anchor foundations through the slots in the base of the anchors.

2803.4 Backfill: Backfill shall be free of rock or other solid material. Backfill shall be installed in 6-inch lifts and compacted with a Compaction Rammer to achieve a minimum of 95% compaction per ASTM D698. The six inches of backfill nearest the conduit shall not be machine compacted to prevent damage.

2803.5 Cable Retainers: Cable retainers shall be installed per the manufacturer’s recommendation. The method of securing the conductors shall not be accessible from the hand hole preventing theft of the conductors. The securing mechanism shall not cause damage to the conductors.

2803.6 Breakaway Supports/T-bases: Breakaway supports shall be installed per the manufacturer’s recommendation. Supports in MoDOT’s Right-of-Way must be installed per MoDOT’s standards.

2803.7 Conduit: Conduit shall be installed as shown on the approved plans, special provisions, standard drawings and contract documents. The conduit shall be installed continuous from outlet to outlet or as otherwise shown on the plans. At all outlets, conduit shall enter from the direction of the run. Conduit bends shall enter junction or pull boxes from below the box and shall extend into the box a minimum of 2 inches unless otherwise specified. The ends of all conduits shall be well reamed to remove burrs and rough edges. All conduits shall be cleaned and swabbed prior to installation of conductors. Field cuts shall be made square and true so that the ends will butt or come together for the full diameter thereof. The end of each conduit run shall be covered to prevent water or debris from entering the conduit while the system is being constructed. Existing underground conduit to be incorporated into a new system shall be cleaned with a mandrel and blown out with compressed air.

If the bottom of the trench is in rock or rocky soil, the conduit shall be placed on a 6-inch protective layer of clean, tamped backfill material. Trenches shall be backfilled as soon as practical after the installation of conduit. Conduit shall be placed to a minimum depth of 24 inches below finish grade.

A. **Fittings and Bends:** All fittings must be a manufactured fitting and shall be listed for connection of conduits. No couplings or joints will be allowed in HDPE conduits at intermediate points unless approved by the City. Conduit bends may be a manufactured fitting or a field-prepared bend and shall have a radius of not less than six times the inside diameter of the conduit. Conduit bends shall be made without crimping or flattening, using the longest radius practicable and utilizing an approved conduit bending method. Fittings shall be glued in a manner prescribed by the manufacturer.

B. **Boring, Plowing or Trenching:** The conduit may be directional bored to minimize disruption to the existing improvements or may be plowed or trenched and shall be placed at a minimum depth of 24 inches below finish grade. Where NUCC conduit is plowed in, the plow shall feed the conduit from a spool into position and shall be non-injurious to the conduit or conductors. The NUCC shall be round and free of kinks as it is fed into the plow to ensure unrestricted movement of the conductors inside the conduit.

C. **Conduit Marker:** Wherever a conduit passes beneath a curbed street, the contractor shall furnish aluminum conduit markers that shall be installed in the curb immediately over the conduit location. The marker shall be 2 inches in diameter and 2 ¼ inches long and shall be clearly inscribed: City of KCMO - ELECTRICAL CONDUIT. The conduit marker shall be installed in the top of the curb by drilling the curb and epoxying the conduit marker in place. The face of the marker shall be flush with the top of the curb. Pavement shall not be disturbed without the written permission of the owner and the City. Conduit shall be bored under existing pavement or concrete surface. All disturbed areas shall be restored to the satisfaction of the City.

D. **Rigid Metal Conduit (RMC):** may be used at all locations where conduit is exposed, above grade. RMC shall be surface mounted and supported as required by NFPA 70 (NEC) and the manufacturer. All fittings shall be manufactured, threaded, and listed for use with RMC.

E. **Liquid Tight Flexible Metal Conduit**: is permitted in links less than four feet in length to connect ridged metal conduit to fixtures or in a conduit run where expansion is needed. LFMC is only permitted when all portions of the conduit are greater than 10 feet above grade or other accessible locations. All fittings shall be manufactured and listed for use with LFMC.

2803.8 Conductors/Cables

A. **Underground Conductors:** Distribution conductors shall be continuous and unspliced from the lighting controller to the first light pole or pull box and between light poles. Conductors shall be pulled with minimal dragging on the ground or pavement. Frame mounted pulleys or other suitable conductor pulling devices shall be used for pulling conductors out of conduits into pull boxes. Listed and labeled conductor pulling lubricant shall be used to facilitate pulling conductors in conduits. All conductors to be installed in one conduit shall be pulled in one operation, and all ends shall be taped to exclude moisture and shall be so kept until the splices are made or terminal appliances attached.

B. **Overhead Conductors:** Overhead cable installation includes cable, pole line hardware, anchors, guys, grounds, and all necessary connections. The work shall be done in accordance with these specifications, the standard drawings, the special provisions, the National Electrical Safety Code, and utility company requirements. All termination supports shall be by wedge clamp and made with bolted type connectors. When cut, the insulated conductors shall be secured to the messenger with aluminum tie straps. No mid-span cuts shall be made. New connectors shall be used as required. For overhead conductors, crimp-type connectors shall be used for all taps. Connections and bare parts of conductors shall be reinsulated by listed means.

C. **Grounding:** All electrical systems, equipment and appurtenances, including poles and cabinets, shall be properly grounded in accordance with NFPA 70 (NEC) requirements. All distribution and pole wiring shall include an equipment grounding conductor and be bonded at the pole hand hole grounding lug. All connections to grounding electrodes shall be a minimum No. 6 AWG copper wire made with exothermic welds or compression clamps as directed by the plan. The ground wire is to be run through a minimum ½-inch diameter conduit. At the lighting controller cabinet, the grounding conductor shall

connect to the neutral bus and the enclosure by means of a main bonding jumper.

D. On wood poles, the grounding conductor shall go up the pole and fasten to the luminaire. The lower 8 feet of the grounding conductor on a wood pole shall be covered with standard molding. The grounding conductor shall be bonded to any existing utility grounds.

2803.9 Splices: Conductor splices shall be made only in a junction box or pole. Splices in the distribution conductors will only be permitted where circuits branch or tee. Splices shall be made with a listed and labeled mechanical connection and shall be installed as recommended by the manufacturer. Connections and bare parts of conductors shall be reinsulated by listed means. All conductors passing through a pull or junction box shall be coiled once around the inside of the box to allow for splicing and connecting wires in the future. Wiring within boxes shall be neatly arranged.

2803.10 Pull or Junction Boxes: Pull or junction boxes shall not be installed in hard surfaces such as sidewalks and driveways unless approved by the City. In joint use boxes, conductors shall be clearly identified as street light conductors with permanent plastic tags. Additional pull boxes may be installed at the contractor's expense when approved by the City. The top edge of all pull or junction boxes shall be flush with grade. All boxes shall have ½-inch clean crushed aggregate or other porous material for a

minimum depth of 6-inches below the box for drainage. The excavated opening outside the junction box shall be wide enough to allow compaction of the backfill material as described in section 2803.4.

2803.11 Lighting Control Cabinet: The lighting control cabinet shall be installed according to the manufacturer's recommendation. The lighting control cabinet shall be grounded per 2803.8. The grounding electrode shall have a resistance to ground of 25 ohms or less. If the resistance is more than 25 ohms, the contractor shall install additional electrodes which are bonded to the first, until the required resistance is achieved.

2803.12 Circuit Breakers, Contactors and Terminal Blocks: Circuit breakers, contactors and terminal blocks shall be installed according to the manufacturer's installation instructions.

2803.13 Breakaway Fused and Non-Fused Connectors: Fuses shall be installed according to the manufacturer's installation instructions.

2803.14 Photoelectric Controls: Photoelectric controls shall be installed according to the manufacturer's installation instructions. Controls for a system fed from a lighting control cabinet shall be mounted within the cabinet adjacent to the window. A shorting cap shall be placed in the receptacle in each light fixture. For direct fed systems, a photoelectric control shall be installed in each light fixture.

2803.15 Poles and Arms: Poles and arms shall be cleaned of wrapping, shipping material, dirt, grease, etc. Scratches, abrasions or other surface damage shall be repaired to like new condition.

A. **Installation on Concrete Foundations:** Concrete foundations must cure for a minimum of 5 days prior to pole installation. A plumbing nut and washer shall be installed on each anchor bolt before the pole placement. The pole shall be erected, and a washer and nut placed on each anchor bolt. Using the lower nuts, the pole shall be brought into vertical alignment (plumb), the top nuts tightened, and the anchor bolt covers installed. The opening between the pole base and the foundation shall be taped and grouted as shown on the plans or in the contract documents.

B. **Installation on Screw Anchor Foundations:** For screw anchor foundations, the pole shall be fastened to the foundation using a hex head or carriage bolt. A washer shall be placed between the hex head bolt and the bottom of the foundation. The pole shall be erected and a washer, lock washer and nut installed. The pole shall be checked for plumb, minor corrections may be made using galvanized or cadmium

plated steel shim stock, the nuts tightened, and the anchor bolt coversinstalled.

C. **Wood Pole Installations:** Wood poles shall be direct buried to depth identified on the plan but shall be no less than 10% of the finished height plus two feet. The hole shall be backfilled per 2803.4 with soil or AB-3 containing a minimum 7% moisture content. All pole line hardware, anchors, guys, grounds, and connections shall be installed as identified on plans. All wood poles shall be plumb within ±2.5 degrees in all directions and positioned such that the bracket arm and luminaire is perpendicular to the street centerline within ±7 degrees.

D. **Bracket Arms:** Bracket arms for luminaires shall project from the street side of the pole and be perpendicular to the roadway unless otherwise identified on the plan. A rubber grommet shall be installed around the conductor entrance hole at the top of the light pole where applicable. The bracket arm is to be attached to the pole as required by the manufacturer. Conductors shall not be pinched when bracket arms are attached to poles. For poles with dual luminaires, pole and bracket conductors shall be identified by means of permanent plastic identification tags to indicate the directional orientation of each luminaire, unless otherwise specified by the City.

E. **Wiring:** For poles other than wood, the conductors within the pole must be minimum 10 AWG copper and shall be connected to the distribution system through in-line, waterproof, breakaway fuse holders

installed in the pole wiring and fused with a 10-amp fuse. The grounding conductor shall not be fused. The fuse holder for the grounding conductor must have a listed copper slug. A minimum of 18 inches of slack shall be left in the pole wire and distribution wire at the hand hole so that the fuse holder can be brought out of the pole for fuse replacement or disconnection. The conductors shall be without splices from the fuse holder to the connection at the luminaire. In joint use poles, conductors shall be clearly identified as street light conductors with permanent plastic identification tags.

2803.16 Luminaires: The luminaire shall be installed on the bracket arm as specified by the manufacturer. The luminaire shall be adjusted and leveled in accordance with the manufacturer's instructions and roadway geometry and characteristics to place the nadir directly below the light center, unless shown otherwise on the plans. Luminaires shall be cleaned of wrapping, shipping material, dirt, grease, etc. Scratches, abrasions or other surface damage shall be repaired to like new condition.

2803.17 Lamps: The installation date shall be marked on the base of the lamp prior to installing it in the luminaire housing.

2803.18 Identification Labels: The contractor shall furnish and install luminaire and controller cabinet identification labels according to the approved plans, special provisions, standard drawings and contract documents.

Labels intended for mounting on wood poles shall be applied to a metal or plastic placard that can be attached directly to the pole.

The label shall be positioned on the vertical axis of the pole facing the street and 8-10 feet above the pavement surface. Labels on cabinets shall be positioned near the top of the door adjacent to the door hinge.

2803.19 Wood Pole Ownership Tags: The Contractor shall furnish and install pole tags to identify Kansas City Missouri ownership.

SECTION 2804 REMOVALS AND RELOCATIONS

2804.1 Scope: This section governs the labor, materials, and equipment necessary for the performance of all work required for the removal and/or relocation of the street lighting system as shown on the approved plans and in the contract documents.

2804.2 Removals and Relocations: All removals and/or relocations shall be noted and identified on the approved plans, special provisions, standard drawings and contract documents. An itemized removal schedule and/or relocation plan shall be submitted. Any damage sustained to the lighting unit during the removal, relocation or storage shall be repaired, or replaced in kind, to the satisfaction of the City at the contractor's expense. Site restoration shall conform to these specifications.

A. **Removals:** This item shall consist of the disconnection and removal of poles, aerial and underground conductors, luminaires, all associated apparatus, connections and backfilling the pole holes and other associated work specified herein. Abandoned sections of buried conductors shall be de-energized at its power source, taped and labeled "abandoned". When required by the City, the Contractorshall carefully remove the existing lighting equipment (poles, arms, fixtures, etc.) in the event that they are to be returned to their original owner. The Contractor shall coordinate this process with the owner so that the equipment is returned in a satisfactory condition. If required, the Contractor shall also be responsible for the proper disposal of material according to federal, state, and local ordinances and regulations at the Contractor's cost.

B. **Relocations:** The re-use of existing poles and appurtenant items will be acceptable under this item, upon physical inspection and approval by the City. Any additional materials required to make the

relocated equipment operational shall be at the contractor's expense. Equipment (poles, foundations, controllers, pull-boxes, etc.) shall be relocated as indicated on the plans, specifications, the standard drawings and special provisions. Any damage sustained to the lighting unit or lighting system during the relocation operation shall be repaired, or replaced in kind, to the satisfaction of the City at the contractor's own expense. Relocated poles shall incorporate cable retainers.

SECTION 2805 SYSTEM TESTING AND ACCEPTANCE

2805.1 Scope: This section governs the labor, materials, and equipment necessary for the performance of all work required for system testing and acceptance in accordance with the approved plans, special provisions, standard drawings and contract documents.

2805.2 Conductor Testing: Prior to final inspection, the contractor shall test the conductor insulation resistance. Each conductor shall be tested to ground with a meg-ohmmeter at 500 volts. Readings in each case shall be infinity. The resistance test shall be performed by the contractor in the presence of and documented by the City.

The ground rod shall have a resistance to ground of 25 ohms or less. If the resistance is more than 25 ohms, the contractor shall install additional ground rods, which are bonded to the first ground rod, until the required resistance is achieved.

2805.3 Operational Testing: The contractor is responsible for testing the completed street lighting system. Prior to acceptance, the contractor shall schedule an inspection with the City as soon as the system is ready. All street lighting system elements shall function properly as a complete system for a minimum period of fourteen (14) days before acceptance is granted. The 14 day period shall be cyclical and initiated by the City. Any malfunction observed or recorded shall stop the test period for the entire system. A new 14 day test period shall start when the malfunction has been repaired to the satisfaction of the City. After the burn test is completed, the street light system must remain in operation.

2805.4 Maintenance Information: Before acceptance of the work, the contractor shall furnish the City electronic copies of the manufacturers' written maintenance and operation instructions for all lighting equipment if requested by the City. At a minimum, the manufacturer's instructions shall include documented, organized instructions, wiring and component layout diagrams, and parts lists with part numbers.

2805.5 As-Built Plans: Prior to the final completion and payment, the Contractor shall submit final as

built plans for City approval. As-built plans shall be submitted in both electronic and hard copy and shall include any changes made during construction.

2805.6 Final Clean Up: Before final acceptance, the contractor shall restore to a condition equal to or better than that existing prior to construction, for all property, both public and private, within, adjacent to and beyond the limits of construction that have been disturbed or damaged while executing the work. This includes, but not limited to, existing curb and gutter, sidewalk, pavement, drainage structures, irrigation systems, street lighting and traffic signal equipment. All unpaved areas damaged during construction shall be restored to the original condition. Unless otherwise directed, grassy areas, which were originally sodded, shall be re-sodded. All restoration work shall be acceptable to the City.

DIVISION II
CONSTRUCTION AND MATERIAL SPECIFICATIONS
SECTION 2800 STREET LIGHTING

SECTION 2806 MEASUREMENT AND BASIS OF PAYMENT

2806.1 Scope: This section governs the method of measurement and basis for payment for all labor, equipment, tools and materials for the performance of all work necessary to complete an operational street lighting system. There shall be no measurement or separate payment for any items of work, appurtenances, incidental work or parts notspecifically identified or listed in the contract documents and all costs pertaining thereto shall be included in the contract unit prices for other items, which are listed in the contract documents.

2806.2 Method of Measurement: The quantities of accepted work will be measured or determined as follows:

A. **Pole and Cabinet Foundations:** Pole and cabinet foundations will be measured as a quantity of one for each type listed in the contract documents.

B. **Trenching:** Trenching will be measured along the trench from center of facility to center of facility to the nearest 0.1 linear foot.

C. **Conduit:** Conduit will be measured along the conduit from center of facility to center of facility to the nearest linear foot.

D. **Underground Conductor:** Underground conductor will be measured along the trench line from center of facility to center of facility to the nearest 0.1 linear foot for each size of conductor installed. An additional 5 feet shall be added to the measured length for each entry into and for each exit out of a foundation, lighting control cabinet or junction box. The measured ground length, plus additions, multiplied by the number of conductors in the trench equals the number of conductor feet. If Nonmetallic Underground Conduit with Conductors (NUCC) is specified, the cable will consist of the conduit and all conductors contained therein for the measured ground length, plus additions.

E. **Overhead Cable:** Overhead cable will be measured on the ground along the pole line from center of facility to center of facility, to the nearest 0.1 linear foot. An additional 25 feet shall be added to the measured length for each connection.

F. **Lighting Control Cabinets:** Lighting control cabinets will be measured as a quantity of one for each type listed on the approved plans, special provisions, standard drawings and contract documents.

G. **Poles and/or Luminaires:** Poles and/or luminaires will be measured as a quantity of one for each type listed on the approved plans, special provisions, standard drawings and contract documents.

H. **Pull or Junction Boxes:** Pull or junction boxes will be measured as a quantity of one for each type listed on the approved plans, special provisions, standard drawings and contract documents.

I. **Line Hardware, Anchors, Guys, and Connections:** Line hardware, anchors, guys, and connections will be measured as a quantity of one for each type listed on the approved plans, special provisions, standard drawings and contract documents.

J. **Spare Equipment:** Spare equipment will be measured as a quantity of one for each type listed on the approved plans, special provisions, standard drawings and contract documents.

K. **Miscellaneous Equipment:** Miscellaneous equipment will be measured as determined on the approved plans, special provisions, standard drawings and contract documents.

L. **Removals:** Removals will be measured as one per contract.

M. **Relocations:** Relocations will be measured as one per contract.

N. **Street Lighting System:** Street Lighting System will be measured as one per contract.

DIVISION II
CONSTRUCTION AND MATERIAL SPECIFICATIONS
SECTION 2800 STREET LIGHTING

2806.3 Basis of Payment: Payment for quantities of accepted work will be made as follows when included in the Contract Schedule of Values:

A. **Pole and Cabinet Foundations:** Pole foundations will be paid for by one of the following:
1. Contract unit bid price
2. Contract lump sum bid price

B. **Trenching:** Trenching will be paid for by one of the following:
1. Contract unit bid price
2. Contract lump sum bid price

C. **Conduit:** Conduit will be paid for by one of the following:
1. Contract unit bid price
2. Contract lump sum bid price

D. **Underground Conductors:** Underground conductors will be paid for by one of the following:
1. Contract unit bid price
2. Contract lump sum bid price

E. **Overhead Cable:** Overhead cable will be paid for by one of the following:
1. Contract unit bid price
2. Contract lump sum bid price

F. **Lighting Control Cabinets:** Lighting control cabinets will be paid for by one of the following:
1. Contract unit bid price
2. Contract lump sum bid price

G. **Poles and/or Luminaires:** Poles and/or luminaires will be paid for by one of the following:
1. Contract unit bid price
2. Contract lump sum bid price

H. **Pull or Junction Boxes:** Pull or junction boxes will be paid for by one of the following:
1. Contract unit bid price
2. Contract lump sum bid price

I. **Line Hardware, Anchors, Guys, and Connections:** Line hardware, anchors, guys, and connections will be paid for by one of the following:
1. Contract unit bid price
2. Contract lump sum bid price

J. **Spare Equipment:** Spare equipment will be paid for by one of the following:
1. Contract unit bid price
2. Contract lump sum bid price

K. **Miscellaneous Equipment:** Miscellaneous equipment will be paid as determined on the approved plans, special provisions, standard drawings and contract documents.

L. **Removals:** Removals will be paid for at the Contract lump sum bid price.

M. **Relocation:** Relocation will be paid for at the Contract lump sum bid price.

N. **Street Lighting System:** The complete, functioning street lighting system including all equipment, materials, labor, supervision, and any additional appurtenances necessary to construct the system depicted on the plans will be paid at the contract lump sum bid price.

SECTION 02930 - EXTERIOR PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Trees.
2. Shrubs.
3. Ground Covers
4. Perennials.
5. Native and ornamental grasses
6. Mulches.
7. Topsoil and Engineered Soils.

B. Related Sections include the following:

1. Division 2 Section "Storm Sewers" for below-grade drainage of landscaped areas, paved areas, and wall perimeters.

1.3 DEFINITIONS

A. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.

B. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. 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 exterior plant required.

C. Finish Grade: Elevation of finished surface of planting soil.

D. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments. Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

E. Engineered BMP Soil: Soil produced off-site by homogeneously blending sand, compost and topsoil to produce planting mix for storm water collection areas.

F. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

1.4 SUBMITTALS

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

B. Samples for Verification: For each of the following:

1. 5 lb (2.2 kg) of mineral mulch for each color and texture of stone required, in labeled plastic bags.

C. Product Certificates: For each type of manufactured product, signed by product manufacturer, and complying with the following:

1. Manufacturer's certified analysis for standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

D. Qualification Data: For landscape Installer.

E. Material Test Reports: For imported topsoil, planting soil and engineered BMP soil mix.

F. Planting Schedule: Indicating anticipated planting dates for exterior plants.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful completion of similar projects. Submit 5 examples.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when exterior planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil, Planting Soil and Engineered Soil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio**;** deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability for plant growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
2. Topsoil, Planting Soil and/or engineered soils shall be supplied by soil supplier approved by the Landscape Architect.

D. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."

E. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches (150 mm) above ground.

F. Observation: Owner or Owners Representative may observe trees and shrubs either at place of growth or at site at the Owner's representatives discretion, before planting for compliance with requirements for genus, species, variety, size, and quality. Owners Representative retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Owners Representative of sources of planting materials seven days in advance of delivery to site.

2. All plant material shall be sourced within 200 miles of the project site.

G. Pre Installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver exterior plants freshly dug.

1. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

B. Do not prune trees and shrubs before delivery, except as approved by Owners Representative. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.

C. Handle planting stock by root ball.

D. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.7 COORDINATION

A. Planting Restrictions: Plant during one of the following periods.

1. As approved by Owners Representative

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

C. Coordination with Lawns: Plant trees and shrubs after finish grades are established and before planting lawns, unless otherwise acceptable to Owners representative.

1. When planting trees and shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.

1.8 WARRANTY

A. Special Warranty: Warrant the following exterior plants, for the warranty period indicated, against defects including death and unsatisfactory growth or incidents that are beyond Contractor's control. Warranty period shall start when the project is complete and the work has been accepted by the Owner.

1. All plant material shall be guaranteed to be true to name and in vigorous growing condition.

2. Warranty Period for Trees and Shrubs: Two years from date of Substantial Completion
3. Warranty Period for Ground Covers / Perennials / Native and Ornamental Grass Plants: Two years from date of Substantial Completion.

B. Replacements: Dead or dying material of 25% or more of a plant shall be removed immediately and replacement made as soon as practical.

C. Any plant material replaced during the two year replacement period shall be guaranteed to remain healthy through the summer if replaced in the spring. If replaced in the fall, the plant shall be guaranteed to fully leaf out the following spring.

D. Replacement of plants or damage to lawn areas as a result of vandalism or acts of negligence on the part of others may be made on order of Landscape Architect and will be at the Owner's expense.

1.9 MAINTENANCE/ESTABLISHMENT

A. General Maintenance: Landscape Contractor shall be responsible for cultivating and watering trees, shrubs, ground covers, perennials, and native and ornamental grasses so that at all time the planting areas have a presentable appearance and the plants are in a healthy condition. This responsibility shall not cease until the completion and acceptance of the contract by the Owner or upon completion of the Two year warranty period, whichever comes first.

B. Landscape Bed Maintenance: Maintenance of all storm water collection landscape beds to ensure proper function and establishment of all plant materials within shall be conducted as follows and in accordance with the Annual Maintenance Scope and Schedule of Tasks for Storm Water Landscape Beds" in the following section.

1. Maintenance Period: Two (2) year after planting operations are complete and accepted by the Owner.

C. Trees : Maintain by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, repair or reset tree stabilization as required, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease.

1. Maintenance Period: Two (2) year after planting operations are complete and accepted by the Owner.

1.10 ANNUAL MAINTENANCE SCOPE AND SCHEDULE OF TASKS FOR STORMWATER COLLECTION LANDSCAPE BEDS

A. This work shall consist of maintaining the storm water collection improvements identified as part of this project.

B. The work of maintenance shall be to perform all activities as necessary to keep the storm water collection facilities operating and properly functioning at all times in accordance with the original design thereof. Said maintenance shall generally include routine inspection, trash and debris removal, weed control and removal, watering, silt removal and plant debris clean-up. In addition, surrounding concrete curbs, forebays and planter curbs shall be kept in good condition at all times. These operations shall be conducted in accordance with the Operations and Maintenance Schedule for this project and may included both hand and mechanical means for all plant related operations. Pre-emergent chemical treatment is acceptable for weed control. Any repairs to these facilities that exceed routine maintenance shall be reported to the owner immediately.

C. The Contractor shall record all activities performed. Each record sheet shall include the date, a brief description of general observations, weather conditions, activities performed (if any), and plant materials replaced, noting size, species and location.

D. Maintenance Program:

20Th Street Storm Water Collection Facilities		
Maintenance Program		
Task	**Maintenance Activity**	**Frequency**
Weed Control	Hand weeding should be conducted on a regular basis, and at a minimum of six times during the active growing season. "Weeds" should be carefully identified utilizing the plant identification photo chart and planting scheme provided. Some native species may look "weedy" early in the growing season. Weeding often will help to avoid unintentionally removal of desirable plant material. Weeds should be pulled to remove the roots to deter re-growth. Pre-Emergent, if used, should be applied according to the schedule. Once the plants are established, the need for weed control may be reduced.	Perform as needed / Inspect bi-weekly
Watering	Water newly planted material ½" to 1" per week depending on rainfall. The soil should be moist but not soggy. Regular inspection will indicate if water is needed. After the first growing season, watering should only be necessary during periods of drought. After three years, the plants should be fully established and watering will no longer be necessary, except in periods of extreme drought.	Perform as needed
Plant Materials	Grasses and perennials with seed heads may be allowed to remain over the winter for seasonal interest. Cut all remaining vegetation to 6 inches prior to new growth in late February to Early March. Inspect all plant materials on a regular basis during the active growing season and remove any dead or diseased plants. Replace with original plant species and size to fill in planting bed only as necessary if removal results in bare spots larger than 18".	Seasonal / Perform as necessary to maintain a neat appearance
Silt Removal / Mulching	Inspect each BMP regularly to ensure proper functioning (each bed should fully drain within 48 hours). Remove silt build up from concrete forebays and rock dissipators before it reaches the top of the concrete baffles (3"). This operation may best be performed by hand shoveling. Redistribute mulch as necessary to maintain flow at all entry points into the garden beds. Remove sediment build up from planting beds when sediment covers more than 25% of the mulch. Excavate mulch and wash or replace with new material similar in type and diameter. This operation may be performed by hand or vacuum truck. In either method silt must be removed from the site and disposed of properly. Do not wash into street or adjacent property. Remove and replant plants that may be disturbed by this process. (Do not disturb tree roots.) Inspect clean outs / vacuum as necessary.	Perform as needed /Inspect monthly
Clean-Up / Trash and Debris Removal	Remove trash and plant debris from the forebay and planting beds regularly or before build up occurs. Remove plant debris from the beds whenever plants are cut back generally in the spring and once more during the growing season.	Perform as needed / Inspect twice weekly

E. Annual Inspection and Maintenance Schedule (By Month):

March:

- Remove weeds
- Remove litter and debris from beds and forebays
- Maintain double ground hardwood mulch (dyed dark brown) to maintain 3" min. depth (South side of 20th St. only)
- Replace any missing River Jacks rock or washed areas of gravel mulch
- Replace dead plant material if needed to fill in bare spots
- Remove silt if more than 3" of build up in forebay or 1 1/2" inches in mulch area (where applicable)
- Cut and remove top growth of perennials and ornamental grasses before new green growth appears
- Apply 1st application of pre-emergent herbicide
- Inspect for pests and disease (herbaceous materials, shrubs and trees)– treat accordingly
- Inspect curbing / inlets / forebays. Report any repairs as necessary

April:

- Remove weeds
- Remove litter from beds and forebays
- Remove silt if more than 3" of build up in forebay or 1 1/2" inches in mulch area (where applicable)
- Inspect for pests and disease – treat accordingly

May:

- Remove weeds
- Remove litter from beds and forebays
- Remove silt if more than 3" of build up in forebay or 1 1/2" inches in mulch area (where applicable)
- Replace dead plant material
- Apply 2nd application of pre-emergent herbicide with
- Inspect for pests and disease – treat accordingly
- Remove any dead/damaged branches or limbs on trees

June:

- Remove weeds
- Remove litter from beds
- Remove silt if more than 3" of build up in forebay or 1 1/2" inches in mulch area (where applicable)
- Inspect for pests and disease – treat accordingly

July:

- Remove weeds
- Remove litter from beds and forebays
- Remove silt if more than 3" of build up in forebay or 1 1/2" inches in mulch area (where applicable)
- Inspect for pests and disease – treat accordingly
- Check for signs of stress and water plants during periods of drought

August:

- Remove weeds
- Remove litter from beds and forebays
- Remove silt if more than 3" of build up in forebay or 1 1/2" inches in mulch area (where applicable)
- Inspect for pests and disease – treat accordingly
- Check for signs of stress and water plants during periods of drought

September:

- Remove weeds
- Remove litter from beds and forebays
- Remove silt if more than 3" of build up in forebay or 1 1/2" inches in mulch area (where applicable)
- Inspect for pests and disease – treat accordingly
- Replace dead plant material

October:

- Remove weeds
- Remove litter from beds and forebays
- Remove silt if more than 3" of build up in forebay or 1 1/2" inches in mulch area (where applicable)
- Replace dead plant material if needed to fill in bare spots
- Maintain double ground hardwood mulch (dyed dark brown) to maintain 3" min. depth (South side of 20th St. only)
- Replace any missing River Jacks rock or washed areas of gravel mulch
- Inspect for pests and disease – treat accordingly
- Inspect curbing / inlets / forebays. Report any repairs as necessary

November/December/January/February

- Remove litter and debris from beds

PART 2 - PRODUCTS

2.1 TREE AND SHRUB MATERIAL

A. General: Furnish nursery-grown trees and shrubs 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.

B. Grade: Provide trees and shrubs of sizes and grades complying with ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Owners representative, with a proportionate increase in size of roots or balls.

C. Label each tree and shrub with securely attached, waterproof tag bearing legible designation of botanical and common name.

D. Label at least one tree and one shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

E. If formal arrangements or consecutive order of trees or shrubs is shown, select stock for uniform height and spread, and number label to assure symmetry in planting.

2.2 SHADE AND FLOWERING TREES

A. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.

1. Provide balled and burlapped trees.
2. Branching Height: One-third to one-half of tree height.

B. Small Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:

1. Stem Form: Single stem
2. Provide balled and burlapped trees.

2.3 DECIDUOUS SHRUBS

A. Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

1. Provide container grown material as specified on plans.

2.4 CONIFEROUS EVERGREENS

A. Form and Size: Normal-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.

1. Provide container grown material as specified on plans.

2.5 BROADLEAF EVERGREENS

A. Form and Size: Normal-quality, well-balanced, broadleaf evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.

1. Provide container grown material as specified on plans.

2.6 GROUND COVER / PERENNIAL / NATIVE AND ORNAMENTAL GRASS PLANTS

A. Provide healthy, field-grown from a commercial nursery, plants of species and variety indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1 and the following requirements:

1. As indicated on drawings.

2.7 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 6 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Import topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land**,** bogs or marshes.

2. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
   a) Only where shown on plans, and
   b) As approved by Landscape Architect\

2.8 BMP SOIL MIX

A. BMP soil mix shall be a custom blend of Sand, Topsoil and Organic Material sourced from a local soil supplier using local resources and conforming to the characteristics and performance of this section. The custom blend shall consist of the above materials mixed by volume:
- 4 parts Sand
- 3 parts Topsoil
- 3 parts Organic Material

The parts by volume of mix shall be modified as necessary to achieve the final testing criteria as outlined further in this specification.

B. Sand:
1. Sand for amending the texture and infiltration rate of the BMP growing medium shall be a finely graded, processed and washed sand conforming to the characteristics below:

US Standard Sieve Mesh	Diameter of Sieve (mm)	Allowable Range
5	4.0	85% Passing
10	2.0	97% to 100% Passing
100	0.15	<5% Passing 100 mesh (0.15mm) and retained on a No. 270 mesh (0.05mm)
Silt	0.05-0.002 mm	≤ 5%
Clay	‹ 0.002 mm	≤ 3%

C. Topsoil:
1. Topsoil shall comply with the USDA textural class of a sandy loam. Topsoil shall be screened to removed debris and stones. The topsoil shall have 100% passing the 6.3 millimeter (1/4-inch) screen. Topsoil shall be free of weeds and weed propagules.
   a. Soil textural class shall be consistent throughout the supply of Topsoil for the entire project. Consistency will be determined by deviation in sand, silt and clay content and approved submittal.
   b. Sand content shall not be less than 60%. Clay content shall not exceed 5%.
2. The topsoil shall be free from subsoil, clay lumps, stones or similar objects larger than 1/2" in greatest diameter, brush, stumps, roots, objectionable weeds or litter, excess acid or alkali or any other material or substance which may be harmful to plant growth. Foreign material shall not exceed 2% by volume or weight.

D. Organic Material:
1. Organic material shall be a locally sourced homogeneous and friable mixture of partially decomposed organic matter resulting from composting.
2. Minimum pH of 7.0.
3. Shall be free of foreign matter over 2mm, such as metal, glass & synthetic polymers (e.g. plastic and rubber)

E. Testing
1. Using ASTM protocols, the Testing Agent shall evaluate the growing medium materials. Testing shall be performed on cores compacted in the lab to a dry bulk density of 1.5 to 1.7 grams/cm3. The prepared cores shall meet the following minimum criteria:

Test	Criteria
*Infiltration Rate (K-SAT) @ 20˚ C	1 – 2 inches per hour
Total Porosity	35% to 45%
Organic Matter Percentage (Dry Weight)	5% to 8%
*Water Retention @ 0 to 75cm	Saturation % > 50%, <85%
*Water Retention @ 75 to 700cm	Saturation % > 45%

*TDD Developed Test

2. Upon approval of soil texture and infiltration rate, the sample shall be forwarded by the Testing Agent for macro and micro-nutrient analysis.

2.9 ORGANIC SOIL AMENDMENTS

A. Liquid Microbial Soil Inoculant/Bio-stimulant: VermaPlex drench for planting of shrubs, bare root materials, and trees. Use drench prepared with 1 volume VermaPlex to 25 volumes of water. Trees: Apply 1.5 gallons per caliper inch after placing backfill. Apply 0.5 gallons of drench per gallon container for shrubs and natives after placing backfill and prior to mulching.

Supplier:
Southern Organics & Supply
Contact: Kim Nytray
Phone: 866-240-8501
Fax: 704-283-2104
Web: www.southernorganicsandsupply.com

Or approved equal.

B. Biofertilizer/Conditioner Amendment: Worm castings produced without any waste products plus microbial enrichment. Larva free Pure Black castings as provided by Vermitechnology Inc. Minimum organic matter content of 30% by weight as determined by loss on ignition (ASTM D 2974-87 Method D). Castings shall be free of sticks, stones, and other debris and comply with the following:

Item	*Criteria*
Total Organic Matter	30% to 52%
pH	5.0 to 7.5
% Moisture (wet wt. basis)	30% to 50%

C. Application Rates: Trees/Shrubs-Apply 0.5 pounds Castings per gallon container size of tree or shrub. Incorporate Castings into bottom of planting hole. For planting beds apply 15 pounds of Castings per 100 SF. Rake castings into the upper 1 to 2 inches.

D. Organic fertilizer applications for Trees and Shrubs shall be provided as follows:

1. For trees and shrubs: Nutri-Cast Biofertilizer. Biofertlizer contains endo and ecto mycorrhizae and yeasts that acquire nitrogen and water from the atmosphere. Apply 1.5 pounds Nutri-Cast per caliper inch of tree. Place Nutri-Cast on top of ball and work into backfill. For gallon containers apply 0.5 pounds of Nutri-Cast per container into the surface 2 inches.

   Supplier:
   Southern Organics & Supply
   Contact: Kim Nytray
   Phone: 866-240-8501
   Fax: 704-283-2104
   Web: www.southernorganicsandsupply.com

   Or approved equal.

E. Compost: Humus rich type derived from the aerobic, thermophilic decomposition of leaves and yard wastes. Textures shall be similar to a shredded peat. The compost shall be considered mature and usable when 60 percent decomposition has been achieved. The compost shall have no offensive smell, no identifiable organic materials, and will not reheat more than 11 degrees C (20 degrees F) degrees above ambient temperature. Compost must be produced by a process to further reduce pathogens and weed seeds.

Animal or poultry manure or products, and bio solids, at any stage of decomposition, shall not be acceptable as compost or components of the compost.

Compost foreign particle restrictions up to 3% at 4 mm (0.16 inch) will apply to the shredded pieces from the plastic bags used to transport feedstocks to the composting facility, but will be considered acceptable if visible in the finished product.

No chemical contaminant, including pesticides, can be present in concentrations that would result in toxic effects to soil organisms, plants, or animals which reside in or on the composted soil areas or use the treated area for food or shelter. At the time of delivery to the Project, the compost shall be in a condition considered safe for exposure to dusts during handling.

Compost shall meet the following requirements:

	Min	Max
Organic Matter Content	30%	----
C/N Ratio	6:1	20:1

pH	5.5	8.5
Moisture Content	5%	55%
Bulk Density (lbs/cu.yd.)	700	1500
Insert Materials (trash bag shreds)	----	3%@0.15 inch
Soluble salts (mmhos/cm)	----	10
Screened Particle Size	----	¾ inch
Seed Germination Tests	80%	100%

Retain paragraph above or first paragraph below if applicable. Retain above if sphagnum peat moss, an acidic peat, is required. Retain below if peat types with a neutral pH are required.

2.10 MULCHES

A. In addition to organic mulches, mineral or inorganic-stone mulches may be required. Some repetition of general descriptions occurs here and in "Organic Soil Amendments" Article. Indicate function and location of each material to suit Project.

B. Mineral Mulch: Use in landscape areas per plans. Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of following type, size range, and color:

1. Smooth River Jacks or as indicated on drawings. (Available from Sturgis)
   a. Size Range: 4”-6’ and 6”-8” diameter
   b. Color: Uniform color range, acceptable to Landscape Architect
2. Decorative Gravel: Missouri Rainbow 2” (Available from House of Rock)

C. Organic Mulch: Double ground and aged hardwood, free from deleterious materials and suitable for trees, shrubs and groundcover. Color: Brown to Dark Brown. Hardwood mulch shall be utilized at a 3” depth within standard, non BMP plant beds. Contractor shall submit sample for approval.

2.11 WEED-CONTROL BARRIERS

A. Composite Fabric: Mirafi 140N or approved equal

2.12 STAKES AND GUYS

A. Upright and Guy Stakes: Studded Steel T-post, 72” (6 ft) length minimum.

B. Guy and Tie Wire: ASTM A 641, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch diameter.
C. Strap Chafing Guard: Reinforced Nylon or Canvas at least 1-1/2 inch with grommets to protect tree trunks from damage.
D. Hose Chafing Guard: Reinforced rubber or plastic hose at least ½ inch in diameter, black, cut to lengths required to protect tree trunks from damage.

2.13 MISCELLANEOUS PRODUCTS

F. Anti-desiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

PART 3 - EXECUTION

3.1 BIORETENTION CONSTRUCTION

A. Prior to beginning construction of the bioretention profile, the contractor shall verify the bioretention subgrade, subdrainage structures, subdrainage gravel and sand is installed and approved by the Owner's representative.

B. During installation of soil materials, provide erosion control measures to prevent contamination by eroded silt. Any contaminated materials shall be removed and replaced at no additional cost to the Owner.
    1. Ensure these erosion control measures, including sand, are in place prior to installation of materials in the BMP basin.

C. Prior to installation, the contractor shall scarify the subgrade surface to a depth of 2" across the entire bioretention bottom.

D. Provide Coarse Sand to the depth required over the drainage gravel only, as detailed in the plans.
    1. Establish a smooth and even surface across the top of the sand.
    2. Re-establish finished surface as required and re-compact sand layer until a finished surface with no deviations greater than 1" per square foot is attained.

E. Provide approved BMP Growing Medium to the depth required and the extents of the MP basin.
    1. Establish a smooth and even surface across the top of the Growing Medium to design elevation. Do not compact.
    2. Wet Growing Medium to settle in place. Add additional Growing Medium as necessary to fill voids and settlement to insure soil is completely settled. Do not compact.
    3. Re-establish finished surface as required until a finished surface with no deviations greater than +/- ½" from design elevation.

F. Using approved Topsoil, establish a smooth transition to the surrounding grades outside extents of BMP basin, feathering the placed material as necessary.
    1. Compact all placed topsoil to 75% (maximum) standard protector.
    2. Re-establish finished surface as required and re-compact until a finished surface with no deviations greater than 1" per square foot is attained.

3.2 PRE-PLANT AMENDMENTS

A. Incorporate amendments into the Growing Medium as follows:
    1. VermaMax – 15 pounds per 1000 SF into the top 5 inches of the finished surface.
    2. Nutri-Cast – 20 pounds per 1000 SF into the top 5 inches of the finished surface.
        a. Following incorporation, re-establish a smooth and even surface.
        b. Contractor to document each application in a log or plan markup which shall be submitted with the turnover documents.

3.3 POST-PLANT DRENCH

A. Apply drench to the planting area at the following rates, prior to mulch installation:
    1. Verma-Plex: Apply Five (5) gallons per 1000 SF of 20% VermaPlex solution to planting area. Coral Calcium Wettable powder shall be added to the mix at a rate of 0.8 ounces (dry weight) per 1000 SF of planting area.

B. Contractor to document each application in a log or plan markup which shall be submitted with the turnover documents.

3.4 CLEANUP AND PROTECTION

A. Keep adjacent paving and construction clean and work area in an orderly condition.

3.5 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

3.6 EXAMINATION

A. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION FOR PLANTING

A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple exterior plantings. Stake locations, outline areas, adjust locations when requested, and obtain Owners representative's acceptance of layout before planting. Make minor adjustments as required.

D. Lay out exterior plants at locations directed by Owners representative. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

E. 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.

1. If deciduous trees or shrubs are moved in full leaf, spray with anti-desiccant at nursery before moving and again two weeks after planting.

3.3 PLANTING BED ESTABLISHMENT (NON STORMWATER COLLECTION AREAS or AS INDICATED ON THE DRAWINGS) (SOUTH SIDE OF 20TH ST. ONLY)

A. Loosen subsoil of planting beds to a minimum depth as indicated on the plans.

B. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix (surrounding landscape areas).

a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

2. Spread planting soil mix to a depth as indicated on the drawings or 6 inches (100 mm) in surrounding landscape areas, but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 3 inches (50 mm) of subgrade. Spread remainder of planting soil mix.

C. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Finish soil grade shall be left 3” below curbs and sidewalks of planting beds other than tree and sod locations.

D. Restore planting beds if eroded or otherwise disturbed after finish grading and before planting.

3.4 EXCAVATION (STORMWATER COLLECTION AREAS)

A. Rototill subsoil of beds to a minimum depth as indicated on the plans. Construction activities shall be conducted in a manner that do not compact soils within the beds. Heavy equipment shall be kept out of the beds. Grading and excavation shall be conducted with lightweight, low-impact earth moving equipment with wide tracks, marsh tracks, or turf type tires, such as

a skid steer with rubber tracks. Grading and excavation equipment shall be approved by owner representative or engineer prior to project execution.

B. If space allows, beds shall be excavated with an excavator operating outside the beds. If equipment must enter the beds to excavate them, they shall consist of low-impact, lightweight equipment. Hand digging may be required to avoid utilities.

C. If an underdrain system is indicated on the plans after excavation of the bed, rake the bed smooth by hand, then install the underdrain system. Temporarily mark the edges of the underdrain with survey stakes.

D. Any compacted soil in the base of the beds shall be restored by ripping or deep tilling to a minimum depth of 12 inches. The BMP soil mix shall be placed in 6" lifts and raked out between lifts. Thoroughly rototill the first lift with tilled subsoil. Place a second 6 inch layer of BMP soil mix, then rototill again. Remove the survey stakes, finish placing the BMP soil mix to specified grades.

E. The BMP soil mix shall be placed by pouring into beds from the edges, then raking out by hand. Equipment shall not enter beds to place the planting mix.

F. Allow soils to settle before planting.

3.5 TREE AND SHRUB PLANTING

A. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball 1 inch (25 mm) above adjacent finish grades.

1. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
2. Place BMP soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of BMP soil mix.

B. Set container-grown stock plumb and in center of pit or trench with top of root ball 1 inch (25 mm) above adjacent finish grades.

1. Carefully remove root ball from container without damaging root ball or plant.
2. Place BMP soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of BMP soil mix.

C. Organic Mulching (any area where mineral mulch is not shown): Apply 3-inch (75-mm) average thickness of organic mulch extending a minimum of 12 inches (300 mm) beyond edge of planting pit or trench. Do not place mulch within 3 inches (75 mm) of trunks or stems.

D. Mineral Mulch (over weed barrier fabric): Apply -6-inch (75-mm**)** average thickness of organic mulch extending 12 inches (300 mm) beyond edge of planting pit or trench. Do not place mulch within 3 inches (75 mm) of trunks or stems.

3.6 TREE AND SHRUB PRUNING

A. Prune, thin, and shape trees and shrubs as directed by Owners representative.

B. Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise indicated by Owners representative, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are sizes after pruning.

3.7 GUYING AND STAKING

A. Stake trees as shown in Tree Planting detail on the drawings.

B. Approved tree guards shall be placed around the base of each tree trunk.

C. Any deviation from the detail shall not be accepted without prior approval by the Landscape Architect.

3.8 GROUND COVER / PERENNIAL / ORNAMENTAL AND NATIVE GRASS PLANTING

A. Set out and space plants as indicated on the drawings.

B. Dig holes large enough to allow spreading of roots, and backfill with planting soil.

C. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

E. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 PLANTING BED MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches (150 mm).

1. Place only where indicated on plans.

2. Material and Seam Treatment: Composite fabric with seams pinned.

B. Mulch backfilled surfaces of planting beds and other areas indicated.

1. Organic Mulch: Apply 3-inch (75-mm) average thickness of organic mulch over weed barrier fabric, and finish level with adjacent finish grades. Do not place mulch against plant stems.
2. Mineral Mulch/Gravel: Apply 2-inch (25-mm) average thickness of mineral mulch over weed barrier fabric, and finish level with adjacent finish grades. Do not place mulch against plant stems.
3. Mineral Mulch/River Jacks: Apply 8-inch (100mm) average thickness of mineral mulch, and finish level with adjacent finished grades over weed barrier fabric. Delete this Article if no edgings. Retain applicable paragraphs below; revise to suit Project.

3.10 CLEANUP AND PROTECTION

A. During exterior planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

3.11 DISPOSAL

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 02930

SECTION 03370 – SANITARY SEWER MANHOLE CONSTRUCTION

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers the construction of standard sanitary sewer manholes. Standard manholes shall be constructed complete with frame and cover, anchors, waterproofing, seals, barriers, joint sealant, fittings and all other specified requirements in accordance with 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 01015 – Specific Project Requirements.
B. Section 01300 – Submittals.
C. Section 02200 – Earthwork.
D. Section 02250 – Trenching, Pipe Embedment and Backfill.
E. Section 02702 – Sewer Pipe and Manhole Testing.
F. Section 03000 – Miscellaneous Concrete.
G. Section 05010 – Sanitary Sewer Manhole 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 A185	Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
ASTM A536	Standard Specification for Ductile Iron Castings.
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
ASTM C109	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
ASTM C191	Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle.
ASTM C443	Standard Specification for Joints for Circular Pipe and Manholes, Using Rubber Gaskets.
ASTM C478	Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
ASTM C827	Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.
ASTM C923	Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes and Laterals.
ASTM C990	Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants.

ASTM C1107	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).
ASTM D4976	Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.

1.05 DEFINITIONS

A. Paved Areas – Areas for which the final surfacing will be street pavement, shoulders, driveways, parking lots, sidewalks, gravel roads or other surface features.
B. Unpaved Areas – Areas for which the final surfacing is 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. Submit for approval general arrangement drawings showing manhole size, height and location of access cover, steps and all pipe penetrations.
    2. Submit for approval joint construction details.
    3. Submit for approval details on reinforcement if requested.
C. Product Data:
    1. Submit for review and approval manufacturer's catalogue/product data and installation instructions for the following:
        (a) Manhole adjustment rings.
        (b) Resilient connectors.
        (c) Joint sealant.
        (d) External joint seal.
        (e) Internal joint seal.
        (f) External frame chimney seal.
        (g) Grade ring liner.
        (h) Non-shrink grout.
        (i) Antimicrobial additive.
        (j) Waterproofing additive.
        (k) Color tinting additive.
D. Certificates:
    1. Certification from precast manufacturer that the precast structures were fabricated to include the specified antimicrobial additive, admixture identifier and waterproofing additives.
E. Other:
    1. Precast concrete mix design.
    2. Compressive strength testing of cylinders.
    3. Compressive strength testing of cores.

1.08 QUALITY ASSURANCE

A. The Contractor is responsible for the quality assurance and quality control of the Work.
B. The installation contractor shall be a licensed underground utility contractor licensed for such work in the state of Missouri. The installing contractor's license shall be current and be state certified/state registered.

C. Manufacturers of all precast concrete structures must be a KCMO "Approved Precast Concrete Product Supplier" as approved as part of the Public Works Quality Management Plan.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Cement, Aggregate and Reinforcement shall be in accordance with Section 03000 – Miscellaneous Concrete and as specified herein.
B. Handle materials and other accessories in such manner as to ensure delivery to the trench in a sound undamaged condition. Take special care not to damage linings. If the lining is damaged, the Contractor shall make satisfactory repairs.
C. Non-shrink grout – Deliver materials to project in Manufacturer's original, unopened packaging, with labels clearly identifying product name, manufacturer and expiration date. Store grout in a cool, dry place, out of the sun.
D. Precast concrete sections shall not be delivered to the job until the concrete control cylinders have attained a strength of at least 80 percent of the specified minimum.
E. 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.
F. Precast concrete sections shall be inspected when delivered. All cracked and visibly defective units shall be rejected. City/Design Professional reserves the right to inspect the production of the units at the manufacturing plant.

1.10 MANHOLE TYPES

A. Unless otherwise noted on the Drawings or in Section 01015 – Specific Project Requirements, all manhole types shall conform to the following:
   1. Standard Precast Manhole – Eccentric Cone: Use for all newly constructed manholes having a depth (measured from top of casting to top of base) of more than 6 feet. See Standard Drawing 03370-1.
   2. Standard Precast Manhole – Shallow Type: Use for all newly constructed manholes having a depth (measured from top of casting to top of base) of less than or equal to than 6 feet. See Standard Drawing 03370-2.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE

A. Materials and Fabrication:
   1. Precast concrete shall conform to ASTM C478.
   2. Air entraining agents shall be added to the concrete to provide 4 to 6 percent entrained air.
   3. Submit for review and approval the precast concrete manufacture's mix design(s) for precast structures.

B. Quality Control:
   1. Compressive Testing of Cylinders – Conduct in accordance with ASTM C478. Provide compressive testing results as requested by the City/Design Professional or as required by Section 01015 – Specific Project Requirements.
   2. Compression Testing of Cores – Conduct in accordance with ASTM C478 and submit results as requested by the City/Design Professional and as required by Section 01015 – Specific Project Requirements.

2.02 MANHOLES

A. The minimum inside diameter of the manhole shall be as follows:

Table 1. Minimum Manhole Diameter

Sewer Pipe Size (inches)	**Manhole Inside Diameter** (inches)	**Min. Manhole Frame Clear Opening** (inches)
Up to 36" (inch)	60"	30"
42"(inch) through 48"(inch)	72" See Standard Drawing 03370-3	30"

B. Reducing sections may be used at six (6) feet or more above the invert.
C. Cone Sections shall be eccentric, unless otherwise specified by City/Design Professional.
D. All required pipe openings shall be plant cast, unless otherwise noted.
E. Pre-cast sections may be provided with lifting notches on the inside faces of the walls to facilitate handling. Lifting notches shall be not more than 3 inches deep. Holes extending through the wall will not be acceptable.
F. If precast base sections are provided with integral concrete invert fill, a roughened surface shall be provided to improve the bond with the final invert fill. A minimum of 2 inches of the concrete invert fill shall be installed in the field.

2.03 MANHOLE ADJUSTMENT RINGS

A. Adjusting rings shall be designed to withstand the wheel loading requirements of AASHTO HS25.
B. Adjusting rings shall be designed and fabricated to withstand deterioration and degradation when exposed to hydrogen sulfide.
C. Acceptable Manufacturers include:
   1. Cretex Pro Ring.
   2. East Jordan (EJ) Infrariser.
   3. LadTech.

2.04 RESILIENT CONNECTORS

A. Manholes shall be provided with circular openings, with continuous, circular, resilient connectors cast into the wall.
B. Resilient connectors shall be installed in accordance with the manufacturer's recommendations, except that connectors shall be positioned so that sealing or resealing operations may be accomplished from inside the manhole.
C. Resilient connectors shall conform to ASTM C923.
D. Mortar connections will be allowed only if prior approval has been given by the City/Design Professional.
E. Acceptable Products/Manufacturer's include the following:
   1. The PSX: Direct Drive as manufactured by Press-Seal Corporation:
      (a) When the PSX: Direct Drive connector is used, it shall be double banded and the take-up screws for the gasket clamps shall be positioned 180 degrees apart.

2. The Quik-LOK Connector as manufactured by A-LOK Products Inc.:
   (a) When the Quik-LOK connector is used, it shall be double banded and the take-up screws for the gasket clamps shall be positioned 180 degrees apart.

2.05 JOINT SEALANT

A. Joints shall be sealed using preformed flexible joint sealants conforming to ASTM C990. The minimum bead dimension shall be one inch.
B. Install in accordance with manufacturer's recommendations.

2.06 EXTERNAL JOINT SEAL

A. External manhole seals shall be installed on new manhole installations, replacements or when project conditions allow for excavation of the manhole sections.
B. External joint seals shall be a minimum of 9 inches wide.
C. Heat Shrinkable Wrap-around Sleeves: Acceptable products include the following:
   1. CCI Pipeline Systems: WrapidSealTM.
D. External Joint Banding Systems:
   1. Infi-Shield®: External Gator Wrap.
   2. Mar Mac Construction Products, Inc.: MacWrap External Sealing Band.
   3. Cretex Specialty Products: Cretex Wrap.
E. Standard Precast Manhole – Shallow Type:
   1. Install an internal Cretex Seal or Infi-Shield Uni-Band External Seal where the chimney meets the flat top of manholes.
F. Materials for manhole seals shall be able to withstand hydrogen sulfide and other corrosive gases found in sewers.
G. Install in accordance with manufacturer's recommendations.

2.07 INTERNAL JOINT SEAL

A. Internal manhole seals shall be used when project conditions prevent the use of external manhole seals or at the direction of the City/Design Professional.
B. Acceptable products for internal manhole seal shall include the following:
   1. Cretex – Internal Joint Seal.
C. Materials for manhole seals shall be able to withstand hydrogen sulfide and other corrosive gases found in sewers.
D. Install in accordance with manufacturer's recommendations.

2.08 EXTERNAL FRAME CHIMNEY SEAL

A. Acceptable manufacturers for external frame chimney seal include the following:
   1. CCI Pipeline Systems – Wrapid Seal.
   2. Infi-Shield – Gator Wrap.
   3. Infi-Shield – Uniband.
B. Install in accordance with manufacturer's recommendations.

2.09 GRADE RING LINER

A. Grade ring liners shall be installed on all manholes in paved applications.
B. Acceptable manufacturers for grade ring liners include the following:
   1. WaterLOK Grade Ring Liners as manufactured by A-LOK Products, Inc.
   2. I&I Barriers as manufactured by Strike Tool Inc.
C. Install in accordance with manufacturer's recommendations.

2.10 FRAMES, COVERS AND GRATINGS FOR MANHOLES

A. Shall conform to Section 05010 – Sanitary Sewer Manhole Castings.

2.11 NON-SHRINK GROUT

A. Non-shrink grout shall conform to ASTM C1107, Grades B and C.
B. Non-shrink grout shall be a trowelable mix, in the plastic state and show no expansion after set (as tested per ASTM C827). Non-shrink grout shall develop a compressive strength not less than three thousand (3,000) psi within twenty-four (24) hours per ASTM C109. The placement time shall be not less than forty-five (45) minutes based on initial set per ASTM C191.
C. Non-shrink grout shall be ConShield Joint Set as manufactured by ConShield Technologies Inc. Mix and apply in accordance with the manufacturer's recommendations.

2.12 ANTIMICROBIAL ADDITIVE

A. Unless otherwise specified in Section 01015 – Specific Project Requirements, an antimicrobial additive shall be included in the following:
    1. Precast concrete sections.
    2. Miscellaneous concrete placed in the interior of the manhole.
    3. Non-shrink grout placed in the interior of the manhole.
    4. Precast concrete base.
    5. Concrete used for cast-in-place concrete base.
B. Acceptable manufacturers include the following:
    1. ConShield HD® as manufactured by ConShield Technologies Inc.
    2. As specified in Section 01015 – Specific Project Requirements.
C. Admixture Identifier – Color tinting shall be included to identify that the concrete contains the antimicrobial admixture. The identifier shall be CONTINT and shall be brown in color.

2.13 WATERPROOFING ADDITIVE

A. A waterproofing additive shall be included in the following:
    1. Precast concrete manholes and manhole bases.
    2. Non-shrink grout placed in the interior of a manhole
    3. Miscellaneous concrete placed in the interior of a manhole
    4. Concrete used for cast-in-place concrete base
B. Acceptable manufacturers include the following:
    1. Crystal-X as manufactured by ConShield Technologies.
    2. Xypex as manufactured by Xypex Chemical.
    3. As specified in Section 01015 – Specific Project Requirements.

2.14 GRANULAR BEDDING MATERIAL

A. Granular bedding material shall be as specified in Section 02250 – Trenching, Pipe Embedment and Backfill.

2.15 MISCELLANEOUS CONCRETE

A. Miscellaneous concrete shall conform to Section 03000 – Miscellaneous Concrete.

PART 3 - EXECUTION

3.01 EXCAVATION, BACKFILL AND COMPACTION

A. Excavation, backfill and compaction for manholes shall be in accordance with Section 02200 – Earthwork.
B. Excavation, backfill and compaction operation shall be achieved in a suitable and orderly manner providing a minimum disturbance to the general public.
C. Depth of excavation shall be to that required for proper installation of the manhole or structure. Over-depth excavation may be required if the subgrade is unsuitable or unstable. Over-depth excavation due to unsuitable or unstable subgrades shall be backfilled as required by the City/Design Professional. Over-depth excavation occurring through an oversight by the Contractor shall be backfilled as required by the City/Design Professional at no additional cost to the City.
D. Side clearance outside the manhole and/or structures shall be no greater than necessary to allow for forming, connection of piping, proper application of special coatings and access for inspection.

3.02 MANHOLE BASE

A. Precast Concrete Bases:
    1. The bottom precast wall section shall not be used for supporting or leveling the other wall sections prior to pouring the base.
    2. The subgrade materials shall be excavated to undisturbed earth and a uniform elevation to allow for a minimum of 4 inches of granular bedding material. The surface of the granular material shall be carefully graded and the base section accurately set so that connecting pipes will be on the proper line and grade. The elevation of the granular material shall be adjusted as required until proper grade and alignment of the base section has been attained.
    3. No wedging or blocking under precast concrete bases is permitted.
B. Cast-in-Place Concrete Bases:
    1. If a precast concrete base cannot be used, a poured concrete base may be used.
    2. The cast-in-place forming shall follow the design of the precast base as shown in Standard Drawing 03370-1 and as described herein.
    3. Cast-in-place concrete bases shall have a minimum thickness of eight (8) inches.
    4. Concrete shall be placed on undisturbed earth in accordance with requirements of Section 03000 – Miscellaneous Concrete.
    5. The bottom wall section shall be embedded in the base section a minimum of four (4) inches.
    6. Concrete blocks shall be used for supporting or leveling the bottom wall section prior to pouring the base. Use of Wood blocks will not be accepted.
    7. When resilient connectors are used with cast-in-place bases, granular bedding material shall be used instead of concrete fill under the connecting pipes. Granular bedding material shall be place on undisturbed earth.

3.03 MANHOLE INVERTS

A. In no case shall the invert section through a manhole be greater than that of the outgoing pipe.
B. The shape of the invert shall conform exactly to the lower half of the pipe it connects.
C. Side branches shall be connected with as large radius of curve as practicable.
D. All inverts shall be troweled to a smooth, even surface.
E. Inverts shall be constructed of be concrete as specified in Section 03000 –Miscellaneous Concrete.

F. Concrete shall be troweled (or formed if inverts are pre-cast) to produce a dense, smooth finish.
G. The invert channel shall be "U" shaped in cross section and shall extend upward as shown in Standard Drawing 03370-1.
H. Smooth transitions shall be formed for pipes of different sizes, elevation and bends.

3.04 RISER AND CONE SECTIONS

A. Circular precast sections shall be provided with a double bead of preformed flexible joint sealant as specified in paragraph JOINT SEALANT between precast sections.
B. All protruding flexible joint sealant shall be removed from inside of manhole and the joint shall be wiped with non-shrink grout - ConShield Joint Set (see paragraph 2.11).
C. Internal or external manhole joint seals shall be installed per manufacturer's recommendation.
D. Lifting notches in manhole walls shall be filled with non-shrink grout - ConShield Joint Set (see paragraph 2.11).

3.05 PIPE CONNECTIONS

A. Resilient Connectors:
   1. Resilient connectors shall be used for all pipe connections unless otherwise approved by the City.
   2. The connecting pipe shall be carefully adjusted to proper line and grade. Granular bedding material shall be compacted under the haunches and to the spring line of the pipe for a distance of at least 6 feet from the manhole wall and to the trench width.
   3. The pipe shall be installed in the resilient connector prior to backfilling outside the manhole and shall be resealed as required after completion of the manhole and backfill. All visible leakage shall be eliminated.
   4. The connecting pipe for installation with resilient connectors shall be plain end, square cut spigots and shall not protrude more than one inch inside the manhole wall.
   5. A clear distance of at least 1 inch from the end of each connecting pipe and around the pipe shall be provided when the concrete invert fill is installed or as recommended by the manufacturer of the resilient connector.
   6. After completion of the manhole installation, the box out shall be filled with mastic filler material, completely filling the space beneath the pipe and extending to at least the spring line. The filler material shall provide a smooth, uniform surface between the inside diameter of the pipe and manhole invert.
B. Grouted Connections:
   1. Grouted connections are not allowed unless approved by the City.
   2. The space between connecting piping and the wall of the precast sections shall be completely filled with non-shrink grout.
   3. The maximum allowable pipe opening on a horizontal axis shall be the outside diameter of the pipe plus twelve (12) inches.
   4. The maximum allowable pipe opening on a vertical axis shall be the outside diameter plus 8 inches.
   5. The minimum clearance between the outside surface of the installed pipe and the concrete of the manhole shall be two (2) inches.
   6. The minimum distance between any two adjacent pipes shall be twelve (12) inches.
   7. For field alterations approved by the City/Design Professional, the walls shall be scored with a masonry saw to a depth sufficient to sever the reinforcing steel. A chipping hammer may then be used to remove the concrete.

3.06 MANHOLE TOP

A. The finished top elevation of manhole castings shall conform to the following unless otherwise shown on the Drawings or directed by the City/Design Professional.
   1. In paved areas, the top of the casting shall conform to the slope of the pavement and shall match the finished pavement elevation as shown in Standard Drawing 03370-4.
   2. In non-pavement areas, the top of the casting shall be not more than one (1) inch above the surrounding ground.
   3. In remote non-paved areas such as along creeks, open fields or wooded areas, the top of the casting shall be eighteen (18) inches above finish grade. Place soil around the casting with a maximum slope of 2 feet vertical to 1 foot horizontal to protect the external manhole seal.

3.07 FRAMES AND CHIMNEYS

A. All manholes shall be constructed with an external frame chimney seal as shown on Standard Drawing 03370-1 and as specified herein.

3.08 GRADE RING LINERS

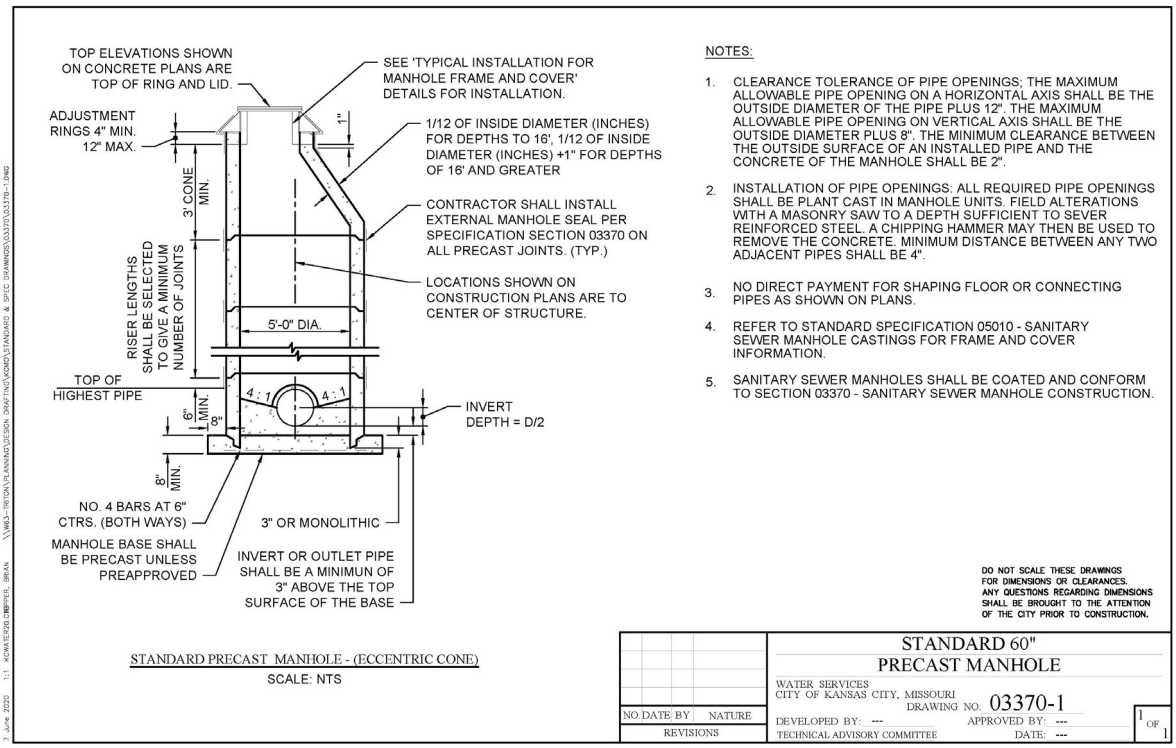
A. All manholes constructed in paved areas shall be installed with a grade ring liner.

3.09 MANHOLE ADJUSTMENT

A. Adjust as shown in Standard Drawing 03370-5.
B. All manholes will shall be provided with adjustment ring(s) to facilitate adjustment:
   1. The manhole shall be provided with adjustment ring. The minimum adjustment for lowering the top of the manhole is 4 inches.
   2. The maximum adjustment for raising the top of the manhole is 12 inches.
C. If the top of an existing manhole is required to be raised to an elevation which will exceed twelve (12) inches or lowered more than the adjustment rings will allow, all vertical adjustments shall be made to the barrel of the manhole.
D. The joints shall be sealed with a double bead preformed flexible joint sealant as specified in 2.04.

3.10 MANHOLE TESTING.

A. The Contractor shall visually verify the absence of leaks and perform a vacuum test, on manholes that have inlet and outlet pipes of less than 42 inches in diameter, in accordance with Section 02702 -Sewer Pipe and Manhole Testing.



STANDARD PRECAST MANHOLE - (ECCENTRIC CONE)
SCALE: NTS

NOTES:

1. CLEARANCE TOLERANCE OF PIPE OPENINGS; THE MAXIMUM ALLOWABLE PIPE OPENING ON A HORIZONTAL AXIS SHALL BE THE OUTSIDE DIAMETER OF THE PIPE PLUS 12". THE MAXIMUM ALLOWABLE PIPE OPENING ON VERTICAL AXIS SHALL BE THE OUTSIDE DIAMETER PLUS 8". THE MINIMUM CLEARANCE BETWEEN THE OUTSIDE SURFACE OF AN INSTALLED PIPE AND THE CONCRETE OF THE MANHOLE SHALL BE 2".
2. INSTALLATION OF PIPE OPENINGS: ALL REQUIRED PIPE OPENINGS SHALL BE PLANT CAST IN MANHOLE UNITS. FIELD ALTERATIONS WITH A MASONRY SAW TO A DEPTH SUFFICIENT TO SEVER REINFORCED STEEL. A CHIPPING HAMMER MAY THEN BE USED TO REMOVE THE CONCRETE. MINIMUM DISTANCE BETWEEN ANY TWO ADJACENT PIPES SHALL BE 4".
3. NO DIRECT PAYMENT FOR SHAPING FLOOR OR CONNECTING PIPES AS SHOWN ON PLANS.
4. REFER TO STANDARD SPECIFICATION 05010 - SANITARY SEWER MANHOLE CASTINGS FOR FRAME AND COVER INFORMATION.
5. SANITARY SEWER MANHOLES SHALL BE COATED AND CONFORM TO SECTION 03370 - SANITARY SEWER MANHOLE CONSTRUCTION.

DO NOT SCALE THESE DRAWINGS FOR DIMENSIONS OR CLEARANCES. ANY QUESTIONS REGARDING DIMENSIONS SHALL BE BROUGHT TO THE ATTENTION OF THE CITY PRIOR TO CONSTRUCTION.

NO.	DATE	BY	NATURE
REVISIONS			

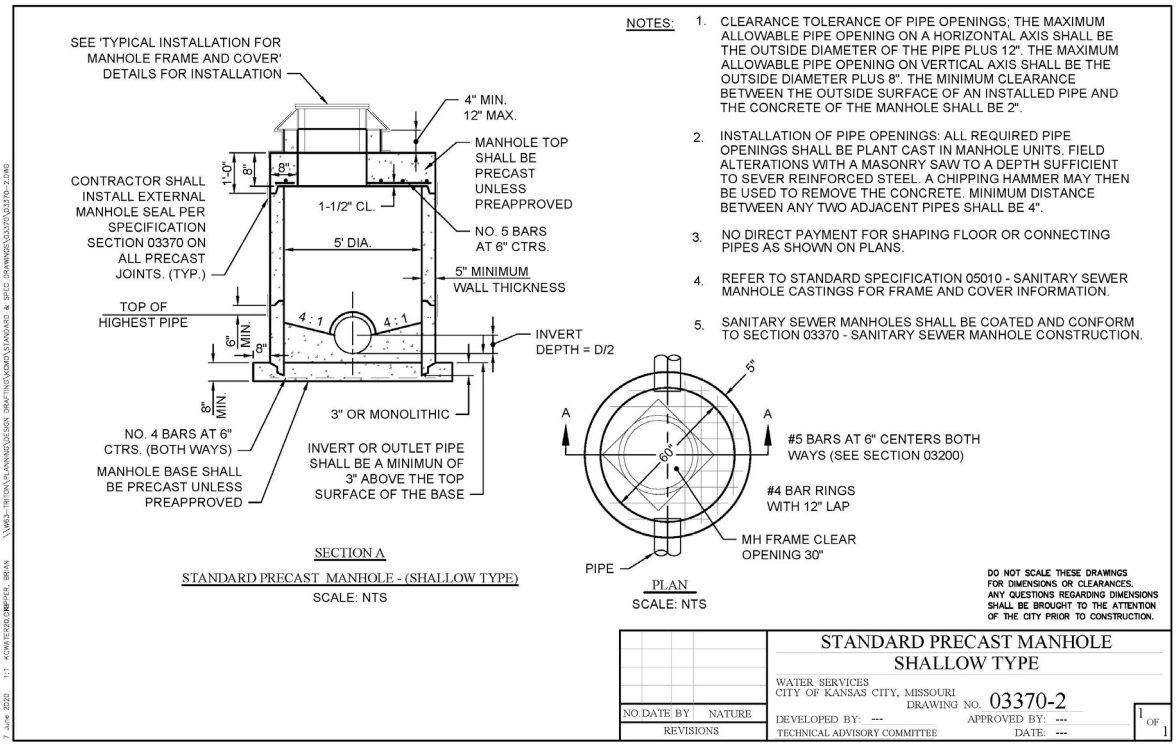
STANDARD 60" PRECAST MANHOLE

WATER SERVICES
CITY OF KANSAS CITY, MISSOURI
DRAWING NO. 03370-1

DEVELOPED BY: ---
APPROVED BY: ---
TECHNICAL ADVISORY COMMITTEE
DATE: ---

1 OF 1

Standard Drawing 03370-1



SECTION A

STANDARD PRECAST MANHOLE - (SHALLOW TYPE)
SCALE: NTS

PLAN
SCALE: NTS

NOTES:

1. CLEARANCE TOLERANCE OF PIPE OPENINGS; THE MAXIMUM ALLOWABLE PIPE OPENING ON A HORIZONTAL AXIS SHALL BE THE OUTSIDE DIAMETER OF THE PIPE PLUS 12". THE MAXIMUM ALLOWABLE PIPE OPENING ON VERTICAL AXIS SHALL BE THE OUTSIDE DIAMETER PLUS 8". THE MINIMUM CLEARANCE BETWEEN THE OUTSIDE SURFACE OF AN INSTALLED PIPE AND THE CONCRETE OF THE MANHOLE SHALL BE 2".
2. INSTALLATION OF PIPE OPENINGS: ALL REQUIRED PIPE OPENINGS SHALL BE PLANT CAST IN MANHOLE UNITS. FIELD ALTERATIONS WITH A MASONRY SAW TO A DEPTH SUFFICIENT TO SEVER REINFORCED STEEL. A CHIPPING HAMMER MAY THEN BE USED TO REMOVE THE CONCRETE. MINIMUM DISTANCE BETWEEN ANY TWO ADJACENT PIPES SHALL BE 4".
3. NO DIRECT PAYMENT FOR SHAPING FLOOR OR CONNECTING PIPES AS SHOWN ON PLANS.
4. REFER TO STANDARD SPECIFICATION 05010 - SANITARY SEWER MANHOLE CASTINGS FOR FRAME AND COVER INFORMATION.
5. SANITARY SEWER MANHOLES SHALL BE COATED AND CONFORM TO SECTION 03370 - SANITARY SEWER MANHOLE CONSTRUCTION.

DO NOT SCALE THESE DRAWINGS FOR DIMENSIONS OR CLEARANCES. ANY QUESTIONS REGARDING DIMENSIONS SHALL BE BROUGHT TO THE ATTENTION OF THE CITY PRIOR TO CONSTRUCTION.

NO.	DATE	BY	NATURE
REVISIONS			

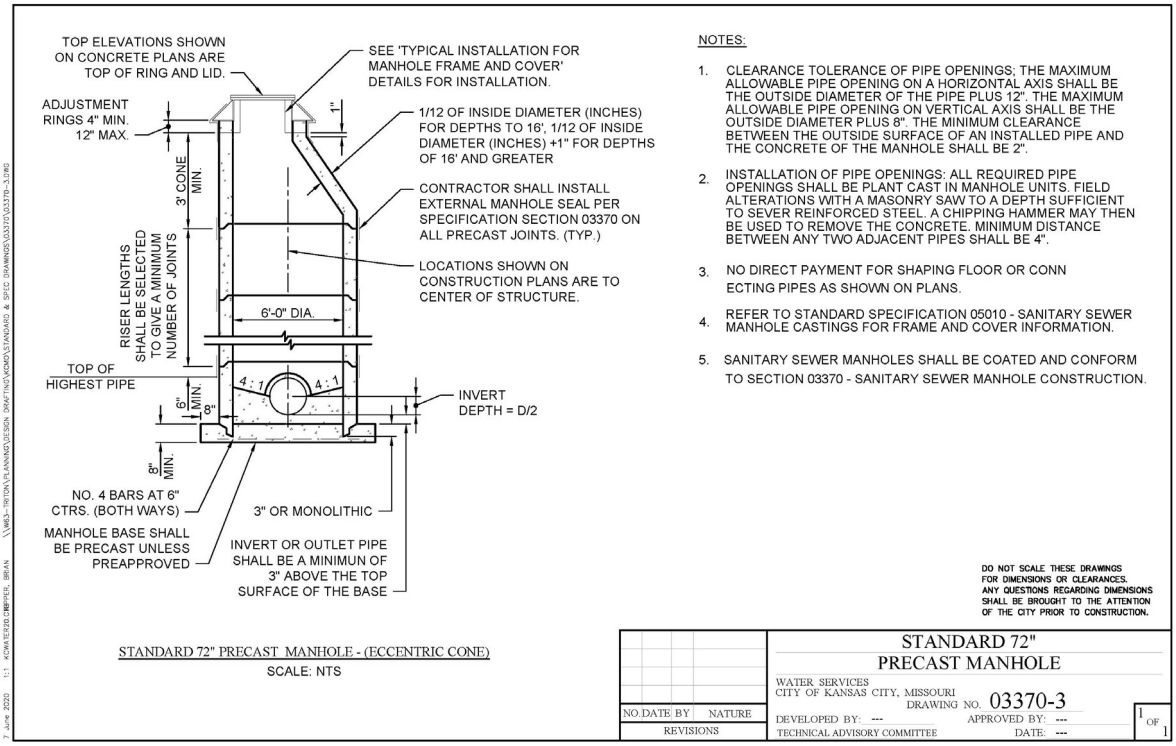
STANDARD PRECAST MANHOLE SHALLOW TYPE

WATER SERVICES
CITY OF KANSAS CITY, MISSOURI
DRAWING NO. 03370-2

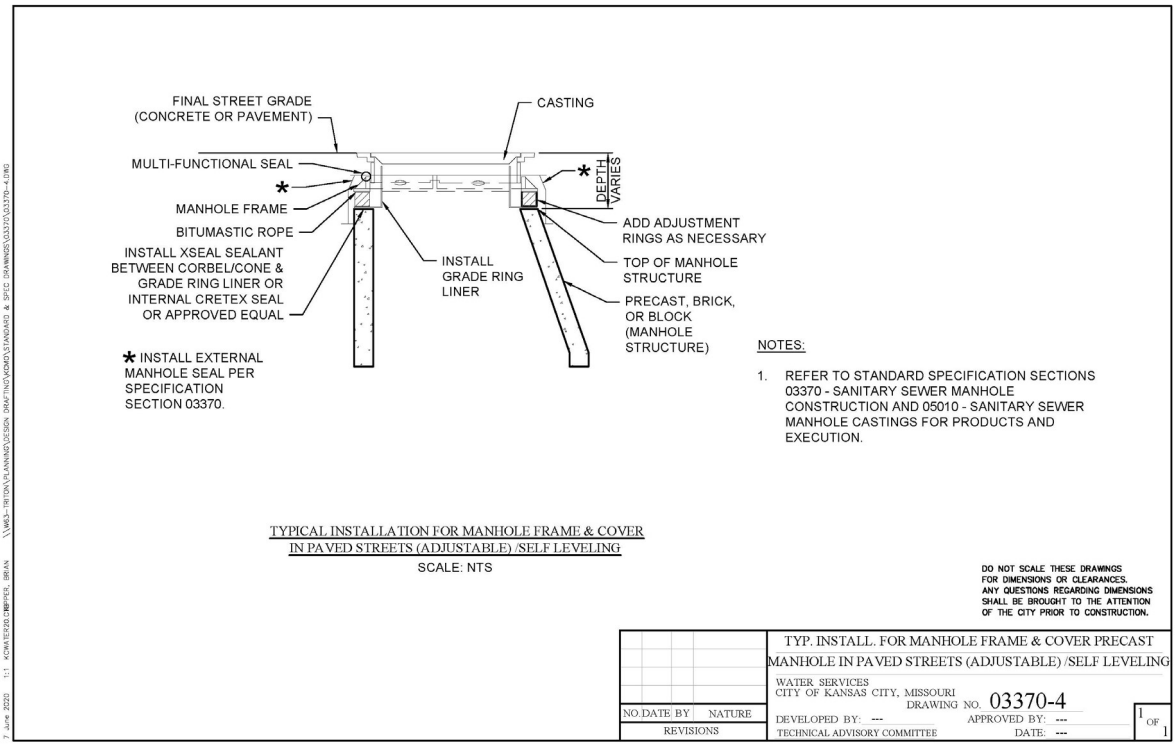
DEVELOPED BY: ---
APPROVED BY: ---
TECHNICAL ADVISORY COMMITTEE
DATE: ---

1 OF 1

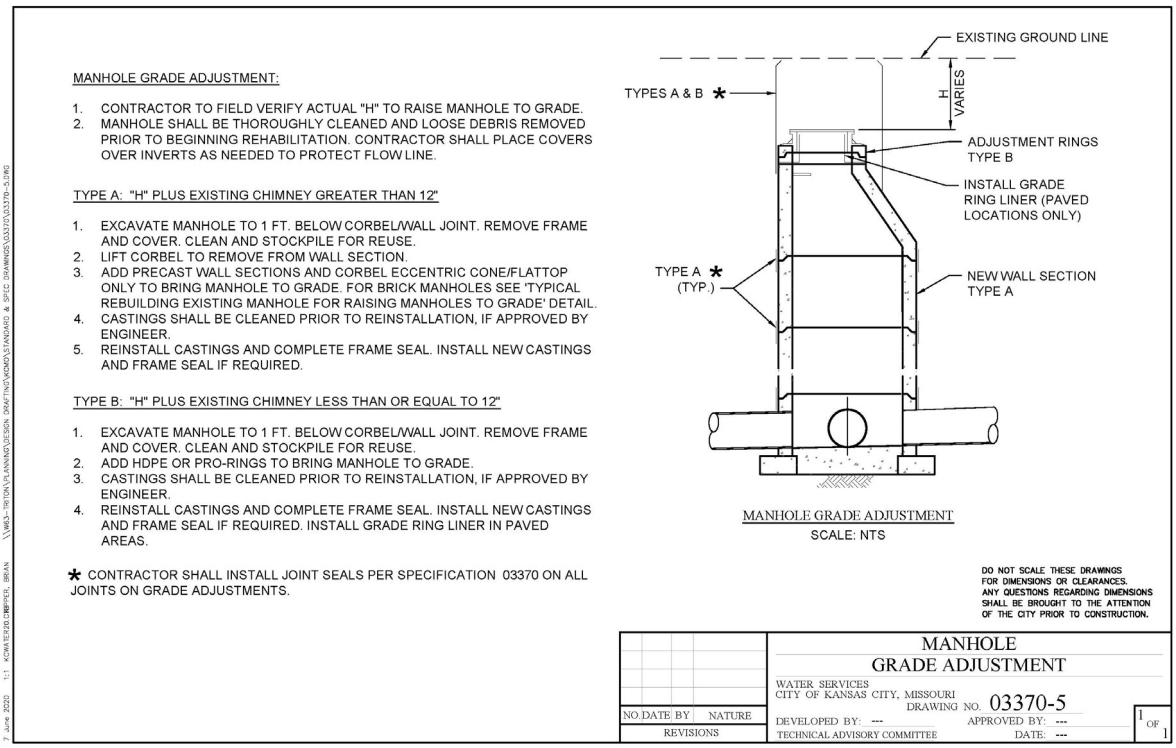
Standard Drawing 03370-2



Standard Drawing 03370-3



Standard Drawing 03370-4



Standard Drawing 03370-5

END OF SECTION

SECTION 05010 – SANITARY SEWER MANHOLE CASTINGS

PART 1 - GENERAL

1.01 SUMMARY

A. This specification covers ductile iron castings and composite castings. All castings for manholes on sewer mains up to 48 inches in diameter shall have a clear opening of 30 inches.

1.02 DESCRIPTION

A. This specification is applicable for ductile iron castings and composite castings. Prior to the Contractor supplying castings, all manufacturers shall be approved suppliers and be able to demonstrate that there is an acceptable quality control program at the producing foundry and/or molding facility.

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 01300 – Submittals.
B. Section 01015 – Specific Project Requirements.
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.
ASTM D2240	Standard Test Method for Rubber Property – Durometer Hardness.
ASTM C501	Standard Testing for Wear and Abrasion.
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.
ASTM C1028	Standard Testing for Coefficient of Friction.

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:
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).
(b) Composite Frames and Cover submittals shall include a certification of conformance to proof-load testing section of AASTHO M306.
(c) 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 castings furnished 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 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.

2.02 COMPOSITE FRAMES AND COVERS

A. Castings shall conform to the following standards:
   1. Composite frames and covers shall be manufactured from fiber reinforced polymer (FRP) and the color shall be black. Fiber reinforcement shall consist of fiberglass, carbon, aramid, basalt, and/or natural fibers. The polymer matrix shall be thermoset consisting of a polyester, vinyl ester, epoxy, polyurethane, and/or hybrid chemical composition.
   2. Cover shall have a gasket seal, and two locking lugs made of stainless steel. The locking lugs shall be designed to lock under the seat of the frame. Lock lugs shall be actuated by a stainless-steel 3/8 Allen Head bolt. All metal hardware shall be 316 Stainless Steel.
   3. Proof Load Testing: Traffic service frames and covers shall have a first article proof load test conducted and the results of that proof load shall be made available to the purchaser upon request. The proof load shall be conducted in accordance with the method and procedure that is outlined in AASHTO M306. The product shall be tested on a suitable and calibrated load testing machine, the composite frame and cover shall hold a 50,000-pound proof load for one minute without experiencing any cracks or detrimental permanent deformation. During the load testing process visible cracking, visible cracks or delamination will be cause for rejection. When load is removed, Permanent Set (Deflection) of more than 1/8” (.125”) measured at center of load area will be cause for rejection. All testing shall be conducted on a NIST calibrated and certified load test machine.
   4. Ultraviolet resistance: Cover shall meet ultraviolet requirements as defined in ASTM G154 (Cycle 1 for 1600 hours). Specimens shall be tested for ultimate flexural strength, retaining at least 75% of control values for load and deflection at failure.
   5. Coefficient of Friction: Static Coefficient of Friction of cover shall be 0.5 or greater, as described in ASTM C1028 Standard, in both wet and dry applications.
   6. Wear and Abrasion: Shall be tested in accordance with ASTM C501, Test shall be 1000 cycles of a H22 wheel with 1000g load. Wear Index is calculated 88/Weight Loss (grams). The four test cycle average shall have a calculated wear index of >300

2.03 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 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 ± 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.

2.04 MANHOLE FRAMES AND COVERS

A. Frames and covers shall be as indicated and shall be of the type suitable for the application. The frames and covers shall be circular and the covers without vent holes. Covers located in the combined sewer system may have vent holes, see Section 01015 – Specific Project Requirements.
B. Markings – See Figure 1, Figure 2, and Figure 3 for approved markings at the end of this section.
C. The minimum clear opening shall be 30 inches for all 5.0-foot diameter manholes and 6.0-foot diameter manholes.
D. All covers shall have provisions for ease of opening, such as concealed pick holes.
E. Special Requirements for Paved Areas (ductile iron or composite acceptable):
    1. Definition: Areas subject to vehicular traffic. Includes, but is not limited to, all paved areas.
    2. All frames and covers shall be "Traffic Rated" in accordance with AASHTO M306 (HS-25) Loading.
    3. All DI manhole frames and covers shall be hinged, adjustable and self- leveling. Frames and covers shall be adjustable to meet any slope and grade of the roadway (from 0 to 17%) and shall be able to be raised or lowered in ¼ inch increments, up to 2¼ inches. Ring height shall be adjustable after installation without disturbing the surrounding pavement or composite frames and covers using grade rings to meet grade
    4. 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.
        (c) Composite Access Products (CAP)
F. Special Requirements for Green Spaces (composite only required):
    1. Definition: Areas that are not subject to regular vehicular traffic. Includes, but is not limited to, greenways, easements, sidewalks, and driveways.
    2. All frames and covers shall be rated for AASHTO M306 (HS-25) Loading.
    3. Flange shall incorporate bedding slots or bolt holes.
    4. Acceptable manufacturers include the following (or pre-approved equal):
        (a) CAP as manufactured by Composite Access Products.
        (b) Durostreet as manufactured by East Jordan.
G. Special Requirements for Flood Plains:
    1. Definition: Areas that are designated Flood Plains.
    2. All frames and covers shall be watertight.
    3. All frames and covers shall be rated for AASHTO M306 (HS-25) Loading.
    4. Flange shall incorporate bedding slots or bolt holes.
    5. Stainless Steel bolts and nuts for lid shall be supplied with anti-seize coating.
    6. Acceptable manufacturers include the following (or pre-approved equal):
        (a) CAP Bolt down as manufactured by Composite Access Products.

2.05 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, Figure 2, and Figure 3 on pages 6, 7 and 8, respectively.

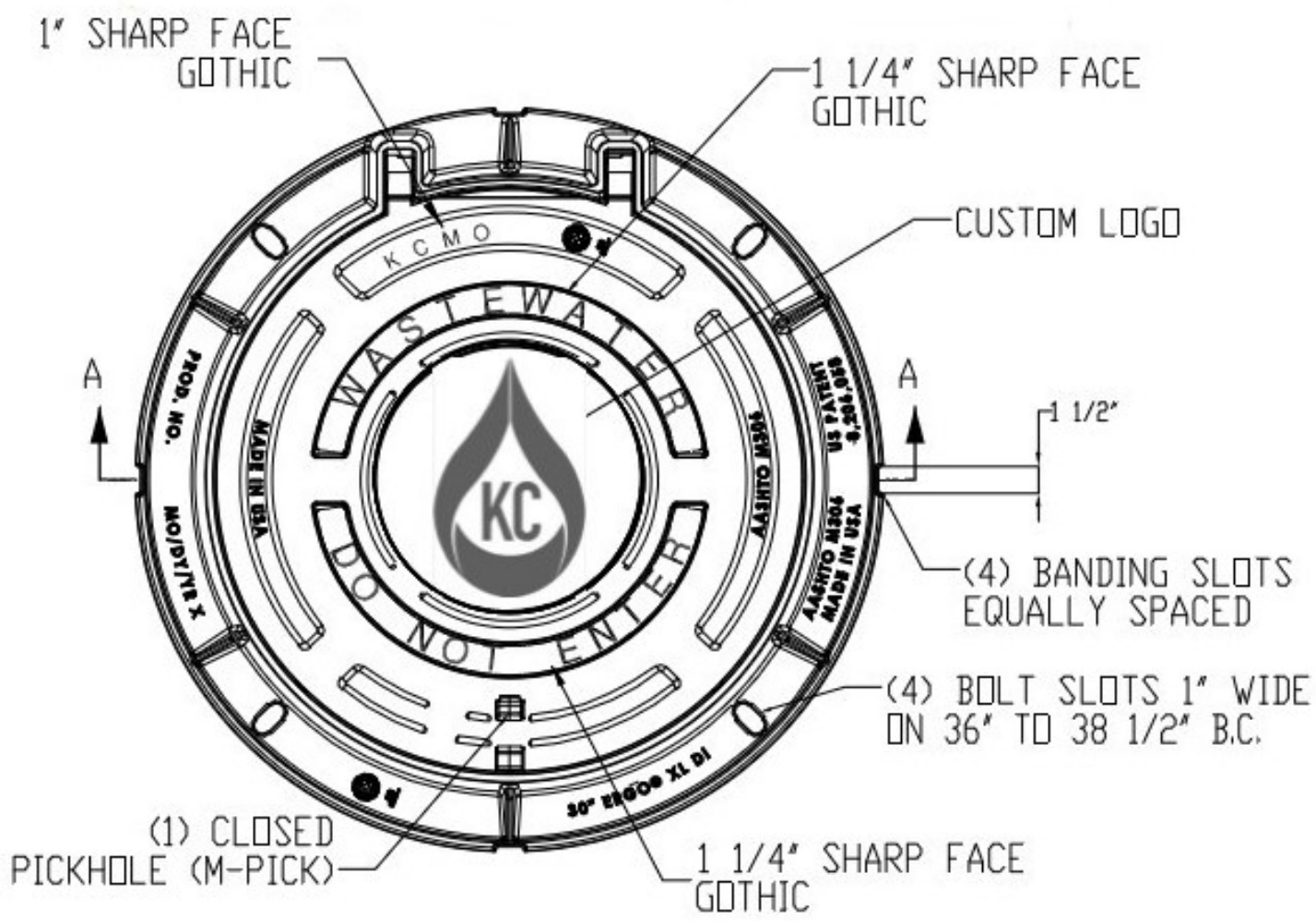


Figure 1: Standard Sanitary Sewer Manhole Markings
For Ductile Iron Castings

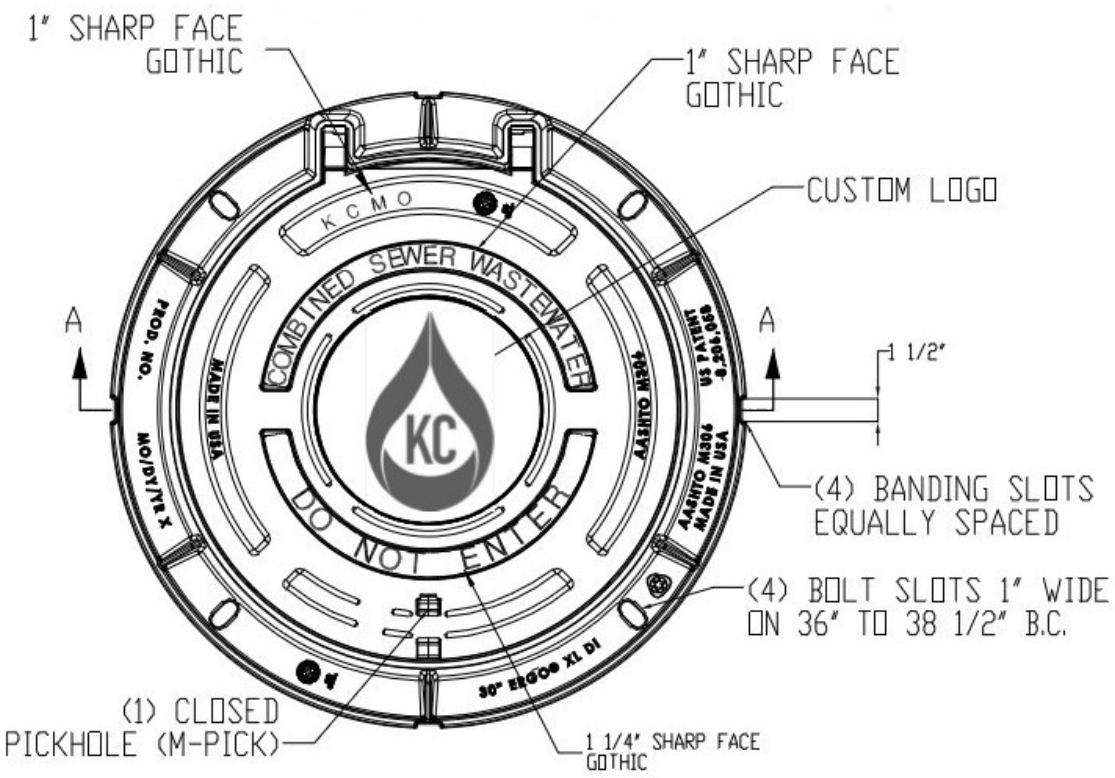


Figure 2: Optional Sanitary Sewer Manhole Markings
For Ductile Iron Castings
See Section 01015 – Specific Project Requirements

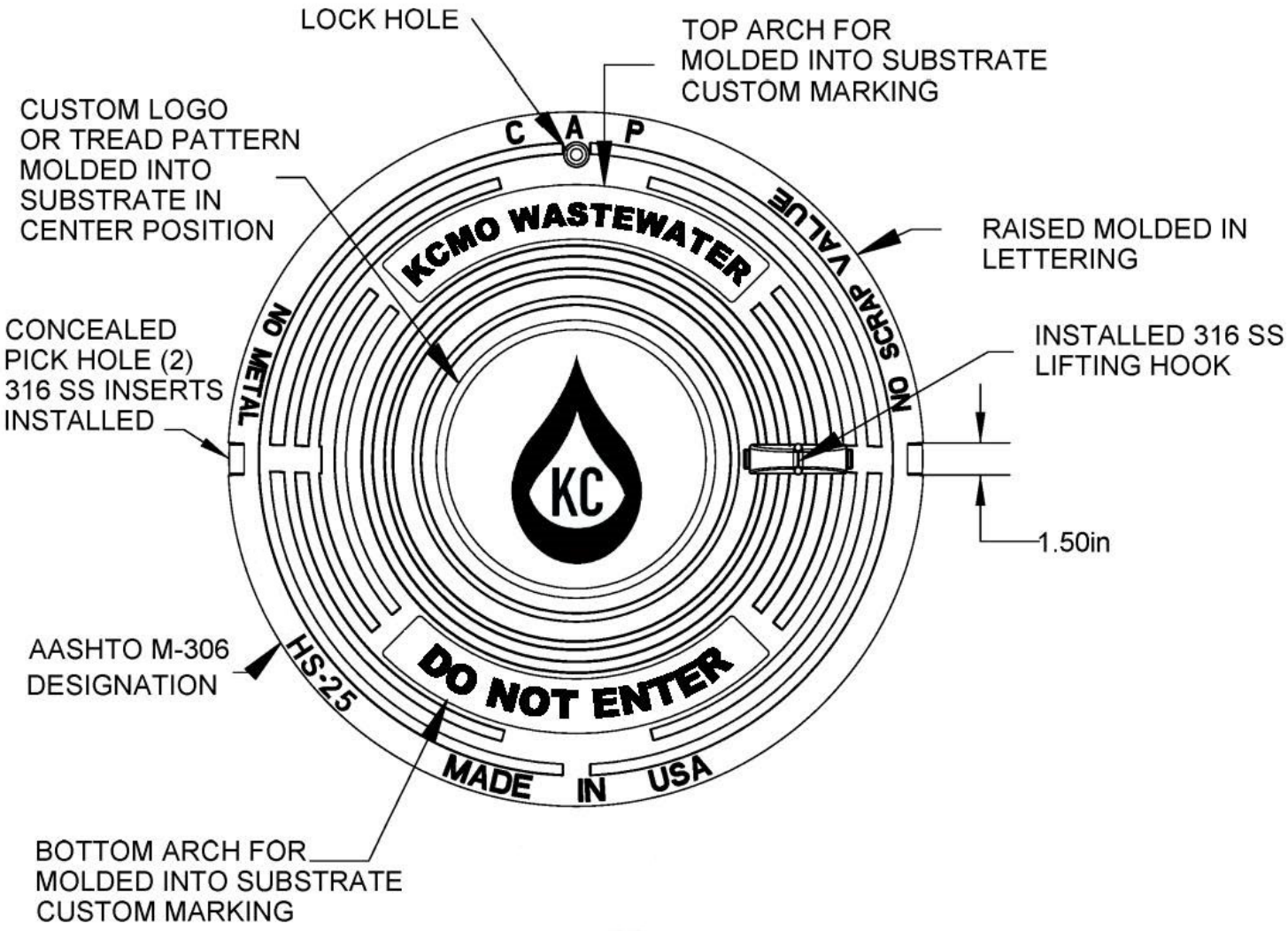


Figure 3: Standard Sanitary Sewer Manhole Markings
For Composite Castings

END OF SECTION