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

Project Manual

FOR

PROJECT/CONTRACT NO. 81000955 / 1804

GREEN INFRASTRUCTURE PROJECT 1-1: MILL CREEK PARK PHASE 2 – RETENTION PONDS

BIDDER/ADDRESS

Company _____
Contact _____
Address _____
_____
Phone _____
Fax _____
Email _____
_____

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

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

CERTIFICATION PAGE

Project/Contract Number: 81000955/1804

Project Title: Green Infrastructure Project 1-1: Mill Creek Park Phase 2 – Retention Ponds

I am responsible for the following specifications:

Specifications: DIV 00; DIV 01 (Except 01015); 02180; 02190; 02200; 02230; 02250; 02575; 02605; 02624; 02631; 02702; 02930; 02931; 05010; 05050

STATE OF MISSOURI
PHILLIP A. SHIVELY
NUMBER PE-2003001099
PROFESSIONAL ENGINEER

3/19/2026

(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.

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

CERTIFICATION PAGE

Project/Contract Number: 10309126/1669

Project Title: Green Infrastructure Project 1-1: Mill Creek Park Phase 2 Retention Ponds

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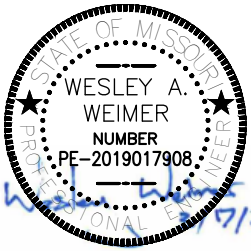
I am responsible for the following specifications:

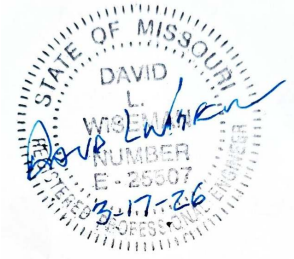
Specifications: Sections 02180, 02190, 02200, 02230, 02250, 02320, 02575, 02605, 02624, 02630, 02686, 02702, 02937, 02938, 02939, 02940, 02941, 02946, 02948, 02949, 02954, 02955, 02956, 05010, and 05011



_____ (SEAL)

I am responsible for the following specifications:

Specifications: Sections 03300, 03370, and 03500



_____ (SEAL)

I am responsible for the following specifications:

Specifications: Sections 02750, 02947, 02950, 02953, 03400, 04150, 04400, 04410, 05710, 12310, and 321218

_____ (SEAL)

I am responsible for the following specifications:

Specifications: Sections 260500, 260519, 260533, 260543, 260916, 262416, 262816.16, 264313, 262801, 262726, 260526, 265000 265000, and 40 69 00

_____ (SEAL)

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

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

CITY OF FOUNTAINS
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Project Title: Green Infrastructure Project 1-1: Mill Creek Park Phase 2 – Retention Ponds

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CITY OF FOUNTAINS
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CITY OF FOUNTAINS
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MISSOURI

INVITATION TO BID

Project Number: 81000955

Project Title: Green Infrastructure Project 1-1: Mill Creek Park Phase 2 - Retention Ponds

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The *Water Services* Department of Kansas City, Missouri will receive sealed Bids until 2:00 PM, on *April 21, 2026,* at Kansas City Water Services Department for *Project No. 81000955 Green Infrastructure Project 1-1: Mill Creek Park Phase 2 - Retention Ponds*. Bids will be opened after that time at a Water Services Conference Room, TBD day of.

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 (10%) MBE participation and (10%) 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 81000955

Project Title Green Infrastructure Project 1-1: Mill Creek Park Phase 2 - Retention Ponds

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1. Sealed Bids for Green Infrastructure Project 1-1: Mill Creek Park Phase 2 - Retention Ponds, Project# 81000955 will be received by the Water Services Department at 4800 East 63rd Street, Kansas City, MO 64130 until 2:00 P.M., April 21, 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. Fully executed Affidavit of Compliance with the Federal Consent Decree regarding the City of Kansas City, Missouri Overflow Control Plan ("OCP") Civil Action No. 4:10-cv-0497-GAF.

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 (10%) MBE participation and (10%) 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 office 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 Engineering Company, Inc.
9400 Ward Parkway
Kansas City, MO, 64114
(816) 601-2531
E-mail: kltonjes@burnsmcd.com

Jamie Driskell, Contract Administration
Burns & McDonnell Engineering Company, Inc.
9400 Ward Parkway
Kansas City, MO, 64114
(816) 652-2927
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.

Bidder: _____

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

BID FORM/CONTRACT

Project/Contract Number 81000955 / 1804

Project Title Green Infrastructure Project 1-1: Mill Creek Park Phase 2 – Retention Ponds

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	$_____
ALLOWANCE NO.	$ 400,000.00
TOTAL BID IN NUMERIC FIGURES	$_____

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. Form 00413 Allowances contain prices included in the Total Bid, and are incorporated into this Bid.
9. The undersigned Bidder acknowledges receipt of the following addenda listed by number and date appearing on each addendum:

Bidder: _____

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

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: **___10____% MBE __10___% WBE ___0____ % DBE**

BIDDER PARTICIPATION: **_____% MBE _____% WBE _____ % DBE**

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

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

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

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

E. Name of M/WBE Firm _____
Address _____
Telephone No. _____

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

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

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

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.**

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.

Business Entity Type:

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

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

_____
Phone No: _____
Cell No: _____
Facsimile No: _____
Bidder's E-Mail: _____

_____
Federal ID. No. _____

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

By: _____
(Signature)

_____
(Print Name)

Title:_____

Date:_____

(Attach corporate seal if applicable)

NOTARY

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

My Commission Expires: _____ _____

ACCEPTANCE OF BID

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

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

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

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

_____

City of Kansas City, Missouri (OWNER or City)

Approved as to form:

_____

Assistant City Attorney

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

_____

Director of Finance (Date)

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

EXPERIENCE AND REFERENCE SUMMARY

Project Number: _____

Project Title: _____

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

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

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

EXPERIENCE AND REFERENCE SUMMARY – CURRENT PROJECTS

Project/ Contract Number: _____

Project Title: _____

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

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

LIST OF EQUIPMENT AND STAFFING AVAILABLE FOR PROJECT

Project/ Contract Number: _____

Project Title: _____

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

Bidder: _____

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

ALLOWANCE FORM

Project Number: 81000955

Project Title: Green Infrastructure Project 1-1: Mill Creek Park Phase 2-Retention Ponds

Allowance No.:	Allowance Description:	Allowance in Figures:
1	General Allowance for items not shown on the plans or required in the specifications	$400,000.00

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

BID BOND

Project Number _____

Project Title _____

Bond Number _____

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

_____Dollars ($_____), lawful money of the United States.

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

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

Signed, sealed and delivered this _____ day of _____. _____.

BIDDER AND PRINCIPAL

Name, address and facsimile number of Bidder and Principal

_____

_____

_____

_____

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

By: _____

Title:_____

(Attach corporate seal if applicable)

SURETY

Name, address and facsimile number of Surety:

_____

_____

_____

_____

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

By:_____

Title:_____

Date:_____

(Attach seal and Power of Attorney)

CREO KC INSTRUCTIONS

FOR CONSTRUCTION CONTRACTS

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

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

A. The City has adopted an Economic Equity & Inclusion Goals--Minority/Women Business Enterprise ("MBE/WBE") Program (Sections 3-421 through 3-469, Code of Ordinances) (the "Program") to implement the City's policy of supporting the fullest possible participation in City contracts and change orders of firms owned and controlled by minorities and women. Each construction contract may have an MBE and/or WBE goal for participation. An MBE or WBE goal is a numerical objective the City has set for the contract that may be awarded pursuant to these bid specifications. Goals are stated as a percentage of contract dollars. For example, if an MBE goal for a contract is 10% and a Bidder submits a bid of $100,000, the goal for MBE participation would equal $10,000. The specific MBE/WBE goals on this contract are set forth elsewhere in the bid specifications.

B. These Civil Rights & Equal Opportunity Department ("CREO KC") Forms & Instructions are part of the BIDDING DOCUMENTS and CONTRACT DOCUMENTS as defined in the General Conditions. By submitting a Bid, the Bidder agrees, as a material term of the contract, to carry out the City's MBE/WBE Program by making good faith efforts to include certified MBE/WBEs in the contract work to the extent of the goals listed for the contract and to the fullest extent consistent with submitting the lowest and best bid to the City. Bidder agrees that the Program is incorporated into this document and agrees to follow the Program. Although it is not a requirement that a Bidder in fact meet or exceed both the MBE and WBE Goals, it is a requirement for approval of the Bid that a Bidder objectively demonstrate to the City that good faith efforts have been made to meet the Goals. Bidders must attempt to meet both the MBE and WBE goals and request a waiver if either is not met.

C. The following CREO KC Forms are attached and must be used for MBE/WBE submittals:

1. Contractor Utilization Plan/Request for Waiver (CREO KC Form 8); and
2. Letter of Intent to Subcontract (CREO KC Form 00450.01); and
3. Timetable for MBE/WBE Utilization (CREO KC Form 10); and
4. Request for Modification or Substitution (CREO KC Form 11); and
5. Contractor Affidavit for Final Payment (Form 01290.14); and
6. Subcontractor Affidavit for Final Payment (Form 01290.15).

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

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

II. Required Submissions Following Bid Opening.

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

1. **Contractor Utilization Plan/Request for Waiver (CREO KC Form 8).** This form states a Bidder's plan to use specific certified MBE/WBEs in the performance of the contract and includes the following:

   a. The work to be performed by each MBE/WBE and the amounts each is to be paid for the work; and

   b. The name, address, race or ethnic origin, gender and employer identification number or social security number of each MBE/WBE that will perform the work.

   c. An automatic request for waiver in the event Bidder has not met or exceeded the MBE and/or WBE goals for the contract but believes that it has made good faith efforts to meet or exceed the goals and desires a waiver of the goals. If a waiver is requested, CREO KC will examine the Bidder's documentation of good faith efforts and make a recommendation to grant or deny the waiver. CREO KC will recommend a waiver be granted only if the Bidder has made good faith efforts to obtain MBE/WBE participation.

2. **Letter(s) of Intent to Subcontract (CREO KC Form 00450.01)**. A letter must be provided from each MBE/WBE listed on the Contractor Utilization Plan. These letters verify that the MBE/WBE has agreed to execute a formal agreement for the work and indicate the scope of work to be performed and the price agreed upon for the work.

III. Required Submission when Requested by City.

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

1. **Timetable for MBE/WBE Utilization (CREO KC Form 10).**

2. **Documentation of good faith efforts.**

IV. Required Monthly Submissions during term of Contract.

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

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

V. Required Submittals for Final Contract Payment.

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

the contract:

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

VI. Additional Submittals.

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

VII. MBE/WBE Participation Credit.

A. The following shall be credited towards achieving the goals:

1. The total contract dollar amount that a prime contractor has paid or is obligated to pay to a subcontractor that is a certified MBE or WBE, except as otherwise expressly provided for herein.
2. The total contract dollar amount that a prime contractor that is a certified MBE or WBE performed itself.
3. Sixty percent (60%) of the total dollar amount paid or to be paid by a prime contractor to obtain supplies or goods from a supplier who is a certified MBE or WBE.
4. Ten percent (10%) of the total dollar amount paid or to be paid by a prime contractor to obtain supplies or goods from a supply broker who is a certified MBE or WBE.
5. One hundred percent (100%) of the total dollar amount paid or to be paid by a prime contractor to a manufacturer of construction supplies who is a certified MBE or WBE.
6. Subcontractor participation with a lower tier MBE/WBE subcontractor using one of the above methods of participation.

B. **NO CREDIT**, however, will be given for the following:

1. Participation in a contract by a MBE or WBE that does not perform a commercially useful function as defined by the Program; and
2. Any portion of the value of the contract that an MBE or WBE subcontractor subcontracts back to the prime contractor or any other contractor who is not a qualified MBE/WBE; and
3. Materials and supplies used on the contract unless the MBE/WBE is responsible for negotiating the price, determining quality and quantity, ordering the materials and installing (where applicable) and paying for material itself; and
4. Work performed by an MBE or WBE in a scope of work other than that in which the MBE or WBE is currently certified.

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

A. A bidder is required to make good faith efforts to achieve the MBE/WBE goals. Good faith efforts are efforts that, given all relevant circumstances, a Bidder actively and aggressively seeking to meet the goals can reasonably be expected to make. Good faith efforts must be made before the Bidder submits a Contractor Utilization Plan, in other words, within 48 hours of bid opening. However, efforts made to increase participation of MBEs and WBEs following submission of the CUP can be considered as evidence of good faith efforts to meet the goals.

B. In evaluating good faith efforts, the Director of CREO KC will consider whether the Bidder has performed the following, along with any other relevant factors:

1. Advertised for at least 15 calendar days prior to the bid or proposal due date opportunities to participate in the contract in general circulation media, trade and professional association publications, small and minority business media, and publications of minority and women's business organizations which are included in a list along with their current contact information identified on the directory as the list of publications available to publish such advertisements, which list shall be updated by CREO KC no less than every three (3) month.

2. Sent written notices at least fifteen (15) calendar days prior to the bid or proposal due date containing the information required in section (9) below, by certified mail, e-mail, or facsimile, to at least 80% of MBEs and WBEs which are included in a list along with their contact information identified on the directory as the list of organizations available to receive such notices, which list shall be updated by CREO KC no less than every three (3) months.

3. Sent written notices, containing the information required by section (9) below, by certified mail, e-mail or facsimile, to at least 80% of MBEs and WBEs listed on the directory certified in the applicable scopes of work for the particular bid soliciting their participation in the contract at least 15 calendar days prior to the bid or proposal due date.

4. Attempted to identify portions of the work for qualified MBE and/or WBE participation in order to increase the likelihood of meeting the goals, including breaking down contracts into economically feasible units that take into consideration the capacity of available MBE/WBEs appearing on the CREO KC directory.

5. At any time prior to submission of the CUP or submittal of a request for modification of a CUP, requested assistance in achieving the goals from the Director and acted on the Director's recommendations.

6. Conferred with certified MBEs and WBEs which inquired about or responded to the bid solicitation and explained to such MBEs and WBEs the scope and requirements of the work for which their bids or proposals were solicited, and if not all certified MBEs and WBEs in the particular scopes listed on the directory have inquired about or responded to the bid solicitation for each scope of work, then contact by certified mail, e-mail or telephone the greater of ten (10) or 80% of additional certified MBEs and WBEs in the particular scopes of work listed on the directory and offer to confer with such MBEs and WBEs for such particular scope of work and request such MBEs

and WBEs to submit a proposal.

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

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

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

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

A. After bid opening, a Bidder or Contractor may need to substitute an MBE and/or WBE or request that the amount of MBE/WBE participation listed in its Contractor Utilization Plan be modified. Bidder or Contractor must file a **Request for Modification or Substitution (CREO KC Form 11) prior to actual substitution and within a reasonable time after learning that a modification or substitution is necessary.** The Director may approve substitutions or modifications and upon approval, the modifications and substitutions will become an amendment to the Contractor Utilization Plan. Modifications or substitutions may be approved when:

1. The Director finds that the Bidder or Contractor made and provided evidence of good faith efforts to substitute the MBE/WBE listed on the Contractor Utilization Plan with other certified MBE/WBEs for the scope of work or any other scope of work in the contract; and
2. The Bidder or Contractor has not attempted intentionally to evade the requirements of the program and it is in the best interests of the City to allow a modification or substitution; and
3. The Director also finds one of the following:
    a. The listed MBE/WBE is non-responsive or cannot perform; or
    b. The listed MBE/WBE has increased its previously quoted price to the bidder, proposer or contractor without a corresponding change in the scope of the work; or
    c. The listed MBE/WBE has committed a material default or breach of its contract with the contractor; or
    d. Requirements of the scope of work of the contract have changed and render subcontracting not feasible or not feasible at the levels required by the goals established for the contract; or
    e. The listed MBE/WBE is unacceptable to the contracting department; or
    f. The listed MBE/WBE thereafter had its certification revoked; or

B. A modification shall not be made unless the modification or substitution has first been requested and approved by the Director. Once a modification has been made, a Construction Contractor Employee Identification Report (CREO KC Form 0485.04) for the newly approved subcontractor must be submitted at least ten (10) days prior to the approved subcontractor commencing work on a City contract.

X. Appeals.

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

1. The grant or denial of a Request for Waiver;
2. Substitution for an MBE/WBE listed on a Contractor Utilization Plan;
3. Modification of the percentage of MBE/WBE participation on a Contractor Utilization Plan;
4. Liquidated Damages;
5. The amount of MBE/WBE credit the Contractor may receive for MBE/WBE participation identified in the contractor utilization plan.

B. Any appeal must be filed in writing with the Director within fifteen (15) calendar days of notice of the determination. Mailing, faxing, personal delivery or posting at CREO KC of determinations shall constitute notice. The appeal shall state with specificity why the Bidder or Contractor believes the determination is incorrect

C. Failure to file a timely appeal shall constitute a waiver of a Bidder's or Contractor's right to appeal such determination and such person shall be estopped to deny the validity of any determination which could have been timely appealed.

XI. Access to Documents and Records.

A. By submitting a Bid, each Bidder agrees to permit the City, its duly authorized agents or employees, access at all reasonable times to all books and business records of Bidder as may be necessary to ascertain compliance with the requirements of this document and the Act, within ten (10) calendar days of the date of the written request.

B. All Bidders agree to cooperate with the contracting department and CREO KC in studies and surveys regarding the MBE/WBE program.

XII. Miscellaneous.

A. A Bidder or Contractor shall bear the burden of proof with regard to all issues on appeal.

B. In the event of any conflict between this document and the Program, the provisions of the Program shall control. The terms used in this document are defined in the Program.

C. Oral representations are not binding on the City.

D. The City Council may waive the requirements of this document and the Program and award the contract to the lowest and best bidder if the City Council determines a waiver is in the best interests of the City.

E. The Director may grant extensions of time to Bidders to submit Letters of Intent to Subcontract (CREO KC Form 00450.01).

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

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

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

PART B. CONSTRUCTION EMPLOYMENT PROGRAM REQUIREMENTS

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

I. City's Construction Employment Program.

A. The City has adopted a Construction Employment Program (Sections 3-501 through 3-525, Code of Ordinances) (the "Workforce Program" or "Program") to implement the City's policy of supporting the fullest possible utilization of minority and women workers in the construction industry.

B. The minimum workforce goals are currently set by ordinance at 10% for minorities and 2% for women. These goals are separate from M/WBE goals. Public recognition may be provided if the bidder achieves at least twice the minimum participation.

C. Construction contracts subject to the Workforce Program and the company-wide and project-specific workforce goals ("workforce goals") are those contracts to construct, reconstruct, improve, enlarge or alter any fixed work that is estimated by the City prior to solicitation to: (1) require more than 800 construction labor hours, (2) has estimated costs that exceed $300,000.00, and (3) involve the expenditure of public funds.

D. The successful bidder may meet company-wide goals by counting the bidder's utilization of minorities and women throughout the Kansas City metropolitan statistical area. In addition, the successful Bidder is responsible to ensure that it and its subcontractors cumulatively make good faith efforts to meet project-specific goals for utilization of minorities and women.

E. These Civil Rights & Equal Opportunity Department ("CREO KC") Forms & Instructions are part of the BIDDING DOCUMENTS and CONTRACT DOCUMENTS as defined in the General Conditions. By submitting a Bid, the Bidder agrees, as a material term of the contract, to carry out the City's Construction Employment Program by making good faith efforts to utilize minority and women workers to the fullest extent consistent with submitting the lowest and best bid to the City. Bidder agrees that the Program is incorporated into this document and agrees to follow the Program. Although it is not a requirement that a Bidder in fact meet or exceed the construction employment goals to receive approval from CREO KC, a Bidder not doing so is required to

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

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

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

II. Required Submissions.

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

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

a. Prior to contract execution for those City construction contracts awarded pursuant to a request for proposals (RFP), the construction contractor shall submit a **Construction Employee Identification Report** (CREO KC Form 00485.04).

b. At least ten (10) days prior to the date upon which any subcontractor is to commence work under a City construction contract, the Prime shall submit a **Construction Employee Identification Report** (CREO KC Form 00485.04) for the subcontractor.

B. The CREO KC Director has established the B2GNow Diversity Management System ("B2GNOW") (an online reporting tool) as the preferred method for fulfilling reporting requirements of the Workforce Program. The CREO KC Director will allow paper submission in lieu of on-line submission if the on-line submission process presents a hardship to the contractor.

C. Bidder must submit the following documents through B2GNow on a monthly basis if awarded the contract:

1. **Project Workforce Monthly Report.** This report is contract specific. This report must be submitted to the Director by the 15th of each month for the Contractor and each subcontractor. It will be utilized to report the Contractor's own workforce compliance data with regard to the City's construction contract. Failure to submit timely reports may result in delays in processing of current and future contract approvals and payment applications.

2. **Company-Wide Workforce Monthly Report.** This report is not contract specific; it is used to report on the utilization of women and minorities, by trade, company-wide. This report must be submitted to the Director by the 15th of each month. It will be utilized to report the Contractor's own workforce compliance data with regard to

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

III. Submittal Required for Final Contract Payment.

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

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

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

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

B. In evaluating good faith efforts, the Director will consider whether the Bidder and its subcontractors have performed the following:

1. For those bidders that are not signatories to a collective bargaining agreement with organized labor:

    a. Requested in writing the assistance of the Director with respect to efforts to promote the utilization of minorities and women in the workforce and acted upon the Director's recommendations; and

    b. Advertised in minority or women trade association newsletters and/or minority or women owned media at least 15 calendar days prior to the utilization of any construction services on the city construction contract and used terminology that sufficiently describes the work available, the pay scale, the application process, and anything else that one might reasonably be expected to be informed of relevant to the position being advertised; and

    c. Maintained copies of each advertisement and a log identifying the publication and date of publication; and

d. Conducted real and substantial recruitment efforts, both oral and written, targeting resident, minority and women community-based organization, schools with a significant minority student population, and training organizations serving the recruitment area; and

e. Established and maintained a current list of resident, minority and women recruitment sources, providing written notification to the recruitment sources of available employment opportunities, and maintained records of the notices submitted to the organizations and any responses thereto; and

f. Maintained a current file for the time period of the city construction contract with the name, address, and telephone number of each resident, minority and woman job applicant, the source of the referral, whether or not the person was hired, and in the event that the applicant was not hired, the reason therefore; and

g. Promoted the retention of minorities and women in its workforce with the goals of achieving sufficient annual hours for minorities and women to qualify for applicable benefits; and

h. Required by written contract that all subcontractors comply with the above efforts.

2. For those bidders that are signatories to collective bargaining agreements with organized labor:

a. Requested in writing from each labor union representing crafts to be employed that:

i. the labor union make efforts to promote the utilization of residents of the City, minorities and women in the workforce; and

ii. the labor union identify any residents of the City, minorities and women in its membership eligible for employment; and

b. Collaborated with labor unions in promoting mentoring programs for journeypersons intended to assist minorities and women in increasing retention with the goals of achieving sufficient annual hours to qualify for applicable benefits; and

c. Maintained a current file with the name, address, and telephone number of each resident, minority and women worker identified by the labor union, whether or not the person was hired, and in the event the person was not hired, the reason therefore.

d. To the extent the good-faith efforts applicable to bidders that are signatories to collective bargaining agreements with organized labor conflict with the procedures implemented by the bidder in order to comply with the relevant bargaining agreement, the bidder shall substitute other procedures as may be approved by the Director in writing, in order to accomplish the purpose and intent of this section.

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

met, a Bidder will be required to give the City documentation to prove that it and/or 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 _____

Project Title _____

_____ _____
(Department Project) Department

_____
(Bidder/Proposer)

STATE OF_____)
) ss
COUNTY OF_____)

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

1. This Affidavit is made for the purpose of complying with the provisions of the MBE/WBE submittal requirements on the above project and the MBE/WBE Program and is given on behalf of the Bidder/Proposer listed below. It sets out the Bidder/Proposer's plan to utilize MBE and/or WBE contractors on the project.

2. The project target goals are_____**% MBE** and_____**% WBE.**

3. Bidder/Proposer assures that it will utilize a minimum of the following percentages of MBE/WBE participation in the above project:

   - **BIDDER/PROPOSER PARTICIPATION:_____% MBE_____% WBE**

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

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

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

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

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

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

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

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

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

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

MBE/WBE BREAKDOWN SHEET

MBE FIRMS:

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

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

WBE FIRMS:

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

TOTAL WBE $ / TOTAL WBE %: $_____ _____%

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

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

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 by the City.

9. I hereby certify that I am authorized to make this Affidavit on behalf of the Bidder/Proposer named below and who shall abide by the terms set forth herein:

Bidder/Proposer primary contact: _____
Address: _____
_____
Phone Number: _____
Facsimile number: _____
E-mail Address: _____

By: _____
Title: _____
Date: _____
(Attach corporate seal if applicable)

Subscribed and sworn to before me this_____day of_____, 20____.

My Commission Expires: _____ _____
Notary Public

LETTER OF INTENT TO SUBCONTRACT

Check one:	
Original LOI:	☐
Updated LOI:	☐

Project Name/Title _____

Project Location/Number _____

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

_____

_____

_____

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

M/WBE Vendor type:

☐ Subcontractor/manufacturer (counts as 100% of contract value towards goals)

☐ Supplier (counts as 60% of the total dollar amount paid or to be paid by a prime contractor for supplies or goods towards goals)

☐ Broker (counts as 10% of the total dollar amount paid or to be paid by a prime contractor for supplies or goods towards goals)

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

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

Select one:

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

☐ The M/W/DBE Subcontractor listed above **IS** subcontracting certain portions of the above stated scope of work(s) to:

(1) Company name: _____

Full address: _____
Street number and name City, State and Zip Code

Primary contact: _____
Name Phone

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

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

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

b) Scope of work to be performed: _____

c) The dollar value of this agreement is: _____

PART 3:

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

PRIME CONTRACTOR BUSINESS NAME: _____

_____ _____

Signature: Prime Contractor Print Name

_____ _____

Title Date

State of)

County of)

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

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

My Commission Expires: _____ _____

Notary Public

STAMP:

MWDBE SUBCONTRACTOR BUSINESS NAME: _____

_____ _____

Signature: Subcontractor Print Name

_____ _____

Title Date

State of)

County of)

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

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

My Commission Expires: _____ _____

Notary Public

STAMP:

TIMETABLE FOR MBE/WBE UTILIZATION

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

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

ALLOTTED TIME FOR THE COMPLETION OF THIS CONTRACT
(Check one only)

15 days	___	75 days	___	135 days	___
30 days	___	90 days	___	150 days	___
45 days	___	105 days	___	165 days	___
60 days	☐	120 days	☐	180 days	☐

Other _____ (Specify)

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

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

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

_____
(Signature)

_____
(Position with Firm)

_____
(Date)

KANSAS CITY CREO

Civil Rights & Equal Opportunity Department
Contracts Management Division

4th Floor, City Hall
414 East 12th Street
Kansas City, MO 64106
Main: 816 513-1836

MWBE Request for Modification or Substitution

This Form must be submitted to CREO to request substitutions for an MBE or WBE listed in the Contractor Utilization Plan (CUP) or for modification of the amount of M/WBE participation listed in the CUP, or for contract renewals. Upon approval by CREO, this Form shall be an amendment to the CUP.

Project/Contract No.: _____ Project Title: _____

Prime Contractor: _____

Address, City, State, ZIP: _____

Amendment / Change Order No./ Renewal 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. Initial: _____
2. By submitting this request, I certify that I have given written notice to the M/WBE subcontractor, with a copy to CREO, of my intention to request to terminate and/or substitute, and the reason for the request. The written notice was provided on _____. The M/WBE has had at least five (5) days to respond to the notice and advise CREO on the reasons, if any, why it objects to the termination of its subcontract and why CREO should not approve the action. If required in a particular case as a matter of public necessity (e.g., safety), CREO may provide a response period shorter than five (5) days. A copy of the notice is attached to this request.
3. I hereby request that the Director of CREO approve: (check appropriate space)

   a. ☐ A renewal; attach M/WBE Letter of Intent to Subcontract for each new M/WBE to be added or for changes to award/scope of work.

   b. ☐ A substitution of the certified M/WBE firm _____, to
   (Name of new firm)
   perform _____, for the M/WBE firm _____
   (Scope of work to be performed by new firm) (Name of old firm)

   which is listed on the Prime Contractor's Utilization Plan to perform: _____.
   (Scope of work of old firm)

   c. ☐ A modification of the amount of M/WBE participation currently listed on the Bidder's/Contractor's/Proposer's CUP from:

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

   TO

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

   d. Attach a copy of the most recent M/WBE Monthly Utilization Report downloaded from the B2G Compliance Reporting Portal. Contact the Contract Compliance Officer assigned to your project for guidance if needed.

KANSAS CITY CREO

Civil Rights & Equal Opportunity Department
Contracts Management Division

4th Floor, City Hall
414 East 12th Street
Kansas City, MO 64106
Main: 816 513-1836

4. Prime Contractor states that a substitution or modification is necessary because: (check applicable reason(s))

- ◯ Contract renewal.
- ◯ The listed M/WBE subcontractor fails or refuses to execute a written contract.
- ◯ The listed M/WBE subcontractor fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the M/WBE subcontractor to perform its work on the subcontract results from the bad faith or discriminatory action of the prime contractor.
- ◯ The listed M/WBE subcontractor fails/refuses to meet prime contractor's reasonable, nondiscriminatory bond requirements.
- ◯ The listed M/WBE subcontractor becomes bankrupt, insolvent, or exhibits credit unworthiness.
- ◯ The listed M/WBE subcontractor is ineligible to work on public works projects because of suspension and debarment proceedings pursuant 2 CFR Parts 180, 215 and 1,200 or applicable state law
- ◯ You have determined that the listed M/WBE subcontractor is not a responsible contractor.
- ◯ The listed M/WBE subcontractor voluntarily withdraws from the project and provides written notice of its withdrawal.
- ◯ The listed M/WBE is ineligible to receive M/WBE credit for the type of work required.
- ◯ An M/WBE owner dies/becomes disabled rendering listed M/WBE contractor unable to complete work on the contract.
- ◯ Other documented good cause that you determine compels the termination of the M/WBE subcontractor. Provided, that good cause does not exist if the prime contractor seeks to terminate a M/WBE it relied upon to obtain the contract so that the prime contractor can self-perform the work for which the M/WBE contractor was engaged or so that the prime contractor can substitute another M/WBE or non–M/WBE contractor after contract award.

5. The following is a narrative summary of the Bidder's/Contractor's/Proposer's good faith efforts exhausted in attempts to substitute the M/WBE firm named above which is currently listed on the CUP with other qualified, certified M/WBE firms for the listed scope of work or any other scope of work in the project (attach additional sheets and any relevant documents):

6. Prime Contractor will present documentation within seven (7) days of submitting this Request for Modification or Substitution when requested by the City to evidence its good faith efforts (if applicable).

Date: _____ Prime Contractor: _____

Signed: _____
(Authorized Representative)

CREO KC MONTHLY REPORTING INSTRUCTIONS

M/WBE Monthly Utilization Report Instructions

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

Prevailing Wage Certified Payroll Report Instructions

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

Workforce Monthly Report Instructions

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

AFFIDAVIT OF TRAINING PROGRAM

This form must be submitted with 48 hours of Bid Opening

Bidder _____

Project Title and Number _____

STATE OF MISSOURI)
) ss:
COUNTY OF _____)

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

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

(attach additional pages, if necessary)

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

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

_____ of _____
(Title) (Name of Bidder)

Dated: _____ By: _____
(Affiant)

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

My Commission Expires: _____ _____
Notary Public

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** _____

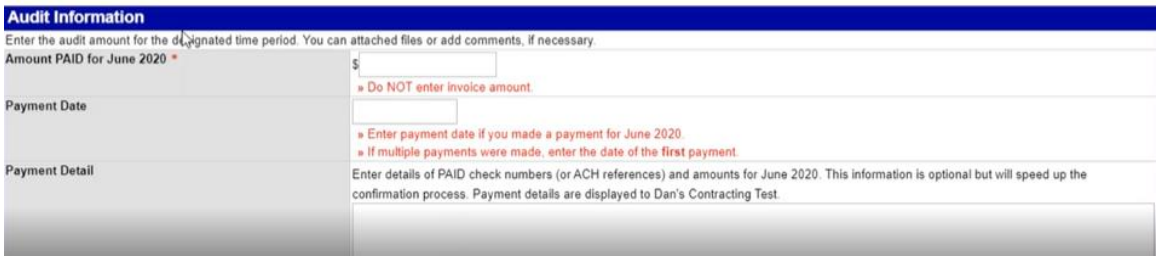
REMINDER: CONTRACTOR is responsible for meeting or exceeding the the D/M/WBE participation amounts in its Contractor Utilization Plan (CUP) as amended by any previously approved Request for Modification/Substitution. Any Change Orders or amendements modifying the amount CONTRACTOR is to be compensated 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:

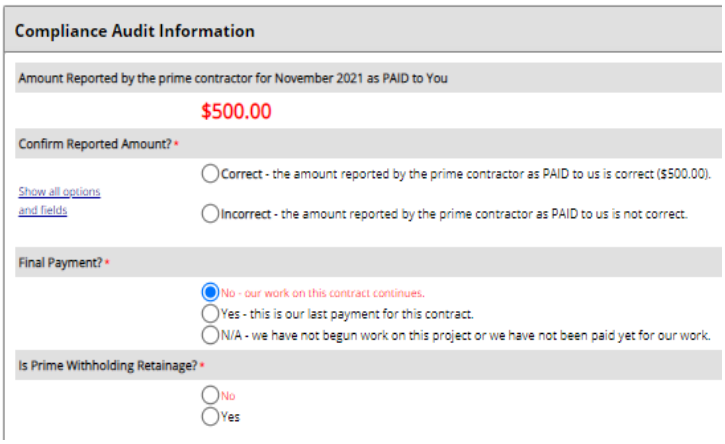


Once information has been entered, select review and save. Complete same steps for all subcontractors. If there were subcontractors that did not receive a payment for the specific audit month, click the Mark Remaining Subcontractors as Zero button to mark remaining subcontractors as 0.

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: _____

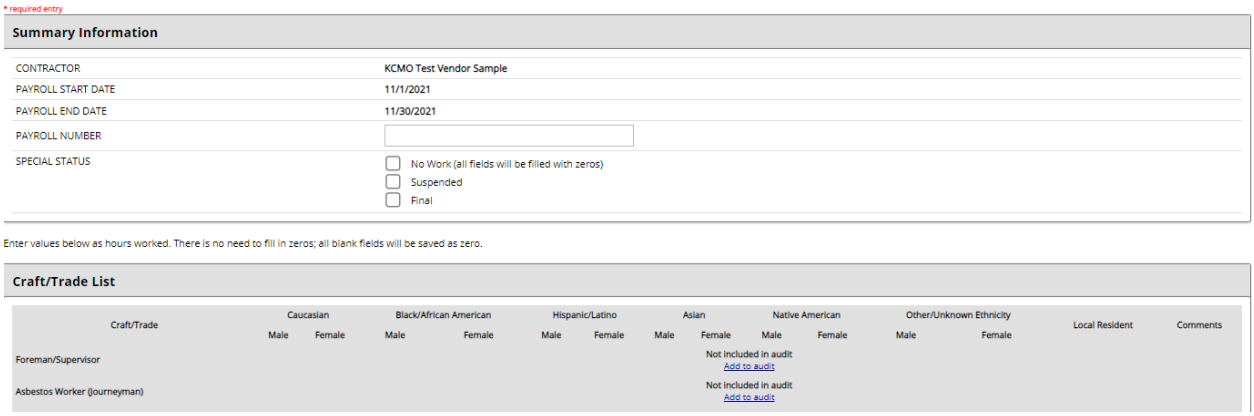
Date: _____

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

Company Name: _____ **Prime's Name:** _____

Company Address: _____ **KCMO Project Name:** _____

Company City, State, Zip: _____ **KCMO Project Number:** _____

Name of Person Completing Report: _____ **Today's Date:** _____

Phone Number: _____

Email: _____ **City Department:** _____

Instructions:

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

Official Use Only

Females		*KCMO Resident*
African American	0	0
Asian/Pacific Islander American	0	0
Caucasian American	0	0
Hispanic/Latino American	0	0
Native American	0	0
Other	0	0
	0	0

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

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

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

	Journeyman	*Apprentice*
Operating Engineer	0	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	--
	0	0

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

	Name		Job Title (*use drop down menu*)	Address	City	State	Zip Code	KCMO Resident	Gender	Ethnicity
	Last	First								
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2										
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14										

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

	Name		Job Title (*use drop down menu*)	Address	City	State	Zip Code	KCMO Resident	Gender	Ethnicity
	Last	First								
15										
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Company Name: 0 KCMO Project Name: 0 KCMO Project Number: 0

	Name		Job Title (*use drop down menu*)	Address	City	State	Zip Code	KCMO Resident	Gender	Ethnicity
	Last	First								
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49										
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Company Name: 0 KCMO Project Name: 0 KCMO Project Number: 0

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

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

Pre Contract Bidder's Certification

Project Number _____

Project Title _____

STATE OF)
) SS
COUNTY OF)

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

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

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

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

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

1. _____
2. _____
3. _____

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

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

_____
(Bidder's Name) (Date)

_____
Signature of Person Making This Affidavit

In witness whereof, I have hereunto subscribed my name and affixed my official seal this __day of, 2024.

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 (If applicable)

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

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

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

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

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

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

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

PERFORMANCE AND MAINTENANCE BOND (If applicable)

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

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

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

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

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

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

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

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

- ☐ Provide a certificate of insurance for all insurance that may be required in the contract such as:

  Commercial General Liability
  Workers' Compensation and Employers' Liability
  Commercial Automobile Liability
  Railroad Protective Liability
  Environmental Liability
  Asbestos Liability
  Longshoremen's Insurance
  Property Insurance

- ☐ List the NAIC Number (National Association of Insurance Commissioners) or A.M. Best Number for each Insurer listed on the Certificate of Insurance.

- ☐ Certificate "Kansas City, Missouri" must named as an Additional Insured.

- ☐ Check the insurance requirements of the Contract. If Contract Documents require that other entities be included as additional insureds, each entity shall be listed on the certificate(s).

- ☐ Description of Operations must include Project/Contract Number and Project/Contract Title/Description as contained in the Contract Documents. The Certificate Holder and address block shall be completed as follows:

  Kansas City, Missouri
  [Name of applicable City Department]
  [Name of Contract Administrator, Buyer, or Project Manager]
  [Department Address]
  Kansas City, Missouri **[Zip Code]**

- ☐ If your insurance agent prepares an ACORD form, the automobile insurance must be "any auto" or better for acceptance by the City.

AFFIRMATIVE ACTION REQUIREMENTS

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

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

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

HEALTH AND SAFETY PLAN (If applicable)

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

EMPLOYEE ELIGIBILITY VERIFICATION AFFIDAVIT

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

STATE OF _____)
) ss
COUNTY OF _____)

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

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

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

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

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

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

_____
Affiant's signature

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

_____
Notary Public

My Commission expires:

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

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

STATE OF MISSOURI)

) ss.

COUNTY OF)

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

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

_____

Signature of affiant

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

_____

Notary Public

My commission expires: _____

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)**	
		___ ___ / ___ ___ / ___ ___ ___ ___	

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)

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

PERFORMANCE AND MAINTENANCE BOND

Project Number _____

Project Title _____

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

WHEREAS,

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

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

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

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

CONTRACTOR
Name, address and facsimile number of Contractor

_____
_____
_____
_____

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

By: _____
Title: _____

(Attach corporate seal if applicable)

SURETY
Name, address and facsimile number of Surety:

_____
_____
_____
_____

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

By: _____
Title: _____
Date: _____

(Attach seal and Power of Attorney)

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

PAYMENT BOND

Project Number _____

Project Title _____

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

WHEREAS,

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

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

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

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

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

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

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

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

CONTRACTOR
Name, address and facsimile number of Contractor

_____
_____
_____
_____

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

By: _____
Title:_____

(Attach corporate seal if applicable)

SURETY
Name, address and facsimile number of Surety:

_____
_____
_____
_____

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

By:_____
Title:_____
Date:_____

(Attach seal and Power of Attorney)

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

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

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

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

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

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

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY ☑ COMMERCIAL GENERAL LIABILITY ☐ CLAIMS-MADE ☑ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ☑ PRO-JECT ☐ LOC	Y	Y	POLICY NUMBER	1/1/2011	Current	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 $ 50,000 $ 10,000 $ 1,000,000 $ 2,000,000 $ 2,000,000
A	AUTOMOBILE LIABILITY ☑ ANY AUTO ALL OWNED AUTOS ☐ SCHEDULED AUTOS ☑ HIRED AUTOS ☑ NON-OWNED AUTOS	Y	Y	POLICY NUMBER	1/1/2011	Current	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ $ $
A	☑ UMBRELLA LIAB ☑ OCCUR EXCESS LIAB ☐ CLAIMS-MADE DED ☑ RETENTION $ 10,000	Y	Y	POLICY NUMBER	1/1/2011	Current	EACH OCCURRENCE AGGREGATE	$ 2,000,000 $ 2,000,000
A	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	POLICY NUMBER	1/1/2011	Current	☑ WC STATU-TORY LIMITS ☐ OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000
A	Leased/Rented/Equip. Owned Equipment Builders Risk/Installation Floater	N/A	Y	POLICY NUMBER	1/1/2011	Current	Limit; Deductible Limit; Deductible Limit; Deductible	

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

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

CERTIFICATE HOLDER

City of Kansas City, Missouri

_____ [Department]

_____ [Address]

Kansas City, MO _____ [Zip]

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

SAMPLE

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FORM **RD-C1**
(12/20)

City of Kansas City, Missouri - Revenue Division

AUTHORIZATION TO RELEASE A REVENUE CLEARANCE LETTER

Phone: (816) 513-1120
Fax: (816) 513-1264

KANSAS CITY MISSOURI

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

Name of taxpayer: _____ FEIN or SSN: _____
(PRINT)
Address: _____

Check this box and complete this section to send the Clearance Letter to a contractor.

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

NAME (PRINT)		BUSINESS NAME	TITLE
ADDRESS		CITY, STATE, ZIP CODE	
PHONE NUMBER	FAX NUMBER	EMAIL ADDRESS	

☐ **I authorize the City to provide the Taxpayer's Revenue Clearance Letter to all City Departments to certify that the Taxpayer is in compliance with the tax ordinances administered by the Commissioner of Revenue.**

Please send my first Revenue Clearance Letter to: _____
(Print Name of City Department / Contact Person / Email / Fax Number)

This authorization shall expire one (1) year from the date on the bottom of this form.

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

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

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

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

A FACSIMILE OF THIS DOCUMENT SHALL CONSTITUTE AN ORIGINAL

Email completed form to business.license@kcmo.org or mail to:

City of Kansas City, Missouri, Business License Office, City Hall, 1st floor, 414 E. 12th St., Kansas City, MO 64106

CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

GENERAL CONDITIONS
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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: 81000955

Project Title: Green Infrastructure Project 1-1: Mill Creek Park Phase 2 – Retention Ponds

These Supplementary Conditions amend or supplement the General Conditions of the Construction Contract and other provisions of the Contract Documents as indicated below. All provisions that are not so amended or supplemented remain in full force and effect.

SC-2.04 A. Article 2, Paragraph 2.04, Copies of Documents, is amended by deleting Paragraph 2.04 A and replacing it with the following:

A. CITY shall furnish to CONTRACTOR one executed copy of the Project Manual including all Addenda.

SC-4.02 Article 4, Paragraph 4.02, Subsurface and Physical Conditions; Subparagraphs A and B are supplemented as follows:

In the preparation of the Contract Documents, the following reports of explorations and tests of subsurface conditions at or contiguous to the Site of the Work were utilized:

1. Report dated 8/25/2023, prepared by TSi geotechnical, inc.; entitled GREEN INFRASTRUCTURE PROJECT: MILL CREEK PARK, KANSAS CITY, MISSOURI, along with supplemental memorandum dated 9/4/2025, which is available from the planroom or opon request. This report is for the bidders information only and is not part of the Contract Documents.

In the preparation of the Contract Documents, no drawings of physical conditions in or relating to existing surface or subsurface structures which are at or contiguous to the Site of the Work were utilized.

SC-4.06 Article 4, Paragraph 4.06, Asbestos, Lead-Based Paint, PCBs, Petroleum, Hazardous Waste or Radioactive Material, Subparagraphs A and B are supplemented as follows:

In the preparation of the Contract Documents, no reports of explorations and tests of any Hazardous Environmental Condition(s) at the Site of the Work 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 28 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 – Cass, Clay, Jackson, Platte or Ray

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. The Resident Project Representative (RPR) will be DESIGN PROFESSIONAL's representative at the Site, will act as directed by and under the supervision of DESIGN PROFESSIONAL, and will confer with DESIGN PROFESSIONAL regarding RPR's actions.

1. General: RPR's dealings in matters pertaining to the Work in general shall be with DESIGN PROFESSIONAL, the CITY’s Smart Sewer Program Manager, and CONTRACTOR. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of CONTRACTOR. RPR shall generally communicate with CITY and CITY’S Smart Sewer Program Manager only with the knowledge of and under the direction of DESIGN PROFESSIONAL.

2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by CONTRACTOR and consult with DESIGN PROFESSIONAL and CITY’S Smart Sewer Program Manager concerning acceptability.

3. Conferences and Meetings: Attend meetings with CONTRACTOR and CITY's Smart Sewer Program Manager, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings.

4. Liaison:

    a. Serve as DESIGN PROFESSIONAL's liaison with CONTRACTOR. Working principally through CONTRACTOR's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.

    b. Assist DESIGN PROFESSIONAL in serving as CITY's liaison with CONTRACTOR when CONTRACTOR's operations affect CITY's on-Site operations.

    c. Assist in obtaining from CITY additional details or information, when required for proper execution of the Work.

5. Interpretation of Contract Documents: Report to DESIGN PROFESSIONAL when clarifications and interpretations of the Contract Documents are needed and transmit to CONTRACTOR clarifications and interpretations as issued by DESIGN PROFESSIONAL.

6. Shop Drawings and Samples:

    a. Record date of receipt of Samples and CONTRACTOR-approved Shop Drawings when hard copies are furnished at the Site.

    b. Receive Samples which are furnished at the Site by CONTRACTOR, and notify DESIGN PROFESSIONAL of availability of Samples for examination.

    c. Advise DESIGN PROFESSIONAL and CONTRACTOR of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by DESIGN PROFESSIONAL.

7. Modifications: Consider and evaluate CONTRACTOR's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager. Transmit to CONTRACTOR in writing decisions as issued by DESIGN PROFESSIONAL.

8. Review of Work and Rejection of Defective Work:

    a. Conduct on-Site observations of CONTRACTOR's work in progress to assist DESIGN PROFESSIONAL and CITY's Smart Sewer Program Manager in determining if the Work is in general proceeding in accordance with the Contract Documents.

    b. Report to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager whenever RPR believes that any part of CONTRACTOR's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval. If RPR believes a Notice of Non-

conformance should be issued, the RPR will advise the DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager in this matter and provide field information as required for the DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager to complete and issue a Notice of Non-Conformance to the CONTRACTOR.

9. Inspections, Tests, and System Start-ups:
    a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate CITY's personnel, and that CONTRACTOR maintains adequate records thereof.
    b. Observe, record, and report to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager appropriate details relative to the test procedures and systems start-ups.
10. Records:
    a. Prepare a daily report or keep a diary or log book, recording CONTRACTOR's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager.
    b. Maintain records for use in preparing Project documentation.
11. Reports:
    a. Furnish to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager periodic reports as required of progress of the Work and of CONTRACTOR's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
    b. Recommend to DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager proposed Change Orders, Work Change Directives, and Field Orders. Assist DESIGN PROFESSIONAL as necessary in drafting such documents and obtain backup material from CONTRACTOR.
    c. Immediately notify DESIGN PROFESSIONAL and CITY'S Smart Sewer Program Manager of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.
12. Payment Requests: Review applications for payment with CONTRACTOR for compliance with the established procedure for their submission and forward with recommendations to DESIGN PROFESSIONAL, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by CONTRACTOR are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to DESIGN

PROFESSIONAL for review and forwarding to CITY prior to payment for that part of the Work.

14. Completion:

    a. Participate in DESIGN PROFESSIONAL's and CITY'S Smart Sewer Program Manager visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.

    b. Participate in DESIGN PROFESSIONAL's and CITY'S Smart Sewer Program Manager final visit to the Site to determine completion of the Work, in the company of CITY and CONTRACTOR, and prepare a final punch list of items to be completed and deficiencies to be remedied.

    c. Observe whether all items on the final list have been completed or corrected and make recommendations to DESIGN PROFESSIONAL concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
2. Exceed limitations of DESIGN PROFESSIONAL's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of CONTRACTOR, Subcontractors, or Suppliers.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of CONTRACTOR's work.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, anprograms in connection with the activities or operations of CITY or CONTRACTOR.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by DESIGN PROFESSIONAL.
7. Accept Shop Drawing or Sample submittals from anyone other than CONTRACTOR.
8. Authorize CITY to occupy the Project in whole or in part.

SC-9.04 Article 9, Paragraph 9.04, Rejecting Defective Work is amended by adding the following new Subparagraph immediately following Subparagraph 9.04 A:

B. When the work performed by CONTRACTOR deviates from the project's contractual requirements, the Contractor is to be notified by the DESIGN PROFESSIONAL using the Non-Conformance Notice/Defective Work Form. The DESIGN PROFESSIONAL shall complete Part 1 – Identification of the Non-Conformance Notice and/or Defective Work to provide written notice to the CONTRACTOR that the work does not meet the referenced contractual requirements. Upon receipt, CONTRACTOR shall suspend work directly related to the non-conforming work in accordance with Specification 00700 General Conditions, Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work.

SC-9.08 E. Article 9, Paragraph 9.08, Limitations on DESIGN PROFESSIONAL's Authority and Responsibilities, Subparagraph E is supplemented as follows:

DESIGN PROFESSIONAL's Consultant(s), resident Project representative and assistant(s) to the resident Project representative are the following:

Consultant(s): HDR Inc.

Resident Project representative: TBD

Assistant(s) to the resident Project representative: TBD

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 **365 Calendar Days** thereafter. Once the Work starts, CONTRACTOR shall continuously pursue completion of the Work. A Notice to Proceed for this project will not be issued prior to July 13, 2026.

2. The Work shall be completed and ready for final payment in accordance with Paragraph 14.07 within **90 Calendar Days** after the date of Substantial Completion of the Work.

C. Liquidated Damages

1. If the Work is not substantially completed, in accordance with Paragraph 14.04, within the period stated in Paragraph 12.01 B.1, CONTRACTOR shall pay to CITY the amount of **two thousand dollars ($ 2,000.00)** as liquidated damages and not as a penalty for each Calendar Day until the Work is substantially complete. The amount of liquidated damages shall be deducted from any payments due or to become due CONTRACTOR.

2. If the Work is not completed and ready for final payment in accordance with Paragraph 14.07, within the period stated in Paragraph 12.01 B.2, CONTRACTOR shall pay to CITY the amount of **one thousand dollars ($ 1,000.00)** 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 work (excluding sodding which will remain one (1) year), 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:
    a. Underground storage units with associated discharge structure(s) including installation and start-up of real-time controls for discharge structure.
    b. All storm sewer piping and appurtenances
    c. Stormwater storage bioretention basins including rock storage media, choker course, and planting media as detailed on the plans.
    d. All stairs and retaining walls including finishes
    e. All standard and decorative paving
    f. Installation of site furniture and metal railings
    g. Installation of lighting system
    h. Sod installation
    i. Final site grading and protection to prepare site for acceptance by landscape contractor.

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.

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 1

Project Number 81000955

Project Title Green Infrastructure Project 1-1: Mill Creek Park Phase 2 – Retention Ponds

ISSUE DATE: **4/14/2026**

Bidders are hereby notified that the Bidding and Contract Documents for the above project, for which Bids are to be received on **April 21, 2026**, are amended as follows:

Specifications

1. Delete and replace the following section(s):
   a. Delete Specification 00015 List of Drawings and replace with the following Specification 00015 List of Drawings, attached herein.

2. Delete the following section(s):
   a. Delete Specification 01270 Adjustment Unit Price and Measurement Procedures.

Drawings:

1. Add Sheets 101-108.

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

LIST OF DRAWINGS

Project Number: 81000955

Project Title: GREEN INFRASTRUCTURE PROJECT 1-1: MILL CREEK PARK PHASE 2 – RETENTION PONDS

Addendum #1

Item	Set /Title /Description /Designation	Drawing No(s).	Dated
001	COVER SHEET	D-1625.02	03/02/2026
002	SHEET INDEX	D-1625.02	03/02/2026
003	ABBREVIATIONS	D-1625.02	03/02/2026
004	GENERAL CONSTRUCTION NOTES	D-1625.02	03/02/2026
005	GENERAL LEGEND	D-1625.02	03/02/2026
006	ELECTRICAL LEGEND	D-1625.02	03/02/2026
007	STORMWATER COLLECTION SYSTEM DRAINAGE AREA MAP	D-1625.02	03/02/2026
008	OVERALL EXISTING CONDITIONS PLAN	D-1625.02	03/02/2026
009	EXISTING CONDITIONS PLAN - NORTH	D-1625.02	03/02/2026
010	EXISTING CONDITIONS PLAN - MIDDLE	D-1625.02	03/02/2026
011	EXISTING CONDITIONS PLAN - SOUTH	D-1625.02	03/02/2026
012	OVERALL DEMOLITION PLAN	D-1625.02	03/02/2026
013	DEMOLITION PLAN -NORTH	D-1625.02	03/02/2026
014	DEMOLITION PLAN -MIDDLE	D-1625.02	03/02/2026
015	DEMOLITION PLAN -SOUTH	D-1625.02	03/02/2026
016	TREE PROTECTION AND REMOVAL PLAN -NORTH	D-1625.02	03/02/2026
017	TREE PROTECTION AND REMOVAL PLAN -MIDDLE	D-1625.02	03/02/2026
018	TREE PROTECTION AND REMOVAL PLAN - SOUTH	D-1625.02	03/02/2026
019	OVERALL LAYOUT AND STAKING PLAN	D-1625.02	03/02/2026
020	LAYOUT AND STAKING PLAN - NORTH	D-1625.02	03/02/2026
021	LAYOUT AND STAKING PLAN - MIDDLE	D-1625.02	03/02/2026
022	LAYOUT AND STAKING PLAN - SOUTH	D-1625.02	03/02/2026
023	OVERALL GRADING PLAN	D-1625.02	03/02/2026
024	GRADING PLAN - NORTH	D-1625.02	03/02/2026
025	GRADING PLAN -MIDDLE	D-1625.02	03/02/2026
026	GRADING PLAN - SOUTH	D-1625.02	03/02/2026
027	EROSION CONTROL PLAN - NORTH	D-1625.02	03/02/2026
028	EROSION CONTROL PLAN - MIDDLE	D-1625.02	03/02/2026
029	EROSION CONTROL PLAN - SOUTH	D-1625.02	03/02/2026
030	RUNNING TRAIL PLAN AND PROFILE	D-1625.02	03/02/2026
031	STORMWATER PLAN AND PROFILE - LINE 300	D-1625.02	03/02/2026
032	STORMWATER PLAN AND PROFILE - LINE 300	D-1625.02	03/02/2026
033	STORMWATER PLAN AND PROFILE - LINE 400, 500, 700 & 1000	D-1625.02	03/02/2026
034	STORMWATER PLAN AND PROFILE - LINE 600 & 800	D-1625.02	03/02/2026
035	STORMWATER PLAN AND PROFILE - LINE 900	D-1625.02	03/02/2026
036	SANITARY SEWER PLAN AND PROFILE - LINE 2000	D-1625.02	03/02/2026
037	EXISTING 66-INCH SANITARY PLAN AND PROFILE	D-1625.02	03/02/2026

038	EXISTING 42-INCH WATER PLAN AND PROFILE	D-1625.02	03/02/2026
039	RETAINING WALL OVERALL PLAN	D-1625.02	03/02/2026
040	WEST RETAINING WALL PLAN AND PROFILE	D-1625.02	03/02/2026
041	EAST RETAINING WALL PLAN AND PROFILE	D-1625.02	03/02/2026
042	WEIR 1 PLAN AND PROFILES	D-1625.02	03/02/2026
043	WEIR 2 PLAN AND PROFILES	D-1625.02	03/02/2026
044	WEIR 3 PLAN AND PROFILES	D-1625.02	03/02/2026
045	NORTHWEST NORTHEAST RETAINING WALL PLAN AND PROFILES	D-1625.02	03/02/2026
046	CIVIL DETAILS	D-1625.02	03/02/2026
047	CIVIL DETAILS	D-1625.02	03/02/2026
048	CIVIL DETAILS	D-1625.02	03/02/2026
049	UG DETENTION CUTSHEETS	D-1625.02	03/02/2026
050	TYPICAL BASIN CROSS SECTIONS	D-1625.02	03/02/2026
051	EROSION CONTROL DETAILS	D-1625.02	03/02/2026
052	EROSION CONTROL DETAILS	D-1625.02	03/02/2026
053	OVERALL FURNISHINGS AND FINISHES	D-1625.02	03/02/2026
054	FURNISHINGS AND FINISHES - NORTH	D-1625.02	03/02/2026
055	FURNISHINGS AND FINISHES - MIDDLE	D-1625.02	03/02/2026
056	FURNISHINGS AND FINISHES - SOUTH	D-1625.02	03/02/2026
057	LANDSCAPE STAKING AND JOINTING PLAN -NORTH	D-1625.02	03/02/2026
058	LANDSCAPE STAKING AND JOINTING PLAN -MIDDLE	D-1625.02	03/02/2026
059	LANDSCAPE STAKING AND JOINTING PLAN -SOUTH	D-1625.02	03/02/2026
060	LANDSCAPE DETAILS	D-1625.02	03/02/2026
061	LANDSCAPE DETAILS	D-1625.02	03/02/2026
062	LANDSCAPE DETAILS	D-1625.02	03/02/2026
063	LANDSCAPE DETAILS	D-1625.02	03/02/2026
064	LANDSCAPE DETAILS	D-1625.02	03/02/2026
065	LANDSCAPE DETAILS	D-1625.02	03/02/2026
066	LANDSCAPE DETAILS	D-1625.02	03/02/2026
067	LANDSCAPE DETAILS	D-1625.02	03/02/2026
068	LANDSCAPE DETAILS	D-1625.02	03/02/2026
069	LANDSCAPE DETAILS	D-1625.02	03/02/2026
070	LANDSCAPE DETAILS	D-1625.02	03/02/2026
071	LANDSCAPE DETAILS	D-1625.02	03/02/2026
072	OVERALL PLANTING AND IRRIGATION PLAN	D-1625.02	03/02/2026
073	PLANTING AND IRRIGATION PLAN -NORTH	D-1625.02	03/02/2026
074	PLANTING AND IRRIGATION PLAN -MIDDLE	D-1625.02	03/02/2026
075	PLANTING AND IRRIGATION PLAN -SOUTH	D-1625.02	03/02/2026
076	STRUCTURAL GENERAL NOTES	D-1625.02	03/02/2026
077	WEIR 1 STRUCTURAL PLAN	D-1625.02	03/02/2026
078	WEIR 2 STRUCTURAL PLAN	D-1625.02	03/02/2026
079	WEIR 3 STRUCTURAL PLAN	D-1625.02	03/02/2026
080	BASIN 2 OUTFLOW STRUCTURE PLAN	D-1625.02	03/02/2026
081	STRUCTURAL SECTIONS	D-1625.02	03/02/2026
082	STRUCTURAL SECTIONS	D-1625.02	03/02/2026
083	STRUCTURAL SECTIONS	D-1625.02	03/02/2026
084	STRUCTURAL SECTIONS	D-1625.02	03/02/2026
085	STRUCTURAL SECTIONS	D-1625.02	03/02/2026
086	STRUCTURAL SECTIONS	D-1625.02	03/02/2026
087	OVERALL ELECTRICAL PLAN	D-1625.02	03/02/2026
088	ELECTRICAL PLAN -NORTH	D-1625.02	03/02/2026
089	ELECTRICAL PLAN -MIDDLE	D-1625.02	03/02/2026

090	ELECTRICAL PLAN -SOUTH	D-1625.02	03/02/2026
091	ELECTRICAL DETAILS, DIAGRAMS AND SCHEDULES	D-1625.02	03/02/2026
092	FOR REFERENCE ONLY	D-1625.02	03/02/2026
093	FOR REFERENCE ONLY	D-1625.02	03/02/2026
094	FOR REFERENCE ONLY	D-1625.02	03/02/2026
095	FOR REFERENCE ONLY	D-1625.02	03/02/2026
096	FOR REFERENCE ONLY	D-1625.02	03/02/2026
097	FOR REFERENCE ONLY	D-1625.02	03/02/2026
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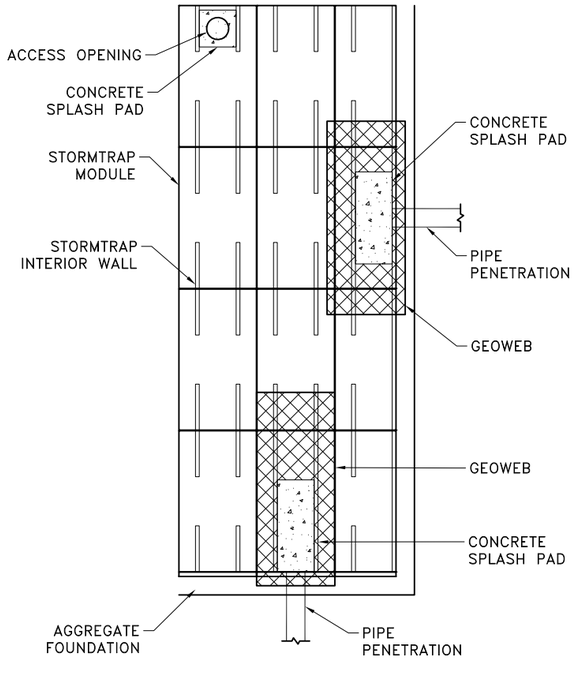
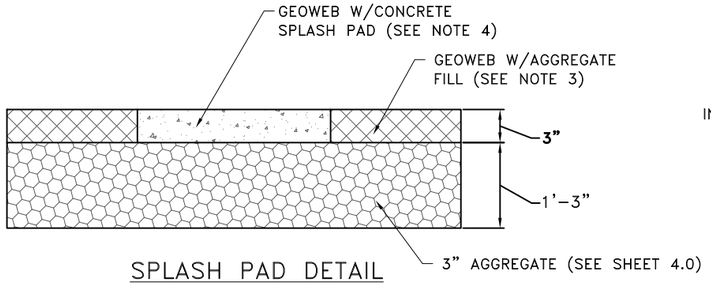
105	FOR REFERENCE ONLY	D-1625.02	03/02/2026
106	FOR REFERENCE ONLY	D-1625.02	03/02/2026
107	FOR REFERENCE ONLY	D-1625.02	03/02/2026
108	FOR REFERENCE ONLY	D-1625.02	03/02/2026

GEOWEB AND SPLASH PAD INSTALLATION SPECIFICATION

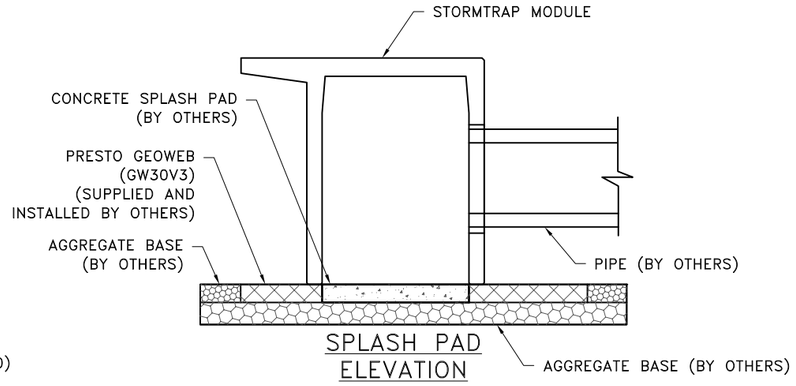
1. THE APPROVED GEOWEB SHALL BE PRESTO GEOWEB (GW30V3). THE GEOWEB NOMINAL DIMENSIONS SHALL BE 9–FT x 25–FT.
2. THE CONCRETE SPLASH PAD AND GEOWEB SHALL BE INSTALLED PRIOR TO INSTALLATION OF THE STORMTRAP MODULES.
3. THE GEOWEB INFILL MATERIAL SHALL BE #5 AGGREGATE.
4. THE CONCRETE SPLASH PAD SHALL BE INSTALLED WITHIN THE GEOWEB AND IS REQUIRED AT ALL PIPE ENTRY LOCATIONS.
5. THE GEOWEB EDGE SHALL BE INSTALLED 1–FT BEYOND THE OUTER PERIMETER OF THE STORMTRAP SYSTEM.
6. THE GEOWEB LONGITUDINAL DIMENSION (25–FT) SHALL BE INSTALLED PARALLEL TO THE STORMTRAP LEGS.
7. THE CONCRETE SPLASH PAD AND GEOWEB SHALL BE CENTERED AT THE PIPE PENETRATION.
8. REFER TO SPLASH PAD LAYOUT FOR CONCRETE SPLASH PAD DIMENSIONS.
9. IF ANY PRODUCT OTHER THAN PRESTO GEOWEB IS TO BE INSTALLED, THE PRODUCT MANUFACTURER IS REQUIRED TO SUBMIT A LETTER STATING THAT THE PRODUCT IS EQUAL OR BETTER THEN PRESTO GEOWEB, BOTH IN PERFORMANCE AND IN STRUCTURAL CAPACITY.
10. ALL GEOWEB AND SPLASH PADS TO BE SUPPLIED AND INSTALLED BY CONTRACTOR.
11. A CONCRETE SPLASH PAD IS REQUIRED AT ANY ACCESS OPENING THAT HAS AN OPEN GRATE FOR DRAINAGE. THE CONCRETE SPLASH PAD SHALL EXTEND BETWEEN THE UNIT LEG WALLS AND 3'–0" FROM THE CENTERLINE OF THE OPENING ON BOTH SIDES UNLESS SPECIFIED OTHERWISE ON THE SPLASH PAD LAYOUT. GEOWEB IS NOT REQUIRED UNDER ACCESS OPENINGS.

SPLASH PAD CONFIGURATION

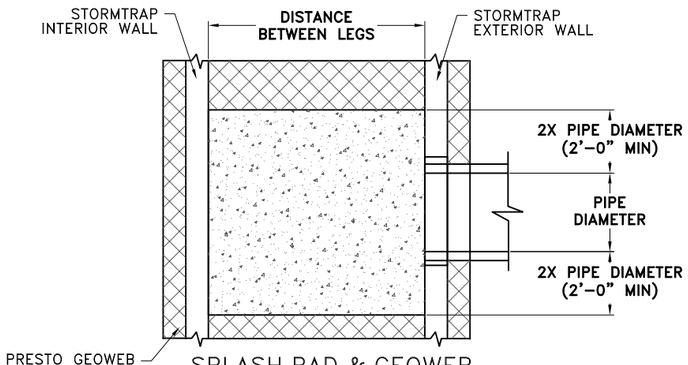




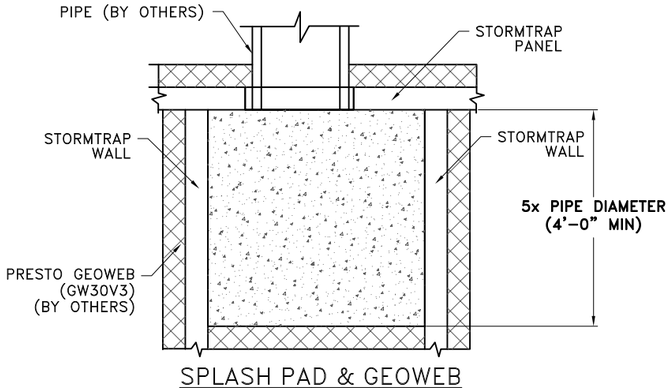
SPLASH PAD DETAIL



SPLASH PAD ELEVATION



SPLASH PAD & GEOWEB
PLAN VIEW – SIDE WALL



SPLASH PAD & GEOWEB
PLAN VIEW – END PANEL

FOR REFERENCE ONLY

StormTrap
PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]
1287 WINDHAM PARKWAY
ROMEOVILLE, IL 60446
P:815–941–4549 / F:331–318–5347

ENGINEER INFORMATION:

HDR
2144 E Republic Rd
B203
Sprigfield, MO 65804
417.351.6500

PROJECT INFORMATION:

Mill Creek Park

Phase 2

Kansas City, MO

CURRENT ISSUE DATE:

02/27/2026

ISSUED FOR:

PRELIMINARY

REV.	DATE:	ISSUED FOR:	DWN BY:
4	02/27/2026	PRELIMINARY	KS
3	10/28/2025	PRELIMINARY	KS
2	7/31/2025	PRELIMINARY	JPH
1	07/10/2025	PRELIMINARY	JH

SCALE:

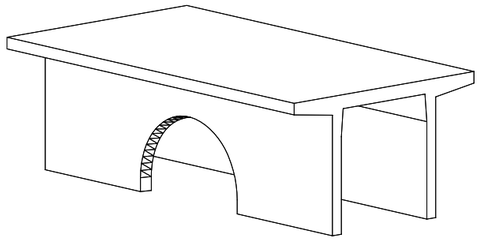
NTS

SHEET TITLE:

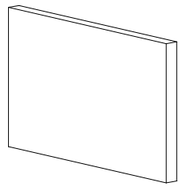
SPLASH PAD & GEOWEB DETAILS

SHEET NUMBER:

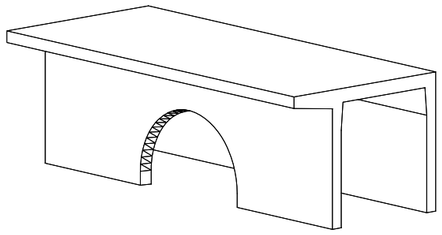
6.0



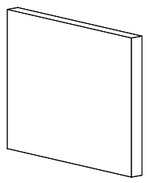
TYPE II



TYPE II
END PANEL



TYPE IV



TYPE IV
END PANEL

NOTES:
1. OPENING LOCATIONS AND SHAPES MAY VARY.
2. SP – INDICATES A MODULE WITH MODIFICATIONS.
3. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
4. POCKET WINDOW OPENINGS ARE OPTIONAL.

FOR REFERENCE ONLY

StormTrap
PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]
1287 WINDHAM PARKWAY
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SCALE:

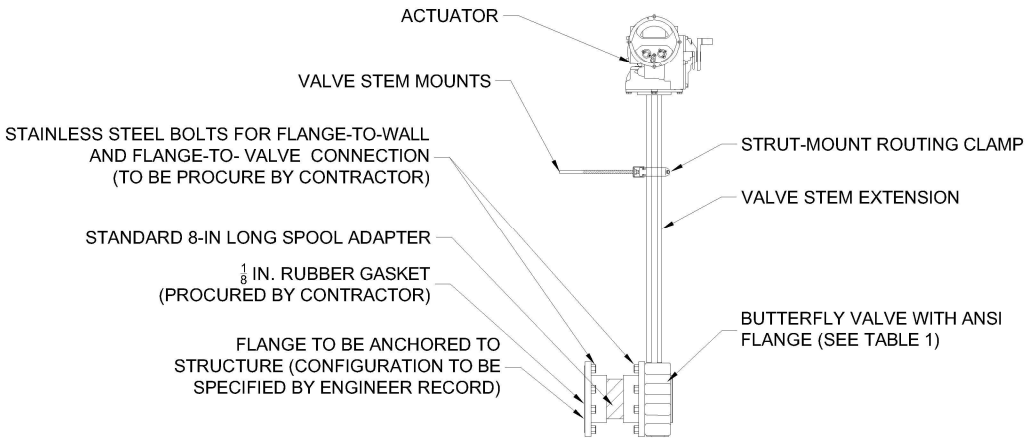
NTS

SHEET TITLE:

SINGLETRAP
MODULE TYPES

SHEET NUMBER:

7.0



FOR REFERENCE ONLY

ACTUATOR VALVE ASSEMBLY NOTES:

OPTI CERTIFIED HARDWARE

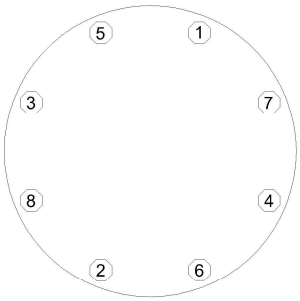
1. CONTACT OPTIRTC SALES AT HTTPS://OPTIRTC.COM/CONTACT/ OR (844) 678-4782 EXT. 3 FOR OPTI CERTIFIED HARDWARE:
   1.1. ACTUATOR-VALVE ASSEMBLY (ACTUATOR, BUTTERFLY VALVE, AND VALVE STEM EXTENSION TO BE DELIVERED PRE-ASSEMBLED ON PALLET)
   1.2. 8-IN LONG SPOOL ADAPTER

ALL OTHER HARDWARE AND EQUIPMENT

2. ALL OTHER HARDWARE AND EQUIPMENT TO BE PROCURED BY INSTALLATION CONTRACTOR.
3. ACTUATOR TO BE ORIENTED SUCH THAT HAND WHEEL, TERMINAL BLOCK, AND DISPLAY SCREEN ARE ACCESSIBLE. VALVE SHALL REST ON ONE OF THE FOLLOWING: POURED CONCRETE PAD (4000 PSI), APPROVED CONCRETE BLOCKS, OR APPROVED STRUCTURE FIT TO BEAR 600LB LOAD.
4. REFER TO ORIFICE CLEARANCE DETAIL FOR STANDARD CLEARANCES.
5. FLEXIBLE CONDUIT SHALL RUN FROM ACTUATOR TO JUNCTION BOX. ALL CONDUIT ALONG WALL TO BE SECURED WITH #304 SS CLIPS (3' SPACING MAXIMUM). IP68 CORD GRIP REQUIRED FOR CONNECTION BETWEEN CONDUIT AND JUNCTION BOX. ALL CONDUIT CONNECTIONS TO BE IP68 RATED AND SEALED WITH POLYWATER FOAM DUCT SEALANT.
6. FLANGE TO VALVE CONNECTION: SEE TABLE 1 FOR FLANGE CONNECTOR BOLTS AND TORQUE RATING. ALL HARDWARE TO BE #304 SS.
7. FLANGE TO WALL CONNECTION: BOLT CAVITIES TO BE CLEANED OF DEBRIS USING AUTO CLEANING DRILL BIT OR COMPRESSED AIR PRIOR TO ANCHORING. BOLT CAVITIES TO BE FILLED WITH INJECTABLE ADHESIVE ANCHOR (HILTI HIT SERIES EPOXY #2123401 OR EQUIVALENT). BOLTS TO BE EMBEDDED TO MINIMUM DEPTH SPECIFIED BY MANUFACTURER, 1 IN. CLEARANCE FROM REBAR.
8. TRASH RACK TO BE SPECIFIED BY THE ENGINEER OF RECORD (OR OTHERS) AND PROCURED BY CONTRACTOR. TRASH RACKS ARE REQUIRED PRIOR TO OPERATION OF THE OPTI ACTUATED VALVE AND SOFTWARE.
9. OUTLET CONTROL STRUCTURE AND INVERT ELEVATIONS TO BE DESIGNED AND SPECIFIED BY THE ENGINEER OF RECORD.

TABLE 1
BOLTS TORQUE (SOURCE: PRATT INDUSTRIAL)

FLANGE SIZE	RECOMMENDED MIN. BOLT TORQUE (POUND FORCE INCHES)
2"-4"	238-354
5"-8"	398-592
10"	628-893
12"	955-1327
14"16"	1681-2398
18"-20"	1796-2522
24"	2575-3593



1 / 1 ACTUATED-VALVE ASSEMBLY DETAIL
WALL MOUNTED GENERIC

Opti by aliaxis

OPTIRTC, INC.
98 NORTH WASHINGTON ST.
SUITE 210
BOSTON, MA 02114
(844) 678-4782

ACTUATED-VALVE ASSEMBLY

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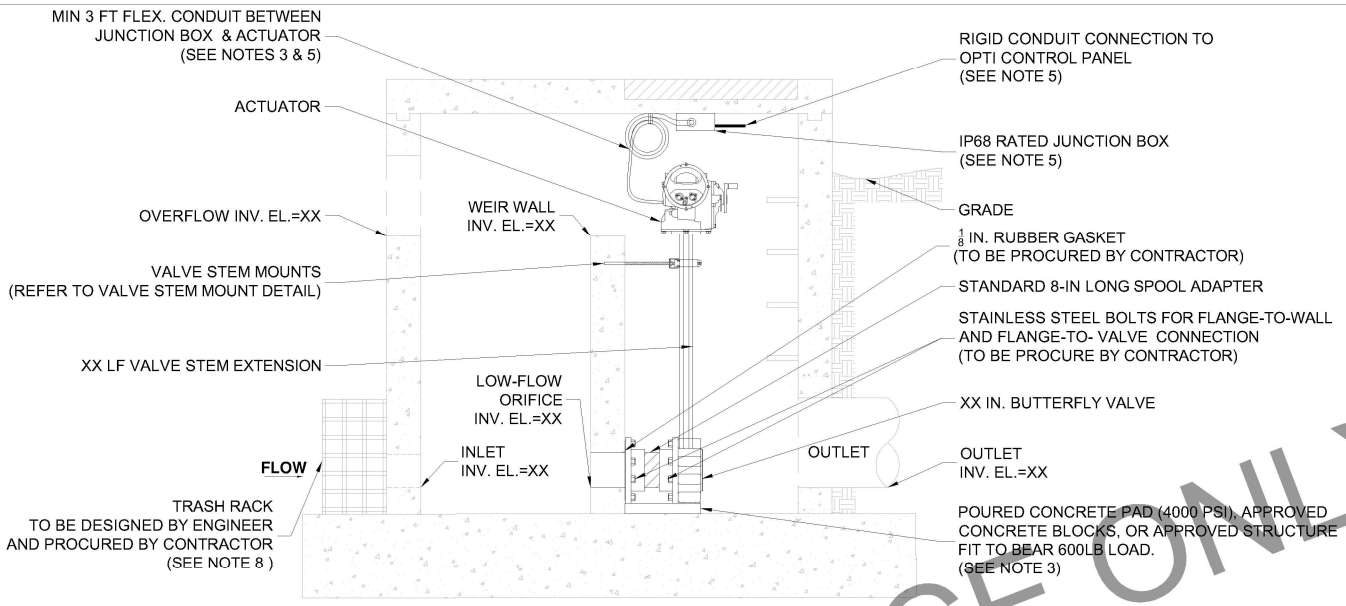

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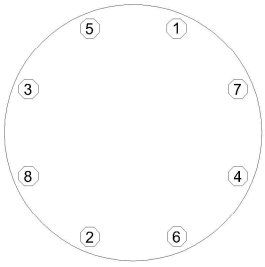

1 ACTUATED-VALVE ASSEMBLY DETAIL
1 WEIR WALL IN OUTLET CONTROL STRUCTURE

OPTIRTC, INC.
98 NORTH WASHINGTON ST.
SUITE 210
BOSTON, MA 02114
(844) 678-4782

ACTUATED-VALVE ASSEMBLY (WEIR WALL IN OCS)

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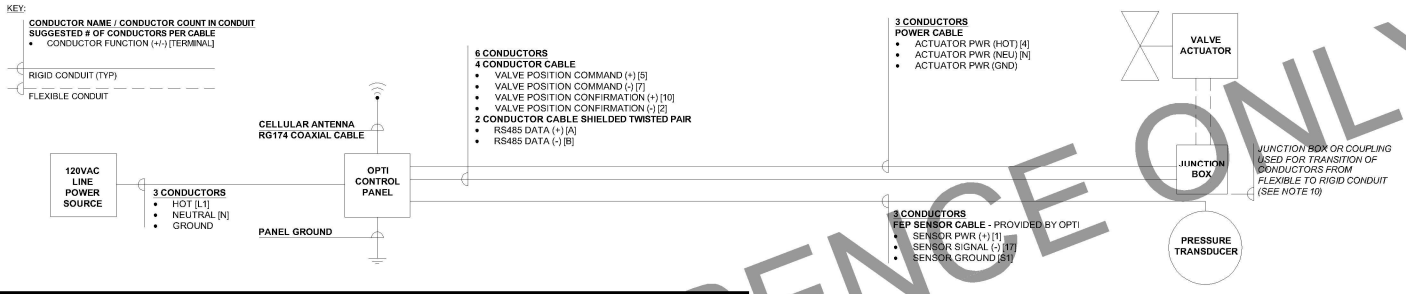

120VAC WIRING GUIDE - V 2.0.4				
CONTROL PANEL TERMINAL	EXTERNAL DEVICE TERMINAL	WIRE COLOR/CABLE LOCATION	PURPOSE	PROCURED BY
LINE POWER CONNECTION				
L1	----------	----------	120VAC HOT, LINE POWER	----------
N	----------	----------	NEUTRAL, LINE POWER	----------
GROUNDING NUT	----------	----------	GROUND, LINE POWER	----------
ACTUATOR - ROTORK IQT SERIES 393M2000				
4	2	3 CONDUCTOR CABLE	120VAC HOT, ACTUATOR POWER	INSTALLER
N	3	3 CONDUCTOR CABLE	NEUTRAL, ACTUATOR POWER	INSTALLER
GROUND LUG	GND SYMBOL	3 CONDUCTOR CABLE	GROUND, ACTUATOR POWER	INSTALLER
5	26	4 CONDUCTOR CABLE	VALVE POSITION COMMAND SIGNAL (+)	INSTALLER
7	27	4 CONDUCTOR CABLE	VALVE POSITION COMMAND SIGNAL (-)	INSTALLER
10	22	4 CONDUCTOR CABLE	VALVE POSITION CONFIRMATION SIGNAL (+)	INSTALLER
2	23	4 CONDUCTOR CABLE	VALVE POSITION CONFIRMATION SIGNAL (-)	INSTALLER
A +	32	2 CONDUCTOR CABLE, SHIELDED TWISTED PAIR	RS485 DATA (+)	INSTALLER
B -	28	2 CONDUCTOR CABLE, SHIELDED TWISTED PAIR	RS485 DATA (-)	INSTALLER
PRESSURE TRANSDUCER (4-20mA) - PMC VL2000 SERIES				
1	----------	RED (+), PMC	PRESSURE TRANSDUCER, POWER	OPTI
17	----------	BLACK (-), PMC	PRESSURE TRANSDUCER, SIGNAL	OPTI
S1	----------	GREEN (GND), PMC	PRESSURE TRANSDUCER, GROUNDING	OPTI

ELECTRICAL INSTALLATION NOTES

1. CONTRACTOR TO DETERMINE IF THERE ARE UNDERGROUND UTILITIES IN THE WORK AREA PRIOR TO EXCAVATION BY CALLING DIG SAFE AT LEAST 48 HOURS PRIOR TO STARTING WORK. CONTRACTOR SHALL BE LIABLE FOR ANY DAMAGE TO UNDERGROUND UTILITIES CAUSED BY TRENCHING OR EXCAVATION.
2. INSTALLATION OF THE CONTROL PANEL AND ASSOCIATED COMPONENTS (E.G., CABLING, CONDUIT, SENSORS) SHALL BE PERFORMED BY A LICENSED ELECTRICIAN. ELECTRICIAN SHALL BE RESPONSIBLE FOR ENSURING THAT THE CONTROL PANEL AND ASSOCIATED COMPONENTS ARE PROPERLY CONNECTED TO THE LINE POWER SOURCE AND THAT CONDUIT AND CABLING IS SIZED AND INSTALLED PER THE NEC.
3. ALL CONDUCTORS SHALL BE IDENTIFIED AT EACH END (LABELED OR COLOR CODED) AND THE IDENTIFIED CONDUCTORS DOCUMENTED IN THE SITE LAYOUT MAP.
4. PENETRATIONS INTO CONTROL PANEL MUST BE IP68 RATED (NO WATER SHALL PENETRATE ANY SEALS). SUBSURFACE TERMINATIONS SHALL BE SEALED WITH POLYWATER CLOSED-CELL FOAM DUCT SEALANT (PROCURED THROUGH OPTI WITH CONTROL PANEL).
5. REFERENCE "ACTUATOR POWER CABLE AWG SPECIFICATIONS" TABLE FOR THE CORRECT CONDUCTOR GAUGE FOR ACTUATOR POWER CONNECTIONS. ALL OTHER CONDUCTORS MUST BE AT LEAST 16AWG.
6. ALL BURIED CONDUIT RUNS SHALL BE RIGID SCH 40 PVC CONDUIT. ALL EXPOSED CONDUIT SHALL BE RIGID SCH 40 PVC OR FLEXIBLE TYPE-UA PVC. BURIED RIGID SCHEDULE 40 CONDUIT SHALL BE INSTALLED WITH A MINIMUM COVER OF AT LEAST 18" IN ACCORDANCE WITH TABLE 300.5 OF THE NEC.
7. CONDUIT SHALL BE SIZED PER THE NEC TO HAVE AN ADEQUATE CROSS-SECTIONAL AREA FOR INSTALLED CABLES. REFERENCE OPTI PROVIDED TABLE FOR MINIMUM CONDUIT SIZE. ACTUATOR HAS ¾" PORTS FOR CONDUIT, USE REDUCING FITTING IF NEEDED.
8. LEAVE A MINIMUM OF 1 FOOT SPARE CABLING NEATLY COILED IN CONTROL PANEL FOR FUTURE MAINTENANCE OR SYSTEM MODIFICATIONS.
9. LEAVE A MINIMUM 3 FEET LOOP OF FLEXIBLE CONDUIT IN OUTLET STRUCTURE FOR EASE OF FUTURE MAINTENANCE. FLEXIBLE CONDUIT SHALL RUN FROM ACTUATOR TO JUNCTION BOX LOCATED IN OUTLET STRUCTURE. RIGID CONDUIT SHALL RUN FROM JUNCTION BOX TO OPTI CONTROL PANEL.
10. ALL SUBMERGED/SATURATED METAL HARDWARE SHALL BE STAINLESS STEEL. GALVANIZED STEEL MAY BE USED ABOVEGROUND OR IN DRY LOCATIONS.
11. PRESSURE REFERENCE DEVICE (COMPONENT OF LEVEL SENSOR AT CABLE TERMINATION) TO BE LOCATED IN OPTI CONTROL PANEL.
12. CONNECT ALL EQUIPMENT GROUNDING CONDUCTORS TO THE OPTI CONTROL PANEL GROUNDING LUGS. GROUND THE OPTI CONTROL PANEL TO A GROUNDING ROD, GALVANIZED STEEL POLE, OR A CONCRETE-ENCASED GROUNDING ELECTRODE.
13. AFTER INSTALLATION, COMPLETE CONTRACTOR INSTALLATION CHECKLIST PROVIDED BY OPTI AND PROVIDE PHOTOS OF ALL INSTALLED EQUIPMENT. SEND SIGNED CHECKLIST AND PHOTOS TO OPTI.
14. OPTI CONSTRUCTION VERIFICATION CHECKLIST SHALL BE COMPLETED PRIOR TO ENERGIZING THE SYSTEM. FINAL COMPLETION SHALL BE REACHED WHEN: (1) CONSTRUCTION OF THE SYSTEM PER THE PLANS IS COMPLETE; (2) THE ENGINEER OF RECORD HAS COMPLETED FINAL INSPECTION OF WORK AND ALL NOTED DEFICIENCIES HAVE BEEN CORRECTED TO THE SATISFACTION OF THE ENGINEER OF RECORD, OPTI, AND THE SITE OWNER; AND (3) AN AS-BUILT SKETCH HAS BEEN PROVIDED OF ALL INSTALLED COMPONENTS IF FINAL INSTALL LOCATIONS HAVE VARIED FROM PLANSET.
15. INDOOR INSTALLATIONS OR INSTALLATIONS WITH POOR CELLULAR RECEPTION REQUIRE AN OUTDOOR WALL-MOUNTED ANTENNA. CONTRACTOR TO COORDINATE ANTENNA LOCATION WITH OPTI ENSURE CONNECTIVITY.
16. SIGNAL WIRE CONDUITS MAY BE COMBINED INTO A SINGLE CONDUIT RUN AS NEEDED
17. LEVEL SENSOR CABLE SHALL NOT BE SPLICED

ACTUATOR POWER CABLE AWG SPECIFICATIONS	
ROTORK IQT125	
WIRE GAUGE	MAX. LENGTH (FT)
8	1647
10	1036
12	651
14	410
16	258
18	162

MINIMUM CONDUIT SIZE SPECIFICATIONS	
NO. CONDUCTORS	MIN. CONDUIT SIZE (IN)
2	½
3 - 6	¾
7 - 9	1
10 - 12	1-¼

FOR REFERENCE ONLY

Opti by aliaxis

OPTIRTC, INC.
98 NORTH WASHINGTON ST.
SUITE 210
BOSTON, MA 02114
(844) 678-4782

WIRING PLAN 3IN-4IN IQT125 (LINE POWERED)

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WPL-125

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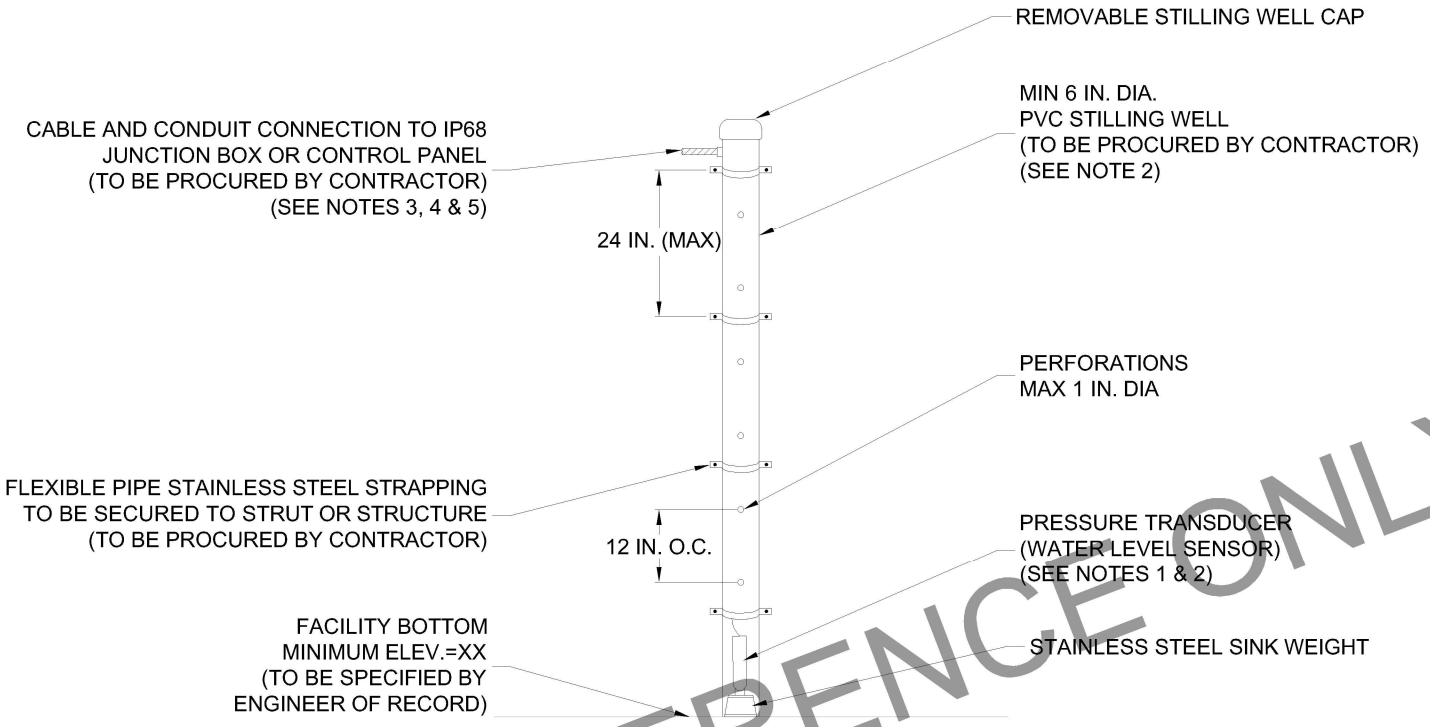

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PRESSURE TRANSDUCER NOTES:

OPTI CERTIFIED HARDWARE

1. OPTI CERTIFIED HARDWARE (CONTACT OPTIRTC SALES AT HTTPS://OPTIRTC.COM/CONTACT/ OR (844) 678-4782 EXT. 3):
   - 1.1. WATER LEVEL SENSOR
   - 1.2. POLYWATER FOAM DUCT SEALANT (SENT WITH OPTI CONTROL PANEL)

ALL OTHER HARDWARE AND EQUIPMENT

2. ALL OTHER EQUIPMENT AND HARDWARE TO BE PROCURED BY INSTALLATION CONTRACTOR.
3. PRESSURE TRANSDUCER TO REST WITHIN PVC STILLING WELL AT BOTTOM OF FACILITY OR AT SPECIFIED MINIMUM ELEVATION (TO BE SPECIFIED BY THE ENGINEER OF RECORD).
4. OPTI-SPECIFIED JUNCTION BOX REQUIRED IF CABLE LENGTH EXCEEDS 100 FT. JUNCTION BOX LOCATION TO BE SPECIFIED BY OPTI. BOTTOM OF JUNCTION BOX TO BE MOUNTED AT LEAST 4 IN. ABOVE OVERFLOW ELEVATION.
5. PENETRATIONS INTO ALL EQUIPMENT AND CONNECTIONS WITHIN JUNCTION BOXES SHALL BE IP68 RATED AND SEALED WITH POLYWATER FOAM DUCT SEALANT. SEE ELECTRICAL DIAGRAM FOR CABLE AND CONDUIT SPECIFICATION.
6. CONDUIT SECURED ON WALL WITH STAINLESS STEEL CLIPS (3' MAX SPACING). PVC STILLING WELL TO BE SECURED WITH STAINLESS STEEL PIPE STRAPPING (24 IN. MAX SPACING).
7. PRESSURE REFERENCE DEVICE TO BE LOCATED IN OPTI CONTROL PANEL. WATER LEVEL SENSOR CABLE SHALL NOT BE SPLICED.
8. MINIMUM 1 FOOT SPARE CABLING TO BE NEATLY COILED IN CONTROL PANEL FOR FUTURE MAINTENANCE OR SYSTEM MODIFICATIONS.

2 / 2 PRESSURE TRANSDUCER DETAIL (WATER LEVEL SENSOR) STRUT OR WALL MOUNTED

Opti by aliaxis

OPTIRTC, INC.
98 NORTH WASHINGTON ST.
SUITE 210
BOSTON, MA 02114
(844) 678-4782

PRESSURE TRANSDUCER (WATER LEVEL SENSOR)

NOT FOR CONSTRUCTION
REFERENCE USE ONLY
NOT TO SCALE
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REVISED: 02/21/2024

DRAWING NUMBER:
PT-1

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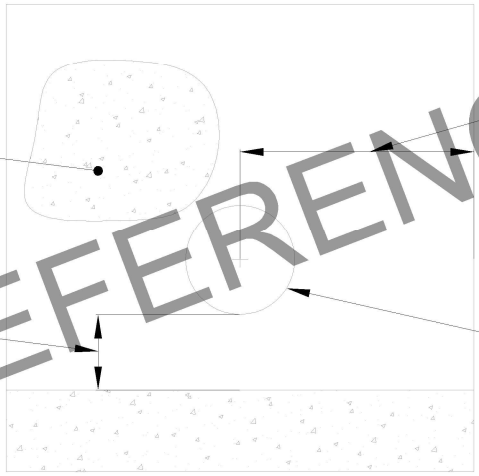

FOR REFERENCE ONLY

1 / 3 ORIFICE CLEARANCE DETAIL GENERIC

Opti by aliaxis

OPTIRTC, INC.
98 NORTH WASHINGTON ST.
SUITE 210
BOSTON, MA 02114
(844) 678-4782

ORIFICE CLEARANCE (GENERIC)

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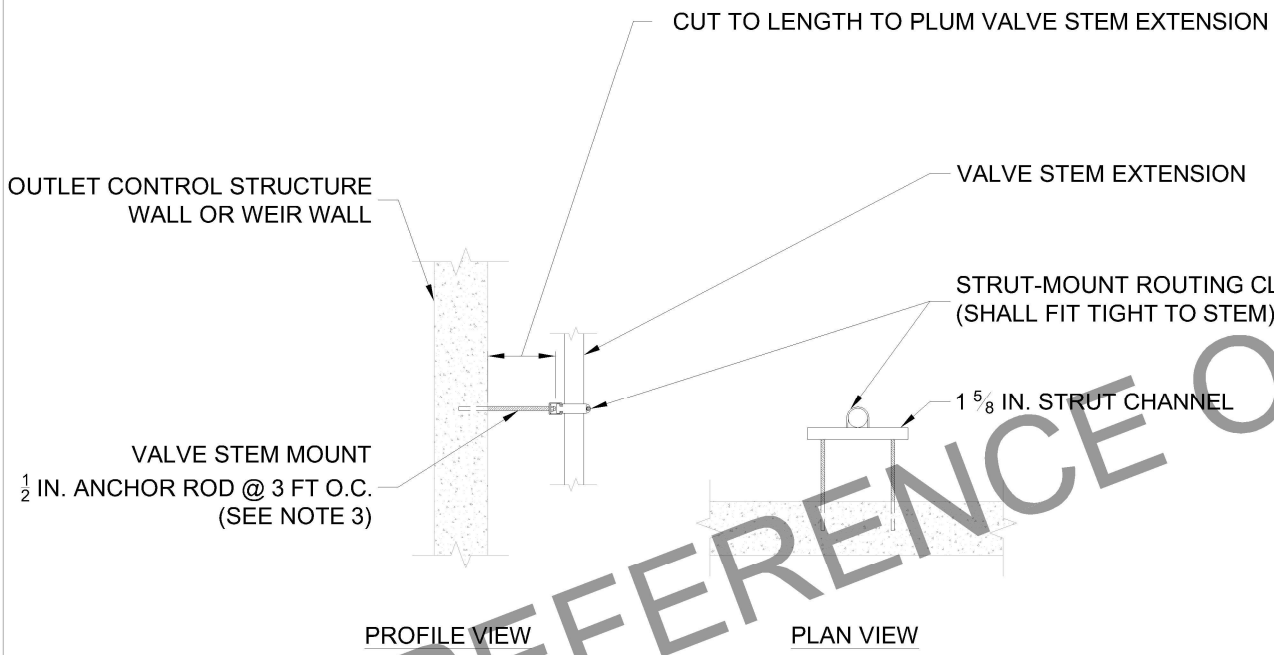

FOR REFERENCE ONLY

VALVE STEM MOUNT NOTES:

OPTI CERTIFIED HARDWARE

1. CONTACT OPTIRTC SALES AT HTTPS://OPTIRTC.COM/CONTACT/ OR (844) 678-4782 EXT. 3 FOR OPTI CERTIFIED HARDWARE:
   - 1.1. VALVE STEM EXTENSION (TO BE DELIVERED WITH VALVE)
   - 1.2. 12" x 1 5/8 IN. STRUT CHANNEL
   - 1.3. 18" x 1/2 IN. ANCHOR RODS (2 PER STRUT)
   - 1.4. STRUT-MOUNT ROUTING CLAMPS (2 PER STRUT)
2. ALL BRACKET MATERIALS MUST BE #304 STAINLESS STEEL.
3. MINIMUM SPACING: 1 VALVE STEM MOUNT FOR STEM LENGTH BELOW 3 FEET. ADD VALVE STEM MOUNTS PER ADDITIONAL 3 FEET OF STEM LENGTH.
4. 1/2 IN. ANCHOR ROD TO BE SET USING INJECTABLE ADHESIVE ANCHOR WITH AUTO CLEANING DRILL BIT OR CLEAN HOLE THOROUGHLY WITH COMPRESSED AIR. USE QUIKRETE HIGH STRENGTH ANCHORING EPOXY (PRODUCT #8620-31) OR EQUIVALENT. ROD SET IN CONCRETE MIN 3 IN..

1 2 VALVE STEM MOUNT DETAIL
WALL MOUNTED

Opti by aliaxis

OPTIRTC, INC.
98 NORTH WASHINGTON ST.
SUITE 210
BOSTON, MA 02114
(844) 678-4782

VALVE STEM MOUNT

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CITY OF FOUNTAINS
HEART OF THE NATION

KANSAS CITY
MISSOURI

ADDENDUM NUMBER 2

Project Number 81000955

Project Title Green Infrastructure Project 1-1: Mill Creek Park Green Infrastructure Phase 2 – Retention Ponds

ISSUE DATE: **4/18/2026**

Bidders are hereby notified that the Bidding and Contract Documents for the above project, for which Bids are to be received on **4/21/2026**, are amended as follows:

Specifications

1. **Section 05710 - Exterior Metal Railings**
   Replace Paragraph 2.1.A.1 with the following:
   1. Welded railing systems and Custom Metal Guardrail Systems
      a) Livers Bronze
      b) Julius Bloom & Co
      c) Wagner Collaborative Metal Works
      d) HDI Railing Systems
      e) Any manufacturer meeting this Specification Section

Drawings:

1. Oldcastle Infrastructure NSBB is an approved equal to the stormwater pretreatment device shown on Reference Drawing Sheet 92 of the Project Plans.

2. Oldcastle Infrastructure Storm Capture Modules are an approved equal to the StormTrap system shown on Reference Drawing Sheets 93 through 102 in the Project Plans.

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

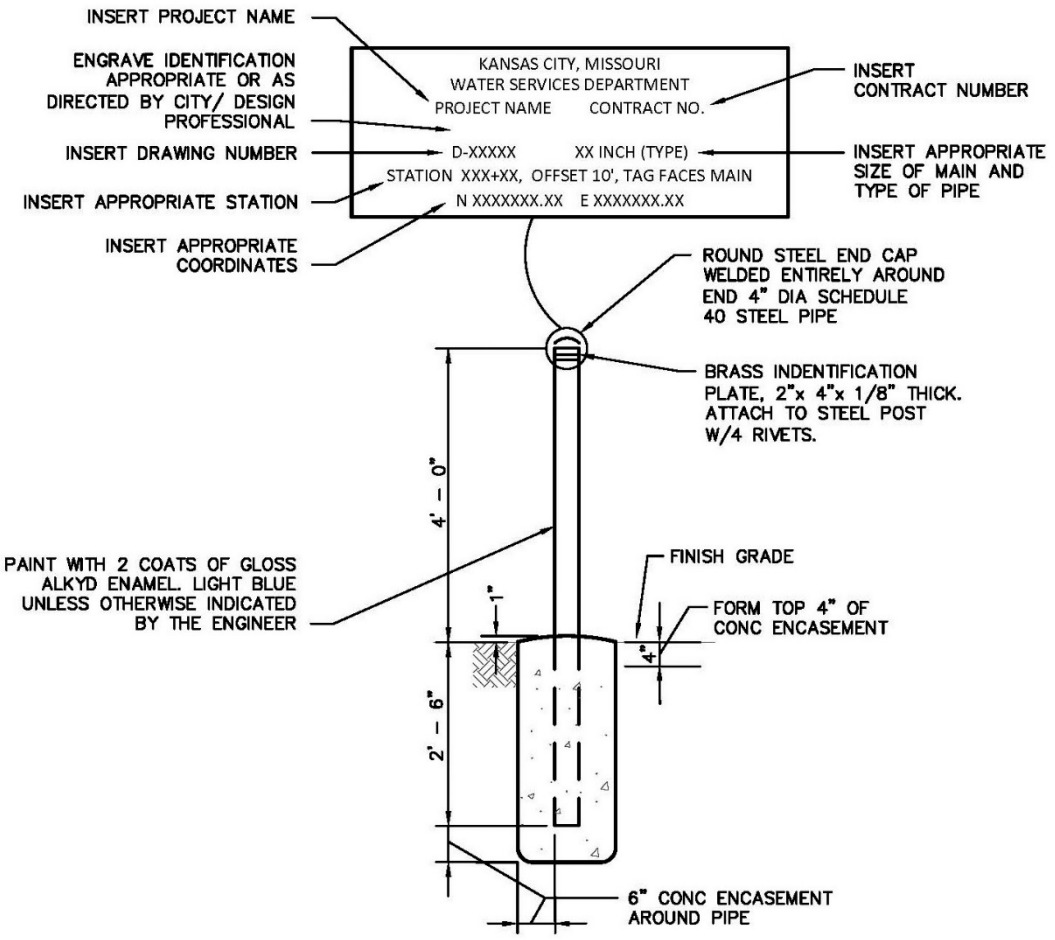
A. Pipeline markers as shown in Construction Detail Drawing No. 01000-1 shall be installed at the locations shown on the Drawings.

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 06; the requirements of this Section shall govern.

1.03 RELATED SECTIONS

A. Section 00700 – General Conditions.
B. Section 00800 – Supplementary Conditions.
C. Section 01020 – Record Documents.
D. Section 01300 – Submittals.
E. Section 01320 – Construction Progress Documentation
F. Section 01357 – Delegated Design Procedures
G. Section 01322 – Photographic and Video Documentation
H. Section 01335 – Document Management
I. Section 01500 – Temporary Facilities
J. Section 01570 – Temporary Erosion Control.
K. Section 01580 – Project Signs.
L. Section 01581 – Public Communications.
M. Section 01700 – Traffic Control
N. Section 02200 – Earthwork.
O. Section 02250 – Trenching, Pipe Embedment and Backfill

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 or as modified as 00800 supplementary conditions in the construction, installation, and completion of all work required in connection with the **Green Infrastructure: Mill Creek Park Phase 2 Retention Ponds** in Kansas City, Jackson County, Missouri.

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

The Water Services Department (WSD) of the City of Kansas City (City) Missouri intends to build a stormwater management system within Mill Creek Park to reduce combined sewer overflows at Outfall 017 in the Bush Creek Basin, per the requirements of the Federal Consent Decree pertaining to the City's Overflow Control Program. The stormwater management system will utilize Green Stormwater Infrastructure (GSI) and consists of four bio-retention ponds and one underground storage basin.

Mill Creek Park is located southeast of the intersection of W. 43rd Street and Mill Creek Parkway and is generally bound by the park limits with the "trail loop" serving as the southern limits of construction.

The proposed GSI will collect stormwater from 43rd Street and 44th Street and control release rates into the combined sewer running through the project bounds. Opti real time controls will control an attenuated valve and meter GIS outflows to prevent combined sewer overflows.

1.07 CONTRACT DRAWINGS

A. The Drawings on which the Contract are to be based are entitled Green Infrastructure Mill Creek Park. The Drawings are to be supplemented by additional shop and dimension drawings of materials and equipment and other drawings where specified.

The following drawings are included in the Drawings:

SHEET	PAGE	DRAWING TITLE
1	G—001	COVER SHEET
2	G—002	SHEET INDEX
3	G—003	ABBREVIATIONS
4	G—004	GENERAL CONSTRUCTION NOTES
5	G—005	GENERAL LEGEND
6	G—006	ELECTRICAL LEGEND
7	G—007	STORMWATER COLLECTION SYSTEM DRAINAGE AREA MAP
8	V—100	OVERALL EXISTING CONDITIONS PLAN
9	V—101	EXISTING CONDITIONS PLAN - NORTH

10	V—102	EXISTING CONDITIONS PLAN - MIDDLE
11	V—103	EXISTING CONDITIONS PLAN - SOUTH
12	X—100	OVERALL DEMOLITION PLAN
13	X – 101	DEMOLITION PLAN - NORTH
14	X – 102	DEMOLITION PLAN - MIDDLE
15	X – 103	DEMOLITION PLAN - SOUTH
16	XL - 101	TREE PROTECTION AND REMOVAL PLAN - NORTH
17	XL - 102	TREE PROTECTION AND REMOVAL PLAN - MIDDLE
18	XL - 103	TREE PROTECTION AND REMOVAL PLAN - SOUTH
19	C – 100	OVERALL LAYOUT AND STAKING PLAN
20	C – 101	LAYOUT AND STAKING PLAN - NORTH
21	C – 102	LAYOUT AND STAKING PLAN - MIDDLE
22	C – 103	LAYOUT AND STAKING PLAN - SOUTH
23	C – 110	OVERALL GRADING PLAN
24	C – 111	GRADING PLAN - NORTH
25	C – 112	GRADING PLAN - MIDDLE
26	C – 113	GRADING PLAN - SOUTH
27	C – 114	EROSION CONTROL PLAN - NORTH
28	C – 115	EROSION CONTROL PLAN - MIDDLE
29	C – 116	EROSION CONTROL PLAN - SOUTH
30	C – 117	RUNNING TRAIL PLAN AND PROFILE
31	C – 301	STORMWATER PLAN AND PROFILE – LINE 300
32	C – 302	STORMWATER PLAN AND PROFILE – LINE 300
33	C – 303	STORMWATER AND PROFILE – LINE 400, 500, 700 & 1000
34	C – 304	STORMWATER PLAN AND PROFILE – LINE 600 & 800
35	C – 305	STORMWATER PLAN AND PROFILE – LINE 900
36	C – 310	SANITARY SEWER PLAN AND PROFILE – LINE 2000
37	C – 311	EXISTING 66-INCH SANITARY PLAN AND PROFILE
38	C – 321	EXISTING 42-INCH WATER PLAN AND PROFILE
39	C – 400	RETAINING WALL OVERALL PLAN
40	C – 401	WEST RETAINING WALL PLAN AND PROFILE
41	C – 402	EAST RETAINING WALL PLAN AND PROFILE
42	C – 403	WEIR 1 PLAN AND PROFILES
43	C – 404	WEIR 2 PLAN AND PROFILES
44	C – 405	WEIR 3 PLAN AND PROFILES
45	C – 410	NORTHWEST & NORTHEAST RETAINING WALL PLAN AND PROFILE
46	C – 501	CIVIL DETAILS

47	C – 502	CIVIL DETAILS
48	C – 503	CIVIL DETAILS
49	C – 504	UG DETENTION CUTSHEETS
50	C – 505	TYPICAL BASIN CROSS SECTIONS
51	C – 506	EROSION CONTROL DETAILS
52	C – 507	EROSION CONTROL DETAILS
53	L – 100	OVERALL FURNISHINGS AND FINISHES
54	L – 101	FURNISHINGS AND FINISHES – NORTH
55	L – 102	FURNISHINGS AND FINISHES - MIDDLE
56	L – 103	FURNISHINGS AND FINISHES – SOUTH
57	L – 201	LANDSCAPE STAKING AND JOINTING PLAN – NORTH
58	L – 202	LANDSCAPE STAKING AND JOINTING PLAN - MIDDLE
59	L – 203	LANDSCAPE STAKING AND JOINTING PLAN - SOUTH
60	L – 501	LANDSCAPE DETAILS
61	L – 502	LANDSCAPE DETAILS
62	L – 503	LANDSCAPE DETAILS
63	L – 504	LANDSCAPE DETAILS
64	L – 505	LANDSCAPE DETAILS
65	L – 506	LANDSCAPE DETAILS
66	L – 507	LANDSCAPE DETAILS
67	L – 508	LANDSCAPE DETAILS
68	L – 509	LANDSCAPE DETAILS
69	L – 510	LANDSCAPE DETAILS
70	L – 511	LANDSCAPE DETAILS
71	L – 512	LANDSCAPE DETAILS
72	L – 800	OVERALL PLANING AND IRRIGATION PLAN
73	L – 801	PLANTING AND IRRIGATION PLAN – NORTH
74	L – 802	PLANTING AND IRRIGATION PLAN – MIDDLE
75	L – 803	PLANTING AND IRRIGATION PLAN – SOUTH
76	S – 001	STRUCTURAL GENERAL NOTES
77	S – 101	WEIR 1 STRUCTURAL PLAN
78	S – 102	WEIR 2 STRUCTURAL PLAN
79	S – 103	WEIR 3 STRUCTURAL PLAN
80	S – 104	BASIN 2 OUTFLOW STRUCTURE PLAN
81	S – 301	STRUCTURAL SECTIONS
82	S – 302	STRUCTURAL SECTIONS
83	S – 303	STRUCTURAL SECTIONS

84	S – 304	STRUCTURAL SECTIONS
85	S – 501	STRUCTURAL DETAILS
86	S – 502	STRUCTURAL DETAILS
87	E – 100	OVERALL ELECTRICAL PLAN
88	E – 101	ELECTRICAL PLAN – NORTH
89	E – 102	ELECTRICAL PLAN – MIDDLE
90	E – 103	ELECTRICAL PLAN – SOUTH
91	E – 501	ELECTRICAL, DETAILS, DIAGRAMS AND SCHEDULES

1.08 MATERIALS FURNISHED BY THE CITY

A. The City will provide the following equipment or materials to be used for the Project. All materials required to complete the Work in accordance with the Contract Documents shall be furnished, installed, and paid for by the Contractor.

   1. No equipment or materials will be provided by the City

1.09 CONTRACTOR'S WORK PLAN

A. Prior to start of work, the Contractor shall submit for review and acceptance by the City a detailed Work Plan. Failure to submit an acceptable Work Plan may result in the City stopping work per General Conditions 13.05 A. The City will not accept or approve for payment any work that is completed prior to the City's approval of the Work Plan. Elements of the Work Plan shall include, but are not limited to, the following information:

   1. City will not issue a Notice to Proceed prior to July 13, 2026.

   2. General Sequence of Work: Contractor shall provide a detailed narrative outlining the general sequence of the work and how each aspect of the task will be performed. The work shall be divided into manageable phases.

   3. Schedule: Contractor shall provide a preliminary construction schedule to the City and their representatives for review and approval within 10 days after Notice to Proceed of work per General Conditions 2.07 B.

   4. The preliminary construction schedule, once approved, will be considered the project baseline schedule per General Conditions 2.08.B. Contractor may commence work without an approved schedule, but will do so at their own risk. Failure to submit an acceptable preliminary schedule may result in the City withholding payment or suspension of work per General Conditions 2.08.B.

B. Installation Methods: The Work Plan shall denote pipe segments that will be installed by open cut or trenchless technologies and shall include a detailed description of installation methods. Means and methods for trenchless technologies shall be submitted to the City for review and approval in accordance with Division 1.

C. Individual Area Work Plans: The Work Plan shall be divided into manageable phases. An individual work plan shall be prepared for each phase. Individual Work Plans for each phase shall at a minimum include: any environmental requirements, sewage bypass requirements, temporary piping required for water, storm or water service8, utility coordination and supporting, detour and traffic control plans, and sheeting shoring and protection of existing infrastructure and new work.

D. Stormwater Runoff Pollution Prevention Plan: The Work Plan shall include a final version of the Stormwater Pollution Prevention Plan. A draft version can be found in Appendix C of this Project Manual. Stormwater Runoff Pollution Prevention Plan shall be integrated with control and protection requirements as specified by Section 01570 to manage stormwater runoff and pollution containment within the Site.

E. Stockpile and Staging Areas: Stockpile and staging areas have not been identified on the Contract Drawings. Contractor shall provide a map showing the location of any additional stockpile and staging areas needed for the project. Contractor shall obtain permission for and pay any costs associated with stockpile and staging areas located on private property at no additional cost to the City. The staging area shall have a construction entrance and washdown area for trucks and equipment to ensure minimal tracking of sediment from the staging areas and onto the street. Stockpile and staging areas shall not be located within the floodplain.

F. Contractor Parking: Contractor shall provide a map showing the location of all parking areas needed for personnel and equipment for the project. Contractor shall obtain permission and pay any costs associated with Contractor parking areas at no additional cost to the City.

1.10 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 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 in accordance with this Section and Section 06010 Part 3.03.B and at no additional cost to the City.

B. New sanitary sewers shall not convey combined sewage or storm flows.

C. The Contractor shall be aware that the existing combined sewer system, the existing water main 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.

D. Contractor is to consider the depth of fill over all sections of pipe, soil conditions, impact of sleep slopes, and work safety. It is the contractor's responsibility to prevent

damage to existing structures. Optional installation methods may include open trench excavation with professionally engineered shoring, bored casing, or directional boring.

E. The method and sequence of construction shall avoid placing heavy construction loads on the existing 60” & 66” brick combined sewer and existing 42” water main.

1.11 SEQUENCE OF WORK FOR GREEN INFRASTRUCTURE

A. Contractor shall deliver all required submittals including work sequence plan, shop drawings, sewer bypass plan, sewer abandonment plan, traffic control plan, and SWPPP.

B. Work performed by the Contractor prior to the City’s or Design Professional’s review and approval of a related submittal will be at the sole expense and responsibility of the Contractor per General Conditions 6.18.E. The Design Professional will not recommend for payment any work completed prior to approval of a related submittal. The City may also stop work per General Conditions 13.05 A. until such submittals have been accepted and approved by the City or Design Professional.

C. Contractor shall proceed with the work in the following general sequence. Note, the below general sequence is not intended to be exhaustive of all work required. Exact construction sequencing, means, and methods are exclusively the responsibility of the contractor. Written approval must be obtained by the contractor from the OWNER prior to deviation from the below sequence.

1. Where excavation is required, call 1-800-DIGRITE or 811 to confirm location of underground utilities in accordance with Missouri One Call System requirements. Contractor to pothole existing utilities as necessary immediately following Notice to Proceed, prior to ordering materials. See Section 1.15.
2. Take preconstruction photograph before beginning onsite construction. A pre-construction CCTV of the 66” and 60” brick combined sewer is required within the project area.
3. Construction entrances shall be constructed per the Kansas City Metro Chapter APWA Standard Specifications and Details.
4. Contractor shall design and install all traffic control measures according to requirements specified in the Manual for Uniform Traffic Control Devices. Traffic control shall include sidewalk closures at construction entrances and lane closures as required by construction disturbances.
5. Contractor to verify the diversion structure at 42nd Street is adequately plugged to prevent stormwater flows from entering the construction area. Temporary plug to remain until after “Phase 3: GSI Plantings” and not to be removed during Phase 2.
6. Contractor shall be responsible for establishing and maintaining erosion control BMP’s prior to commencement of work, during work, and after land disturbance until sod is established on the disturbed areas and the site has been accepted by the Phase 3 Landscape Contractor for installation of Phase 3 plants.

7. Following installation of perimeter fencing and sediment and erosion control, the contractor shall begin GSI construction.
8. Maintain flow in the existing 30" RCP from 44th Street and do not discharge flow to Basin 1 until all downstream improvements have been complete. Do not let flows discharge down the hill from 44th street and provide a piped slope drain as needed discharging to a stabilized outlet location
9. Stormwater flow shall not be discharged over unstabilized ground at any time.
10. Contractor shall perform project site temporary seeding and maintenance of erosion control BMPs during all phases to prevent sediment and organic materials from entering the green infrastructure facility. The contractor shall maintain the #57 aggregate free from erosion, and fouling. Fouled aggregate shall be removed and replaced with clean #57 aggregate from the quarry.
11. During paving, do not let concrete slurry or washout enter the basins. The exposed aggregate paving will take special precautions to capture the wash water. It is anticipated sandbags and visqueen will be used to divert the wash water from the basins. Depending on Contractor Means and Methods, pumps may be needed to remove the collected slurry.
12. At conclusion of project Contractor shall remove all construction debris from project site, including collected sediment behind erosion control BMPs.
13. Contractor shall restore all disturbed surfaces to existing conditions or better. This includes pavement, driveways, curb & gutter, sidewalks, ADA ramps, fences, and turf areas that are removed or disturbed during construction. This work should be completed as soon as possible following the disturbance.
14. Contractor shall take post-construction photographs. A post construction CCTV of the 66" and 60" brick combined sewer is required within the project area.
15. Complete as-builts in accordance with this Project Manual.
16. After completion of sodding, Contractor shall water and maintain sod through substantial completion and final completion of the project and through the correction period as set forth in Section 00800. If the Phase 3 Landscape Contractor mobilizes to the site to perform final plantings of trees within the Park and plantings within the bioretention basins, Contractor shall coordinate waterings with the Landscape Contractor.

1.12 OPERATION OF EXISTING SEWER.

A. The capacity of the existing sewers must be maintained. No separate payment shall be made for bypass pumping of combined sewers during wet weather. The Contractor shall note when construction is occurring downstream of a sewer inlet and shall plan accordingly. When pumping and bypassing is required, the Contractor shall supply all equipment necessary to divert the flow of wastewater around the main sewer section being televised, cleaned, rehabilitated, or replaced. Contractor shall monitor bypass operations at all times. No sewage shall be discharged into surrounding waterways or to the surface. In case of discharge, Contractor shall contact Owner's project manager immediately. The Contractor will be held responsible for any wastewater backups caused by their operations and any damage to public or private property as a result of wastewater backups. Service laterals remaining offline for more than 12 hours shall be bypass pumped until such time as they can be reconnected.

1.13 MANHOLE FRAME AND COVER

A. All manhole castings that are to be replaced are indicated on the plans.

B. All manhole castings shall be raised to the existing surrounding grade unless otherwise stated.

C. Manhole frame and cover replacement located in “non-thru traffic” areas including unpaved areas, driveways, and sidewalks are to receive standard hinged castings.

D. Manhole frame and cover replacements in streets, alleys, or other thru-traffic areas shall receive adjustable type castings.

E. Contractor shall furnish and install new manhole frame and covers per Section 05011 – Construction Castings. If Contractor determines in the field that over 12-inches of adjustment is required, Contractor shall contact Owner/Engineer and submit an RFI.

F. Manhole covers removed by the Contractor shall be delivered to Kansas City Water Services, 18th Street Storeroom. Contractor shall not retain any manhole covers.

G. In 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. After setting the casting to 1/8-inch below the finished pavement elevation, a Portland cement concrete cap (MCIB Mix WA738-3/4-4) shall be poured flush with the surrounding pavement securing the adjustable casting. The concrete cap surrounding the casting shall be no smaller than 4-feet by 4-feet, but no larger than 6-feet by 6-feet. Casting is subsidiary to structure unit price.

1.14 TRAFFIC SIGNAL OPERATIONS

A. The project location has traffic signals 43rd and Mill Creek Parkway. Contractor shall locate all traffic signal pull boxes and appurtenances while coordinating with City of Kansas City Missouri Public Works staff during construction to ensure all equipment locations are known. The traffic signals must remain in operation during construction in accordance with the traffic control plan and the requirements of Public Works. Contractor shall be responsible for repairs of all damages to the signal, whether the appurtenance was known or unknown, and have the repairs completed as quickly as possible to ensure a working signal. Should a signal be temporarily out of service, Contractor shall provide flagmen to assist with the flow of traffic while the signal is being restored.

1.15 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. 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. Asphalt cap, if required, shall be at no additional cost to the City.

G. Contractor shall organize and lead a coordination meeting with the affected utility companies.

1.16 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.

1.17 SURVEYING:

A. Contractor shall use the services of a Professional Land Surveyor licensed in the State of Missouri 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.

1.18 STORM AND SANITARY SEWER CONNECTIONS:

A. Not all utilities and services are shown in the plan and 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.

1.19 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.

1.20 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.

1.21 PERMITS AND DEGRADATION FEES

A. Contractor shall be responsible for all costs of permits and degradation fees pertaining to the scope of work in this contract. Public Works Department will require an excavation permit for each individual excavation and a degradation fee for each area of pavement disturbed within the street right-of-way, in addition to a traffic control permit if required.

1.22 CONCRETE ENCASEMENTS

A. Contractor shall be responsible for reestablishing all concrete encasements encountered on project. Encasements shall be returned to like or better condition.

1.23 DELEGATED DESIGN

A. Procedures for Delegated Design shall follow Section 01357.

B. Delegated design is required, but not limited to the following:
   1. Opti attenuated valve, controls, pressure transducer, and appurtenances
      a. Contractor must coordinate with Opti Solutions:
         Contact: Laney Nelson, PE
         Email: lnelson@optrtc.com
         Phone: 844-678-4782
   2. Underground Storage Chambers and precast structures
   3. 6' x 14' STF
   4. Pavement Mix Design and Concrete Mix Design

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

3.01 DIVISION 1 – GENERAL REQUIREMENTS, SPECIFICATION MODIFICATIONS

A. Section 01020 – Record Documents.

1. Conforming to Construction Drawings:

a. The Contractor shall be responsible for developing Conforming to Construction Drawings.

b. CAD files to be provided to the Contractor for the preparation of Conforming to Construction Record Drawings shall be in AutoCAD 2022.

B. Section 01300 – Submittals

1. Schedule of Values.

a. As provided in the General Conditions, and after review of the preliminary progress schedule at the preconstruction conference and before submission of the first Application for Payment, Contractor shall prepare and submit to City for review a Schedule of Values for the construction phases of the project. The Schedule of Values, showing the estimated quantity and value of each kind of work must be approved by City before any Application for Payment is prepared.

b. The Schedule of Values for the construction phase portion of the project shall include at least the following items:

Item	Description	Units	Unit Cost	Total
	GENERAL			
1	Mobilization	LS		
2	Permits	LS		
3	CCTV of 60" & 66" Combined Sewer	EA		
4	Utility Pothole	EA		
5	Traffic & Pedestrian Control	LS		
	SITEWORK			
6	Topsoiling	AC		
7	Demolition	LS		
8	Relocation of Park Features	LS		
9	Tree Removal	EA		
10	Tree Protection Fencing	LF		
11	Clear and Grub	AC		
12	SWPP/Erosion Control	LS		
13	Temp Irrigation	LS		
14	Sod	SY		
15	Compost	CY		
16	Import Topsoil	CY		
17	Fertilizer	LS		
	EARTHWORK			
18	Rough/Fine Grading	SY		
19	Earthwork Fill	CY		

20	Earthwork Cut	CY		
	ARCHITECTURAL & STRUCTURAL FEATURES			
21	Running Trail - Rubberized Surface on Asphalt Base	SF		
22	6" Exposed Aggregate Concrete	SY		
23	6" Exposed Aggregate Concrete Medium Broom Finish	SY		
24	6" Broom Finished Concrete	SY		
25	Limestones Stair	LF		
26	Limestone Cheekwalls at steps	EA		
27	Precast Concrete Bench	EA		
28	Basin Retaining Wall with Stone Cap	LF		
29	Limestone Curbing with footer	LF		
30	Weir Top (Walkway with Limestone Paverband)	SY		
31	Weir Walls Structure and Footer	LF		
32	Clay Dike	CY		
33	Weir Drip Edge	EA		
34	Bollard	EA		
35	Litter Receptacle	EA		
36	Precaste Concrete Stepped Terrace	LS		
37	Limestone Veneered Retaining Wall	SFF		
38	Handrail, Single Pipe, Stainless Steel	FT		
39	Guardrail	LF		
40	Weir Internal Fill (AB3 Rock)	CY		
41	Weir Metal Edging	LF		
	BIORETENTION FEATURES			
42	Gravel Storage	CY		
43	Choker Course	CY		
44	Filter Sand Course	CY		
45	Bio Retention Soil	CY		
46	River Stone	CY		
47	Geotextile Fabric - Bottom (MIRAFI FW403)	SY		
48	Geotextile Fabric - Sides (MIRAFI 140N)	SY		
49	Turf Reinforcement Mat (Landlock 450)	SY		
50	Nonwoven 8oz Geotextile Fabric	SY		
51	8" Perforated Underdrain	LF		
52	8" Solid Underdrain	LF		
53	8" Cleanout	EA		
54	Water Level Control Structure (Agridrain)	EA		
55	8" Elbow	EA		
	STORM SYSTEM FEATURES			

56	StormTrap (or approved equal)	LS		
57	Opti 12" Actuated Valve	EA		
58	6'x14' SiteSaver (or approved equal)	EA		
59	66" Combined Sewer Tap	EA		
60	4"x 4" Area Inlet	EA		
61	Checkmate Backflow Preventer (or approved equal)	EA		
62	5'x7' Outlet Control	EA		
63	Basin 2 Overflow Structure	EA		
64	Catch Basin (24" Nyloplast)	EA		
65	3'x1' RCB	LF		
66	4'x6' JB	EA		
67	4' Dia MH	EA		
68	4'x7' Flow Split Structure	EA		
69	12" HDPE	LF		
70	24" HDPE	LF		
71	30" HDPE	LF		
72	12" RCP	LF		
73	24" RCP	LF		
74	24" Pipe Collar	EA		
	COMBINED & SANITARY SEWER FEATURES			
75	60" Brick Sewer Encasement	LF		
76	66" Brick Sewer Encasement	LF		
77	Adjust Existing MH to Grade	EA		
78	24" Encasement	LF		
	ELECTRICAL FEATURES			
79	Equipment Rack	EA		
80	Pole Light (Type A Fixture)	EA		
81	Wall/Step Light (Type C Fixture)	EA		
82	Pole Light (Type D Fixture)	EA		
83	Conduit	LF		

2. In accordance with paragraph APPLICABLE CODES, the following Public Works Department standard specifications are incorporated into this set of Contract Documents by reference:

    a. Section 2200 Paving, excluding basis of payment

    b. Section 2300 Incidental Construction, excluding basis of payment

3. In accordance with paragraph APPLICABLE CODES, all relevant Public Works Department standard details are incorporated into this set of Contract Documents by reference.

C. Preconstruction Conference.

1. The following are the items requiring submittals by the Contractor at the pre-construction conference. Submittals shall indicate, but not be limited to, name of manufacturer, shop drawings, physical & chemical testing & certification, appurtenances used, etc.:

    a. Storm Pipe
        i. Encasement (concrete and steel)
        ii. Casing Pipe with spacers and end seals.

    b. Storm Sewer Submittals
        i. Storm Pipe
        ii. Sanitary Pipe
        iii. Perforated Underdrain
        iv. Precast Structures
        v. Castings:
            a) Grate
            b) Frame
            c) Lid
        vi. Quarry Submittals
        vii. Blocks:
            a) Concrete
            b) Stone
            c) Landscape
        viii. Geotextiles
        ix. Concrete mix
        x. Exposed Aggregate Concrete Mix
        xi. Bedding material
        xii. Backfill material
        xiii. Sod/seeding certification
        xiv. Erosion Control Products
        xv. Testing Lab

2. The following is a list of documents that are to be submitted in electronic format:

    a. Preliminary Project Schedule, submit one (1) copy and provide one (1) hardcopy at the Preconstruction Meeting.

    b. Project Baseline Schedule, submit one (1) copy.

    c. Progress Schedules, submit one (1) copy.

    d. Project Recovery Schedules (as applicable), submit one (1) copy.

    e. Stormwater Pollution Prevention Plan.

D. Section 01320 – Construction Progress Documentation

1. In accordance with Section 01320, paragraph 1.06, Contractor shall provide a Schedule Level that meets the minimum requirements of a Level 3 - Detail Schedule

2. In accordance with Section 01320, paragraph 1.11, a Cost Correlation is not a requirement of the Project.

E. Section 01322 – Photographic Documentation

1. A Pre-Construction Video will be required as part of the Project. Contractor shall include the entire project area within pre-construction video.

2. A Haul Route Video is not required as part of the Project.

3. Pre-Construction Photographs will be required as part of the Project.

4. Construction Progress Photographs will be required as part of the Project.

5. Construction Activity Photographs will be required as part of the Project.

6. Post-Construction Photographs will be required as part of the Project.

7. 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.

2. Sensitive Areas
    a. Sensitive areas to be disturbed by the Work that are less than one acre have not been identified.

H. Section 01580 – Project Signs

1. Printers: The following is a list of local businesses who have provided printing services for City project signs. Printing location shall be coordinated with the City/Design Professional.

    a. Almar Printing
    7735 Wornall Road
    Kansas City, MO 64114
    Phone: (816) 523-4566

    b. Custom Color
    14320 W. 101st Terrace
    Lenexa, KS 66215
    Phone: (913) 730-3100

    c. KC Blueprint Company
    1804 Swift St.
    North Kansas City, Missouri 64116
    816-513-1048 Print Center
    816-527-0900 Home Office

    d. Office Max

    e. City Hall Basement Print Center
    414 E. 12th Street
    Kansas City, MO 64106
    Phone: (816) 513-1048

I. Section 01700 – Traffic Control

1. Traffic Control Plans:

    a. Contractor shall maintain a minimum of two (2) lane of traffic each direction at all times on Mill Creek Parkway and a minimum of one (1) lane of traffic at all times on 43rd St.

    b. Contractor shall keep residents, schools, hospitals, 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. The ambulance entrance on Mill Creek Parkway must remain accessible at all times.

    c. Contractor shall coordinate as necessary travel routes for KCATA buses during lane closures.

3.02 DIVISION 2 – SITEWORK, SPECIFICATION MODIFICATIONS

A. Section 02200 - Earthwork

1. Backfill and Compaction

    a. The allowable range of moisture content is within +/ – 3 percent of optimum for both paved and unpaved areas.

B. Section 02250 – Trenching, Pipe Embedment and Backfill

1. PAVEMENT REMOVAL AND RESTORATION, Public Right of Way

    a. Kansas City, Missouri Public Works Department Standard Detail SR-1, Street Cut Restoration is hereby incorporated by reference.

    b. Removal and restoration of pavement shall be in accordance with Standard Detail SR-1 with the following exceptions:

        i. General Note 2, Bedding: the note shall be deleted. Bedding requirements shall conform to Section 02250 – Trenching and Backfilling for Utilities.

        ii. General Note 3, Backfill: the note shall be deleted. Backfill and compaction shall conform to Section 02250 – Trenching and Backfilling for Utilities.

        iii. General Note 5.B, Grass Areas: Precedence to the requirements for grading and establishment of turf shall be given to the grading, seeding and sodding specifications in Contract Documents.

        iv. General Note 7: Delete “The City will make available it proposed 2-year schedule of street construction and resurfacing to businesses that may require street cuts. If a street cut is made, for a non-emergency purposed, within 5 years after a street is constructed or resurfaced.

        v. General Note 9: Manhole castings shall meet the requirements of Section 05010 – Sanitary Sewer Manhole Castings.

2. DISPOSAL OF EXCESS MATERIAL:

A.

    a. Excess materials shall be disposed off site by the Contractor.

3.03 DIVISION 3 – METALS, SPECIFICATION MODIFICATIONS

Section 05011 Stormwater Casting

1. All stormwater frames and covers for manholes, junction boxes, outlet control structures, pretreatment structures, etc. shall be 30” clear opening as specified in

Section 05011. This requirement supersedes all detail drawing and standard details otherwise shown.

2. Composite materials for frame and cover are acceptable.

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.

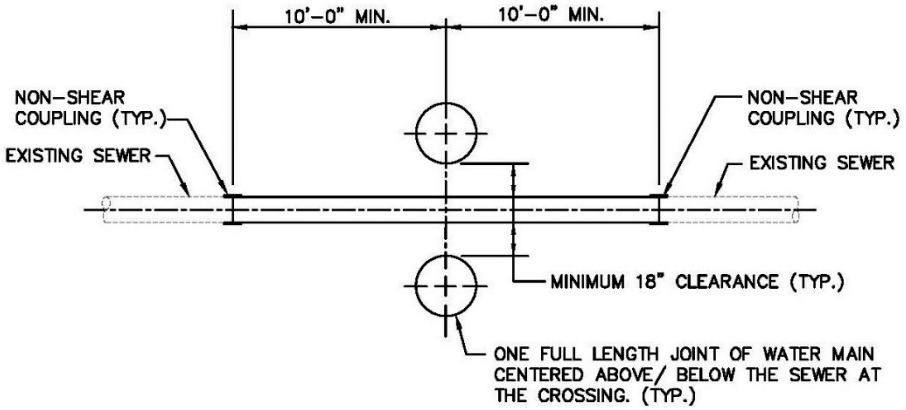
B. The full length of casing pipe shall be located so both joints will be as far from the non-potable pipeline as possible, but in no case less than 10 feet or centered on a nominal 20-foot pipe.

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:

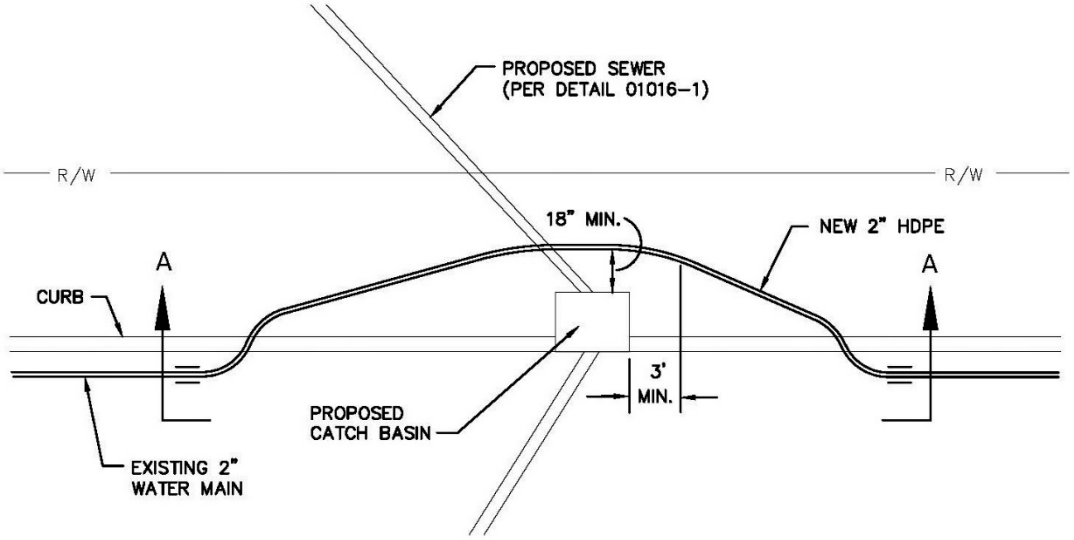
1. IF THE WATER MAIN CROSSES BELOW THE SEWER, THE SEWER SHALL BE REPLACED WITH PVC OR DIP.
2. PVC PIPE SHALL CONFORM TO 02624 PVC GRAVITY SEWER PIPE, DIP SHALL CONFORM TO 02620 DIP FOR SEWERS.

SEWER CROSSING DETAIL

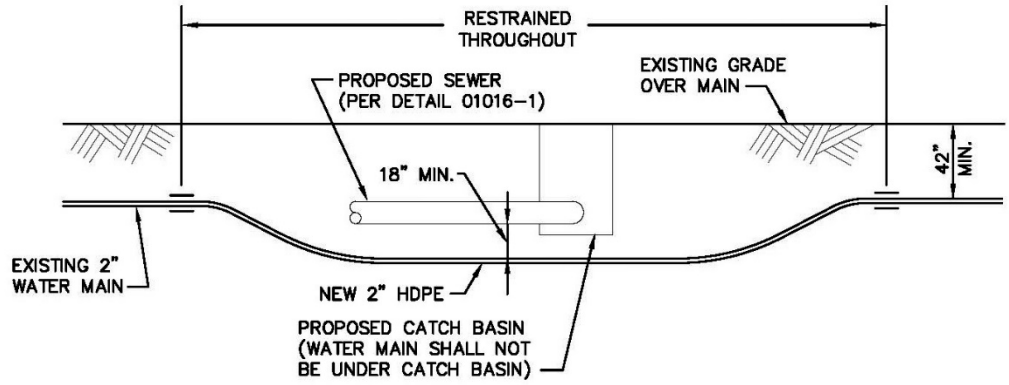
WATER SERVICES
CITY OF KANSAS CITY, MISSOURI
DRAWING NO. 01016-1

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

1 OF 1



PLAN
NOT TO SCALE



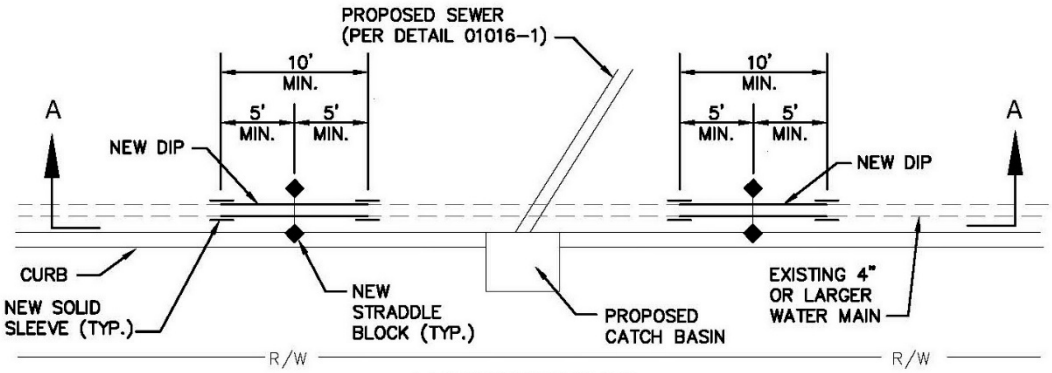
SECTION A-A
NOT TO SCALE

EXISTING 2" OR SMALLER WATER MAIN RELOCATION AT SEWER

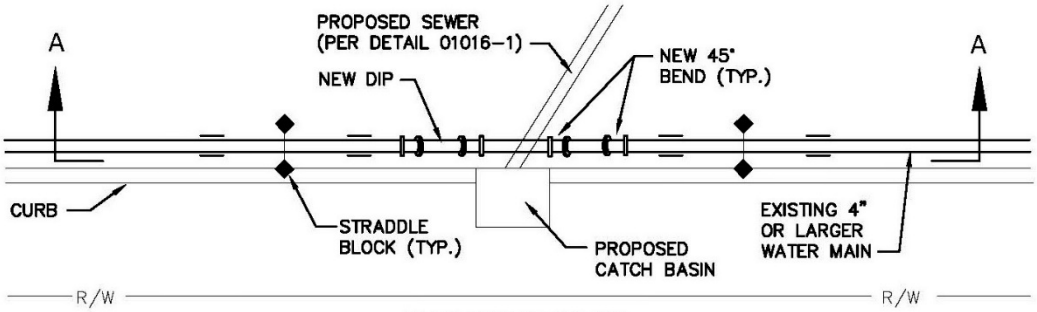
WATER SERVICES
CITY OF KANSAS CITY, MISSOURI
DRAWING NO. 01016-2

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

1 OF 1

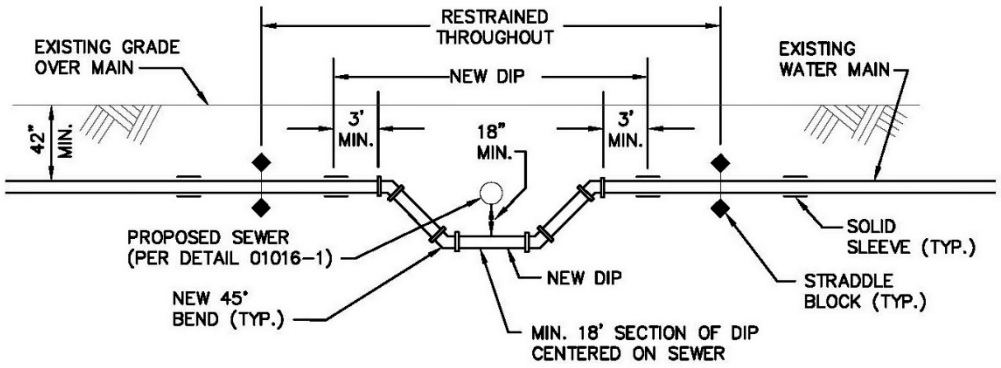


TEMPORARY PLAN



PERMANENT PLAN

NOT TO SCALE
RESTRAIN ALL JOINTS



SECTION A-A

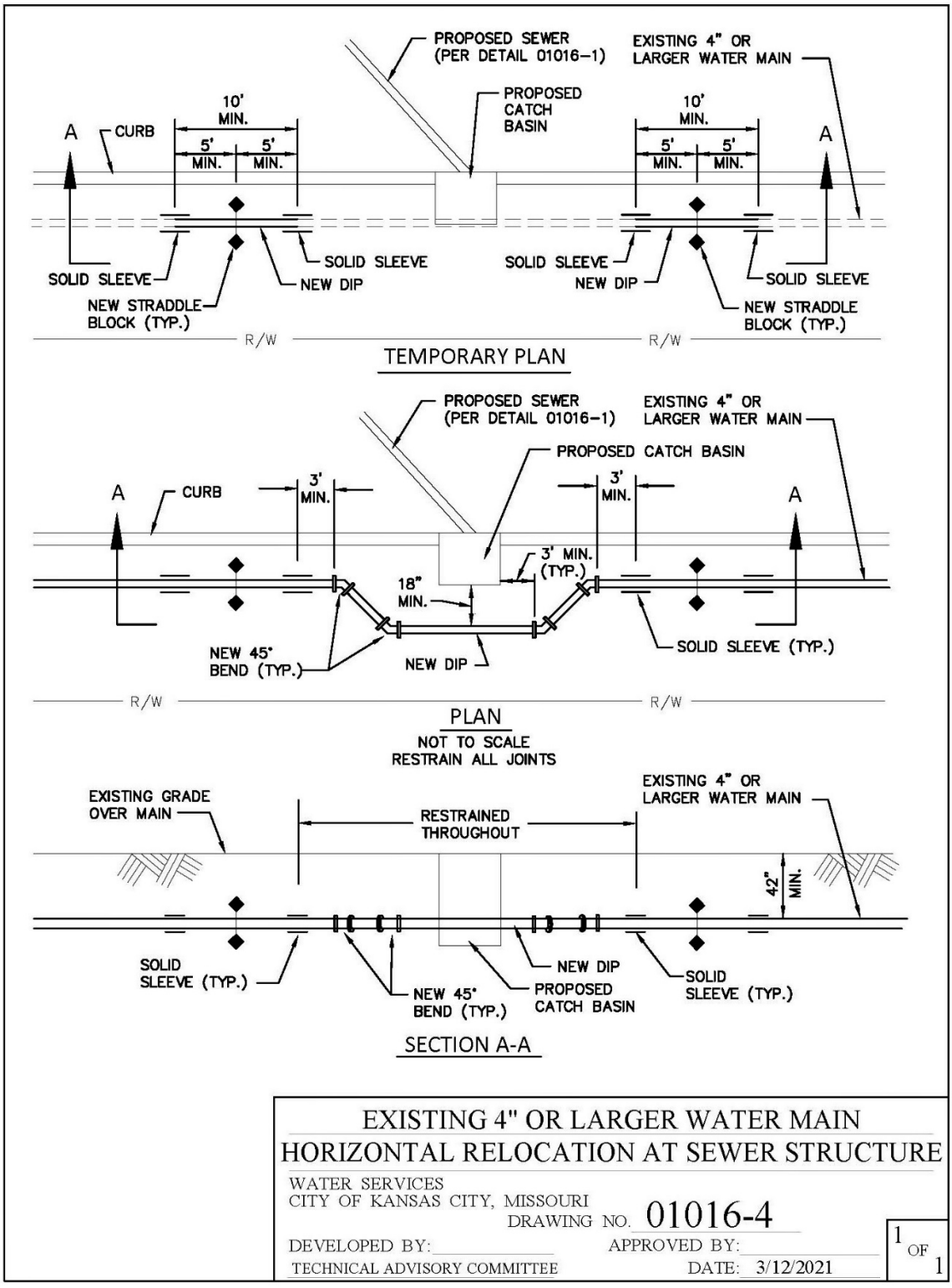
NOT TO SCALE

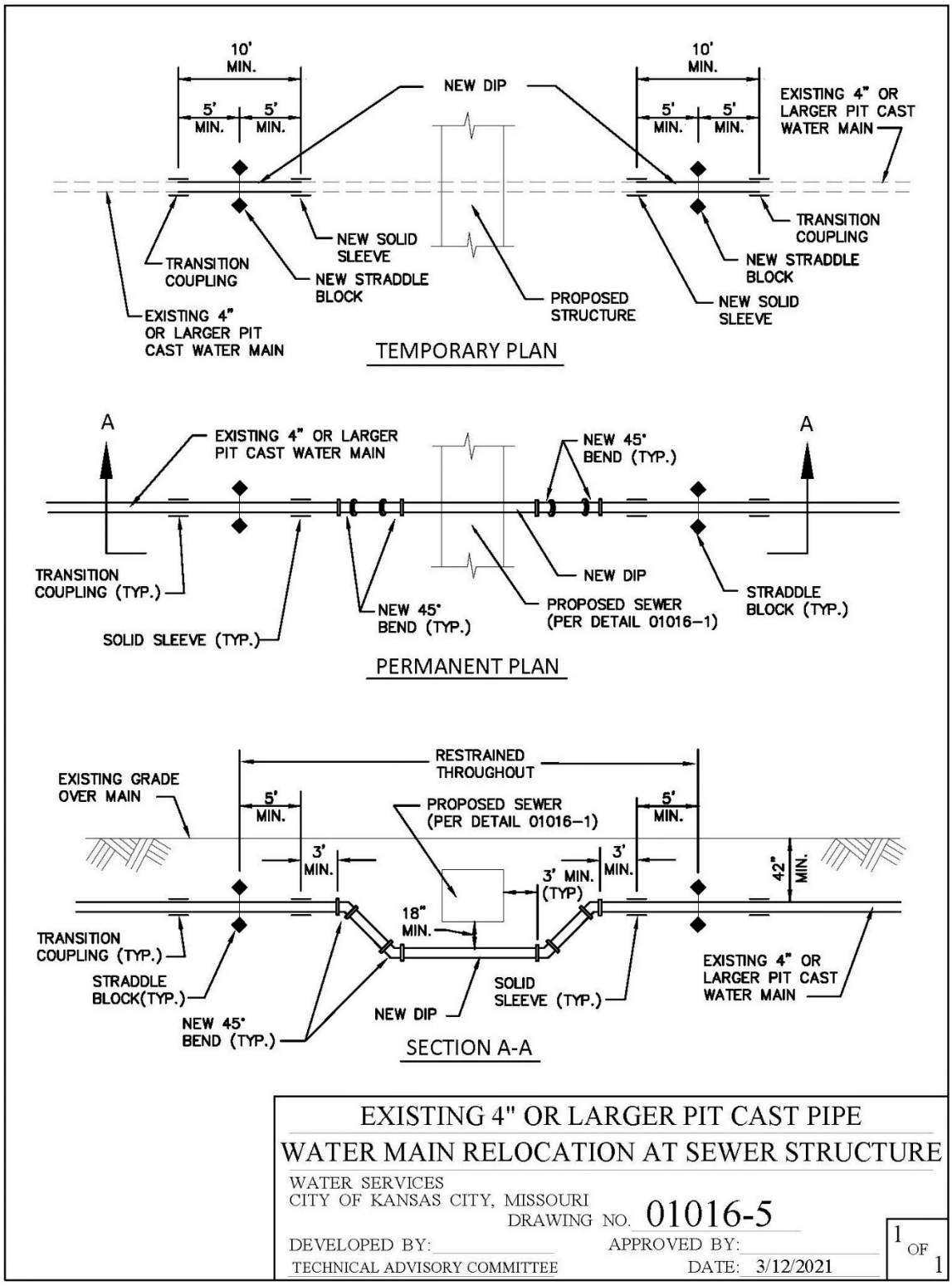
EXISTING 4" OR LARGER WATER MAIN VERTICAL RELOCATION AT SEWER

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

SECTION 01270 – ADJUSTMENT UNIT PRICE AND MEASUREMENT PROCEDURES

PART 1 – GENERAL

1.01 DESCRIPTION

A. This section describes the method by which construction of this project shall be measured and paid in accordance with the Adjustment Unit Prices. Should there be any conflicts between payment described in individual specification sections and this section, payment shall be made in accordance with this section. Any work shown on the Construction Contract Documents described in the specifications but not specifically covered by the bid items shall be included in other items of work.

B. The Base Bid and Bid Alternate 1 shall be as calculated on Form 00412 Adjustment Unit Prices. The Base Bid and Bid Alternate 1 or any combination thereof may be selected for construction at Owner's discretion.

C. The Bid includes all profit, overhead, markups, labor, equipment, materials, incidental or ancillary work, permits, coordination, traffic control, submittals, bonds, insurance, and other costs required to provide a complete functioning project that satisfies the project specifications.

D. Form 00412 includes a listing of Adjustment Unit Prices items and Adjustment Unit Price costs. The final Contract Price shall be adjusted according to the final measured, used, or delivered quantities based on Form 00412 Adjustment Unit Prices. Measurement shall be as approved by the Owner.

E. The Owner may add or delete any quantity of work to the project as specified in Supplementary Condition SC-11.04 C.

F. For Line Items shown on Table A and B where quantities do not exist, no unit cost is necessary.

PART 2 – ADJUSTMENT UNIT PRICE ITEMS

2.01 SANITARY SEWER PIPE OPEN CUT POINT REPAIR
POINT REPAIR 5-FOOT (OR LESS) 8, 18 AND 24-INCH PIPE (PAVED AND UNPAVED)
(ADJUSTMENT UNIT PRICE LINES ITEMS 1-5)

A. This section refers to open cut replacement of 8-inch to 24-inch pipe. Replacement of sewer pipe by open cut excavation will be measured and paid by Each (EA) point repair completed. The point repair includes up to five (5) linear feet of pipe installed. The cost of the pipe replacement will be paid according to the appropriate diameter of pipe installed according with Form 00412 Adjustment Unit Prices. Additional footage of pipe installed exceeding five (5) linear feet shall be paid in accordance with Form 00412 Adjustment Unit Price Line Items 6-10.

B. Any active service lateral exposed during point repair construction shall be re-established by installing a wye connection and the service lateral shall be replaced to the limits of the right-of-way/permanent easement line via open cut

replacement. The cost of these items include 18-inches of service lateral replacement.

C. The cost for the additional length of service lateral installed exceeding 18-inches shall be paid by the Adjustable Unit Price Line Items 28-29.
D. Corresponding service lateral connection shall also be re-established prior to backfilling the excavation. The contractor shall contact Water Services Sewer Line Maintenance Division prior to backfilling and the service connection shall be inspected by Water Services Sewer Line Maintenance Division prior to backfilling the excavation.
E. Contractor shall be responsible for protecting driveways throughout the construction. Any driveway damaged by construction activities shall be replaced at the no additional cost to Owner.
F. All costs associated with this item includes locating the pipe to be repaired, excavation, the installation of sewer pipe, connections to existing sewer system, pipe fittings, restoring service connections with a wye connection, 18-inches of service lateral, backfill, surface restoration including fencing, landscaping, street restoration, curb replacement, sidewalk replacement, driveway restoration, ADA ramps, and traffic control are to be included in the appropriate Adjustment Unit price for the appropriate pipe size and Surface Type.
G. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.02 SANITARY SEWER PIPE POINT REPAIR
ADDITIONAL LINEAR FOOT POINT REPAIR 8, 18 AND 24-INCH PIPE (PAVED AND UNPAVED)
(ADJUSTMENT UNIT PRICE LINE ITEMS 6-10)

A. This section refers to open cut replacement of 8-inch to 24-inch pipe exceeding the first five (5) linear feet of point repair pipe installed. Replacement of sewer pipe by open cut excavation will be measured and paid per linear foot (FT) installed.
B. All costs associated with this item includes excavation, the installation of sewer pipe, connections to existing sewer system, pipe fittings, backfill, surface restoration including fencing, landscaping, street restoration, curb replacement, sidewalk replacement, driveway restoration, ADA ramps, and traffic control are to be included in the appropriate Adjustment Unit price for the appropriate pipe size and Surface Type.
C. Contractor shall be responsible for protecting driveways throughout the construction. Any driveway damaged by construction activities shall be replaced at the no additional cost to Owner.
D. Any active service lateral exposed during point repair construction shall be re-established by installing a wye connection and the service lateral shall be replaced to the limits of the right-of-way/permanent easement line via open cut replacement. The cost of these items include 18-inches of service lateral replacement.

E. The cost for the additional length of service lateral installed exceeding 18-inches shall be paid by the Adjustable Unit Price Line Items 28-29.
F. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.03 SANITARY SEWER PIPE OPEN CUT POINT REPAIR
42-INCH EXTERNAL POINT REPAIR
(ADJUSTMENT UNIT PRICE LINES ITEM 11)

A. This section refers to open cut external point repair of a 42-inch sewer pipe. The sewer pipe repair will be measured and paid by Each (EA) completed. The cost of the pipe replacement will be paid according to the appropriate diameter of pipe installed according with Form 00412 Adjustment Unit Prices Line Item 11.
B. All costs associated with this item includes locating the pipe to be repaired, excavation, bypass pumping, materials and labor to complete repair, clearing and grubbing, backfill, surface restoration including fencing, landscaping, street restoration, curb replacement, sidewalk replacement, driveway restoration, ADA ramps, and traffic control are to be included in the appropriate Adjustment Unit price for the appropriate pipe size and Surface Type.
C. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.04 SANITARY SEWER CURED-IN-PLACE-PIPE (CIPP) LINING
8-INCH TO 24-INCH MAIN SEWER CIPP
(ADJUSTMENT UNIT PRICE LINE ITEMS 12-17)

A. This section refers to the Cured-In-Place Pipe (CIPP) Lining of 12-inch to 24-inch pipe. CIPP sewer pipe will be measured per linear foot installed. All costs associated with the installation of the CIPP, post-rehabilitation CCTV inspection and reports, CCTV data submittals, material testing and shipping costs, and surface restoration are to be included in the adjustment unit price cost item for the size of CIPP required.
B. The preliminary cleaning and CCTV will be paid according to Adjustment Unit Price Line Item 18.
C. Contractor shall submit supporting documentation, CCTV, and written explanation to Owner if CIPP lining cannot be completed prior to transferring repair to open cut repair list.
D. Contractor shall install a CIPP end seal on each end of every segment listed to be CIPP lined. The cost of the CIPP end seal shall be included in the appropriate size of liner installed. No separate payment shall be made for this item.
E. CIPP lining contractor shall be responsible for reinstating active service connections. CIPP lining contractor shall dye test as necessary to verify active service connections at no additional cost to the Owner. The CIPP lining contractor shall install a CIPP Point Repair in accordance with SECTION 06014 – CURED-IN-PLACE PIPE SECTIONAL POINT REPAIRS FOR

SANITARY SEWERS for all re-instated non-active service connections, at no cost to the Owner.

F. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

G. Contractor shall submit post CCTV prior to payment. CCTV data needs to be reviewed by Owner/Design Professional prior to payment being made.

2.05 SANITARY SEWER CURED-IN-PLACE-PIPE (CIPP) LINING PRELIMINARY CLEANING AND CCTV MAINLINE (8 TO 24-INCH) (ADJUSTMENT UNIT PRICE LINE ITEM 18)

A. Cleaning shall include light cleaning, as well as any heavy cleaning of 8-inch to 24-inch sewer pipe necessary to install the CIPP liner. Heavy cleaning with root cutters and mechanical chains are included in the cost of this item. Contractor shall submit supporting documentation, CCTV, and written explanation to Owner if lining cannot be completed. The cleaning and CCTV will be paid by linear foot (FT).

2.06 CURED-IN-PLACE-PIPE (CIPP) SECTIONAL POINT REPAIR FOR SANITARY SEWER
8 TO 24-INCH CIPP POINT REPAIR
(ADJUSTMENT UNIT PRICE LINES ITEMS 19-25)

A. This section refers to the installation of Cured-In-Place-Pipe (CIPP) Sectional Point Repairs For Sanitary Sewers of 8-inch to 24-inch pipe. Rehabilitation of sewer pipe by cured-in-place method will be measured and paid by linear foot (LF) point repair installed. The cost of the pipe rehabilitation will be paid according to the appropriate diameter of pipe installed on Form 00412 Adjustment Unit Prices Line Items 19-25 and in accordance with Specification SECTION 06014 – CURED-IN-PLACE-PIPE (CIPP) SECTIONAL POINT REPAIRS FOR SANITARY SEWERS.

B. All costs associated with this item includes locating the exact location of the pipe to be rehabilitated, pre-rehabilitation and post-rehabilitation CCTV, any necessary bypass pumping, sewer cleaning, the installation of the CIPP point repair, surface restoration including fencing, landscaping, street restoration, and traffic control are to be included in the appropriate Adjustment Unit price for the appropriate pipe size.

C. If CIPP point repair liner fails to be installed properly, the Contractor shall make all necessary repairs at no additional cost to the Owner. Contractor shall make all necessary precautions that a sewer overflow does not occur. Contractor shall be responsible for any sewer overflows that exist due to construction activities.

D. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.07 SERVICE LATERAL REPAIR/REHABILITATION
LATERAL CONNECTION CIPP SHORT LINER (FULL WRAP OR TOP HAT)

(ADJUSTMENT UNIT PRICE LINE ITEMS 26-27)

A. The Adjustment Unit Cost for the Lateral Connection Full Wrap CIPP Short Liner and the Lateral Connection Top Hat CIPP Short Liner are to be based on a lateral length of 18-inches and shall be measured per unit (EA) installed.
B. The Adjustment Unit Cost for the Lateral Connection Full Wrap CIPP Long Liner are to be based on a lateral length of 18-inches and shall be measured per unit (EA) installed.
C. All costs associated with the installation of the Lateral Connection Full Wrap CIPP Short Liner and Top Hat CIPP Liner includes pre-rehabilitation CCTV inspection, post-rehabilitation CCTV inspection, any cleaning of the sewer/lateral required to install the lateral connection liner and shall be included in the appropriate Adjustment Unit Price. All costs associated with this item includes locating and verifying the lateral and lateral size to be rehabilitated, surface restoration and traffic control are to be included in the appropriate adjustment unit price cost for the size of pipe required.
D. Cleaning shall include light cleaning, as well as any heavy cleaning necessary to install the CIPP liner. Heavy cleaning with root cutters and mechanical chains are included in the cost of each item. Contractor shall submit supporting documentation, CCTV, and written explanation to Owner if lining cannot be completed.
E. For locations that the full wrap lateral liner is not allowed to be installed, the CIPP lateral to main connection liner repair system shall be "Top Hat" Lateral Sealing and Repair. The Contractor shall get approval from Owner prior to the installation of the "Top Hat" Lateral Sealing and Repair.
F. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.08 SERVICE LATERAL REPAIR/REHABILITATION

OPEN CUT LATERAL REPLACEMENT TO R/W OR EASEMENT (PAVED OR UNPAVED)

(ADJUSTMENT UNIT PRICE LINE ITEMS 28-29)

A. Lateral rehabilitation or replacement from the lateral connection beyond 18-inches to the limits of the right-of way/permanent easement line as indicated on the Service Lateral Rehabilitation Schedule shall be measured and paid per linear foot (FT) installed.
B. All costs associated with lateral rehabilitation or replacement shall be included in the Adjustment Unit Price. All costs associated with the Service Lateral Rehabilitation or Replacement includes the installation of pipe or liner, pre-rehabilitation CCTV inspection, post-rehabilitation CCTV inspection, any cleaning of the lateral required to install the lateral connection short liner or long liner and shall be included in the appropriate adjustment unit price.
C. All costs associated with these items includes locating and verifying the lateral to be rehabilitated or replaced to the right-of-way or easement line, excavation, installation of PVC SDR 26, connecting it to existing sewer system, fittings, backfill, surface restoration including fencing, landscaping, street restoration,

curb replacement, sidewalk replacement, driveway restoration, ADA ramps, and traffic control are to be included in the appropriate Adjustment Unit Price. Approximate lateral repair length to right-of-way is included in the Sewer Main and Lateral Rehabilitation Schedules. Payment will be based on actual service lateral liner installed.

D. Cleaning shall include light cleaning, as well as any heavy cleaning necessary to install the CIPP liner. Contractor shall submit supporting documentation to Owner if lining isn't an option by providing CCTV and written explanation why the sewer can't be lined. No separate payment will be made heavy cleaning.
E. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.09 MANHOLE REHABILITATION
REMOVE AND REPLACE MANHOLE (UNPAVED)
(ADJUSTMENT UNIT PRICE LINE ITEM 30)

A. Installation of a new sewer manhole will be measured and paid per unit (1 each) installed. All costs associated with demolition of the existing manhole, measurements and surveys to size the manhole and locate the openings, installation the new sewer manhole, connections to existing sewers, plug lift holes, bedding, backfill, and surface restoration including fencing, landscaping, street restoration, curb replacement, sidewalk replacement, driveway restoration, ADA ramps, and traffic control are to be included in the Adjustment Unit Price.
B. The cost for the frame and cover will be paid according to Adjustment Unit Price Line Item 32.
C. Contractor shall replace a minimum of 5 feet of existing sewer entering/exiting the manhole. The cost of this pipe is included in the cost of this Adjustment Unit Price Item. The diameter and approximate depth of all manholes to be replaced are shown on the Construction Contract Documents. The manhole depths are from manhole inspection data and sewer records.
D. All manholes shall be constructed in accordance with SECTION 03370 – MANHOLE CONSTRUCTION.
E. Include as part of this Adjustment Unit Price item, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.10 MANHOLE REHABILITATION
REPLACE FRAME AND COVER (PAVED AND UNPAVED) (ADJUSTMENT UNIT PRICE LINE ITEMS 31-32)

A. Frame and cover replacements shall be measured per unit (1 each complete unit consisting of a frame, cover and external frame seal) installed. All costs associated with this item includes the installation of the frame and cover, external frame seal, raising the frame and cover to grade and surface restoration are to be included in the adjustment unit price.

B. All costs associated with frame and cover replacement shall include surface restoration consisting of fencing, landscaping, street restoration, curb replacement, sidewalk replacement, driveway restoration, ADA ramps, and traffic control are to be included in the Adjustment Unit Price.
C. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.11 MANHOLE REHABILITATION
INSTALL ADJUSTMENT RING(S) ADJUST TO GRADE
(ADJUSTMENT UNIT PRICE LINE ITEM 33)

A. The installation of adjustment rings shall be measured and paid per vertical inch (IN) installed. All costs associated with this item includes the installation of the adjustment rings, external frame seal, raising the frame and cover to grade and surface restoration are to be included in the adjustment unit price.
B. Frame and cover replacement is a separate Adjustment Unit Price item. Payment for the frame and cover replacement shall be per the applicable frame and cover Adjustment Unit Price.
C. Include as part of this Adjustment Unit Price item, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.12 MANHOLE REHABILITATION
REPLACE CONE (PAVED AND UNPAVED)
(ADJUSTMENT UNIT PRICE LINE ITEM 34)

A. Replace cone shall be measured per each (1 each complete unit consisting of removing existing cone, replacing existing cone and external frame seal) installed. All costs associated with this item includes the installation of the frame and cover, external frame seal, raising the frame and cover to grade and surface restoration are to be included in the adjustment unit price.
B. All costs shall include surface restoration consisting of fencing, landscaping, street restoration, curb replacement, sidewalk replacement, driveway restoration, ADA ramps, and traffic control are to be included in the Adjustment Unit Price.
C. The cost for the frame and cover will be paid according to Adjustment Unit Price Line Item 32.
D. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.13 MANHOLE REHABILITATION
LINE MANHOLE - CEMENTITIOUS
(ADJUSTMENT UNIT PRICE LINE ITEM 35)

A. Cementitious liner for sewer manhole rehabilitation will be measured to the tenth of a vertical foot (VF) of manhole lined, regardless of manhole diameter. All costs associated with the installation of the cementitious liner are to be

included in the Adjustment Unit Price for the thickness required. The size and depth of the manholes are shown on the Construction Contract Documents. All testing shall be included in the Adjustment Unit Price.

B. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.14 MANHOLE REHABILITATION
REBUILD BENCH AND TROUGH
(ADJUSTMENT UNIT PRICE LINE ITEM 36)

A. Rebuilding the bench and trough will be measured per unit (EA) completed. All costs associated with this item are to be included in the Adjustment Unit Price.

B. Include as part of this Adjustment Unit Price item, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.15 MANHOLE REHABILITATION
PIPE END SEAL LINER 4-INCH TO 15-INCH DIAMETER
(ADJUSTMENT UNIT PRICE LINE ITEMS 37-39)

A. Pipe End Seal Liner rehabilitation of 4-inch and 15-inch diameter pipes shall be measured per unit (EA) installed. All costs associated with the installation of the Pipe End Seal Liner rehabilitation includes any cleaning of the sewer required to install the Pipe End Seal Liner, materials, traffic control, installation, testing, and surface restoration are to be included in the Adjustment Unit Price.

B. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

2.16 ALLOWANCE (BASE BID ADJUSTMENT UNIT PRICE LINE ITEM 40)

A. Any additional work requested by the Owner that is not specifically stated in the construction contract documents shall be paid by this item. Contractor's maximum upper limit for compensation includes a total allowance amount of $200,000.00 not yet authorized by Owner that may be required throughout the course of the work. This allowance amount shall not be utilized unless specifically authorized in writing by the Owner to perform additional work. Additional work shall not be performed, nor is the Contractor approved to utilize any of the allowance amount, unless the Owner provides written authorization to Contractor that includes the scope of work for work to be performed and a maximum billing limit for compensation that has been mutually agreed upon.

PART 3 – LUMP SUM ITEMS

3.01 MOBILIZATION
(ADJUSTMENT UNIT PRICES LINE ITEM 41)

A. Mobilization is a lump sum item and shall not exceed 0.5% of the calculated Adjustment Unit Price Extension Subtotal on Form 00412.
B. This item shall be paid with the first Application for Payment.

3.02 BONDS AND INSURANCE
(ADJUSTMENT UNIT PRICES LINE ITEM 42)

A. Bonds and insurance is a lump sum item and shall not exceed 1.5% of the Adjustment Unit Price Extension Subtotal on Form 00412, Table A and B.
B. This item shall be paid with the first Application for Payment.

3.03 FINAL COMPLETION, DEMOBILIZATION, RECORD DRAWINGS AND CLOSE-OUT
(ADJUSTMENT UNIT PRICES LINE ITEM 43)

A. Shall be a lump sum item. There is no limit on the maximum value of this lump sum item.
B. Regardless of the lump sum price, this item shall be included in the Schedule of Values at a minimum price amount shown on Form 00412.
C. This item shall be paid after submittal of Record Drawings and CITY approval of the Record Drawing submittal.

PART 4 – BID ALTERNATE 1 ITEMS

4.01 SERVICE LATERAL CONNECTION REPAIR (LONG LINERS)
LATERAL CONNECTION FULL WRAP CIPP LONG LINER
(ADJUSTMENT UNIT PRICE LINE ITEM 44)

A. The Adjustment Unit Cost for the Lateral Connection Full Wrap CIPP Long Liner are to be based on a lateral length of 18-inches and shall be measured per unit (EA) installed.
B. All costs associated with the installation of the Full Wrap CIPP Long Liner CIPP Liner includes pre-rehabilitation CCTV inspection, post-rehabilitation CCTV inspection, any cleaning of the sewer/lateral required to install the lateral connection liner and shall be included in the appropriate Adjustment Unit Price. All costs associated with this item includes locating and verifying the lateral and lateral size to be rehabilitated, surface restoration and traffic control are to be included in the appropriate adjustment unit price cost for the size of pipe required.
C. Cleaning shall include light cleaning, as well as any heavy cleaning necessary to install the CIPP liner. Heavy cleaning with root cutters and mechanical chains are included in the cost of each item. Contractor shall submit supporting documentation, CCTV, and written explanation to Owner if lining cannot be completed.
D. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

4.02 SERVICE LATERAL CONNECTION REPAIR (LONG LINERS)

LATERAL CIPP LONG LINER TO EASEMENT (BACKYARD)
(ADJUSTMENT UNIT PRICE LINE ITEM 45)

A. Lateral rehabilitation or replacement from the lateral connection beyond 18-inches to the limits of the right-of way/permanent easement line as indicated on the Service Lateral Rehabilitation Schedule shall be measured and paid per linear foot (FT) installed.
B. All costs associated with lateral rehabilitation or replacement shall be included in the Adjustment Unit Price. All costs associated with the Service Lateral Rehabilitation or Replacement includes the installation of pipe or liner, pre-rehabilitation CCTV inspection, post-rehabilitation CCTV inspection, any cleaning of the lateral required to install the lateral connection short liner or long liner and shall be included in the appropriate adjustment unit price.
C. All costs associated with these items includes locating and verifying the lateral to be rehabilitated or replaced to the right-of-way or easement line, excavation, installation of Lateral CIPP Long Liner, connecting it to existing sewer system, fittings, backfill, surface restoration including fencing, landscaping, street restoration, curb replacement, sidewalk replacement, driveway restoration, ADA ramps, and traffic control are to be included in the appropriate Adjustment Unit Price. Approximate lateral repair length to right-of-way is included in the Sewer Main and Lateral Rehabilitation Schedules. Payment will be based on actual service lateral liner installed.
D. Cleaning shall include light cleaning, as well as any heavy cleaning necessary to install the CIPP liner. Contractor shall submit supporting documentation to Owner if lining isn't an option by providing CCTV and written explanation why the sewer can't be lined. No separate payment will be made heavy cleaning.
E. Include as part of these Adjustment Unit Price items, miscellaneous devices, accessory objects, and all necessary appurtenances required to complete installation.

4.03 MOBILIZATION
(ADJUSTMENT UNIT PRICES LINE ITEM 46)

A. Mobilization is a lump sum item and shall not exceed 0.5% of the calculated Adjustment Unit Price Extension Subtotal on Form 00412.
B. This item shall be paid with the first Application for Payment.
C. Contractor will be paid this item only if Alternate 1 is awarded.

4.04 BONDS AND INSURANCE
(ADJUSTMENT UNIT PRICES LINE ITEM 47)

A. Bonds and insurance is a lump sum item and shall not exceed 1.5% of the Adjustment Unit Price Extension Subtotal on Form 00412, Table A and B.
B. This item shall be paid with the first Application for Payment.
C. Contractor will be paid this item only if Alternate 1 is awarded.

4.05 FINAL COMPLETION, DEMOBILIZATION, RECORD DRAWINGS AND CLOSE-OUT
(ADJUSTMENT UNIT PRICES LINE ITEM 48)

A. Shall be a lump sum item. There is no limit on the maximum value of this lump sum item.
B. Regardless of the lump sum price, this item shall be included in the Schedule of Values at a minimum price amount shown on Form 00412.
C. This item shall be paid after submittal of Record Drawings and CITY approval of the Record Drawing submittal.
D. Contractor will be paid this item only if Alternate 1 is awarded.

End of Section.

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)											FRINGE PAID TO:	☐ APPROVED PLAN (29a)	
	GROUP: (31)		SKILL GROUP: (32)								(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			$ -	$ -
											FRINGE PAID TO:	☐ APPROVED PLAN	$ -
	GROUP:		SKILL GROUP:									☐ 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			$ -	$ -
											FRINGE PAID TO:	☐ APPROVED PLAN	$ -
	GROUP:		SKILL GROUP:									☐ 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			$ -	$ -
											FRINGE PAID TO:	☐ APPROVED PLAN	$ -
	GROUP:		SKILL GROUP:									☐ 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
HEART OF THE NATION

KANSAS CITY
MISSOURI

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project Number _____ Project Title _____

From Contractor _____ To _____ Date _____

Spec. No.	Section Title		Firm, Address (Check box if Supplier)	Phone, FAX and e-mail	Contact

❑ Attachments:

Signed by: _____ Date _____

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

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 _____

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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 01357
DELEGATED DESIGN PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General provisions for delegated design services.
2. Coordination of delegated designs with other Work.
3. Qualifications requirements for delegated design professionals.
4. Limitations on Engineer's review of delegated design Submittals.
5. Responsibilities of delegated design professionals.

B. Scope:

1. Where delegated design is specifically Contractor's responsibility in accordance with the Contract Documents, Contractor shall provide labor, services, other effort, and pay all costs necessary and required to perform delegated design services for Work that will be part of the completed Project as a functioning whole.
2. Perform delegated design Work in accordance with the Contract Documents, delegated design Action Submittals approved by Engineer, and Shop Drawings, product data Submittals, and Samples approved by the associated delegated design professional.
3. Contractor's correction period, general warranty and guarantee, and obligations for safety and protection apply to delegated design Work to the same extent such provisions apply to all other Work under the Contract.
4. Specifications requiring delegated design services include, but are not necessarily limited to, the following:
    a. Section 03400 - Custom Precast Concrete
    b. Section 03500 - Concrete Vaults and Chambers
    c. Section 05710 – Exterior Metal Railings
    d. Section 40 69 00 – Continuous Monitoring and Adaptive Controls (CMAC)
    e. Bollards
    f. Precast or Modular Stormwater Storage and Management Systems, including storage chambers, chambers foundations, and soil support.
5. Not Delegated Design: The following are not delegated design and are not covered by this Section:
    a. Contractor's use of design professionals for: (1) temporary construction or temporary facilities not part of the completed Project as a functioning whole, or (2) Contractor's means, methods, procedures, techniques, and sequences of construction and safety and protection measures incident thereto.
    b. Certain final designs that, in accordance with commonly accepted practice, are typically prepared by unlicensed, unregistered individuals, including for manufactured or fabricated systems, components or assemblies, not acting under the supervisory control of the design professional in responsible charge, but who commonly possess appropriate certification from a relevant industry organization, together with appropriate training and experience.

1.2 REFERENCES

A. Terminology:

1. Terminology indicated below are not defined terms and are not indicated with initial capital letters but, when used in this Section and Specifications of Division 02-9 where delegated design Work is required, have the meaning indicated below:

a. “Delegated design” means preparing the final design of part of the completed, permanent Work by one or more delegated design professionals, in accordance with the Contract Documents. The terms “delegated design”, “delegated design services”, “delegation of design responsibility”, and similar or derivative terms have the same meaning.

b. “Delegated design professional” means the licensed and registered engineer, architect, geologist, or other design professional retained by or employed by Contractor, Subcontractor, or Supplier to perform delegated design services for delegated design Work and possessing appropriate experience and qualifications for such delegated design services.

c. “Delegated design Work” means delegated design services, associated construction, and related Work.

d. “Instruments of service”, relative to delegated designs, means delegated design professional’s: (1) certifications (including delegated design professional’s certification of compliance, as required in this Section, and other certifications required of delegated design professional), (2) reports (where required), (3) design drawings, (4) design specifications, (5) other documents specifically indicated as delegated design professional’s “instruments of service” in the Contract Documents, and (6) documents modifying a delegated design (after Engineer’s approval of the original delegated design Submittals). “Instruments of service” are to be sealed, signed, and dated by delegated design professional and expressly required as Submittals. Shop Drawings sealed and signed by delegated design professional are delegated design professional’s “instruments of service”.

1.3 GENERAL PROVISIONS CONCERNING DELEGATED DESIGN SERVICES

A. Delegated Designs - General:

1. This Section augments the requirements of the General Conditions, as may be amended by the Supplementary Conditions, and other provisions of the Contract Documents regarding Contractor’s responsibilities for delegated design Work.
2. Delegated design professionals or their employer shall furnish professional liability insurance. Provisions on professional liability insurance are set forth in the Supplementary Conditions. Submit through Contractor appropriate documentation of professional liability insurance.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordination - General:
   a. Contractor shall coordinate the services of delegated design professionals with all other elements of the Work.
   b. Contractor has full responsibility for scheduling delegated designs and all related Work.
   c. Allow sufficient time in Progress Schedule for performance of delegated design services, including requests for interpretation or clarification between delegated design professional and Contractor and between Contractor and Engineer.
2. Coordination of Delegated Design Work’s Connections to Other Work:
   a. Where delegated design Work connects to other Work designed by Engineer, existing construction, or both, the delegated design Work shall be consistent with the other Work and existing construction to which delegated design Work connects, and adjacent construction.
   b. Submit details, loading, anchorage, and other coordinating information necessary for the delegated design Work to properly interface with Work designed by Engineer.
   c. Changes in the Work, whether designed by Engineer, designed by delegated design professional, or existing construction, necessary as a result of the delegated design are ineligible for increase in Contract Price or Contract Times, unless: (1) otherwise agreed

by both Engineer and Owner, or (2) expressly indicated otherwise elsewhere in the Contract Documents for the associated delegated design Work.

d. Changes requiring extra compensation, time, or both arising from delegated design aspects needed for convenience of Contractor, Subcontractor, or Supplier, are not grounds for increase in Contract Price or Contract Times.

3. Coordination of Submittals, Fabrication, Production, and Shipment:

a. Do not release for raw materials procurement, fabrication, production, and shipment to the Site materials, equipment, or systems designed by delegated design professional until the associated delegated design professional has reviewed and approved all associated Shop Drawings, product data, Samples, and (relative to shipment) source quality control Submittals, and such Submittals have been delivered to and accepted by Engineer.

1) For delegated design systems that required reactions to be submitted to the Engineer. These submittals shall be submitted and approved first before approval is given for the delegated design submittal.

b. Allow sufficient time in the Progress Schedule for required Submittals and required actions by delegated design professionals and Engineer.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Delegated Design Professionals:

a. Each delegated design professional shall possess not less than the minimum qualifications set forth in this provision. Where the Specifications for the associated delegated design Work establish more-stringent qualifications requirements, comply with the more-stringent requirements.

b. Each delegated design professional shall comply with all of the following:

1) Legally qualified, as both an individual and as a business entity, to practice the associated design discipline(s) in the jurisdiction where the Site is located, including possessing current, valid license and registration for the design discipline(s) for which the delegated design professional will render its services on the Project.

2) Possess not less than five years of experience in the subject design discipline(s).

3) Served as design professional in responsible charge on not less than five other designs similar in scope and complexity to the Work for which delegated design professional is retained on the Project; construction of such prior projects shall be complete by the start of the Project's construction.

c. Summary of Qualifications: Submit to Engineer summary of delegated design professional's experience and qualifications, including:

1) Evidence of coverage under appropriate professional liability insurance in accordance with the Contract Documents.

2) Evidence of delegated design professional's ability to legally conduct business as a design professional in the same jurisdiction as the Site, as a business entity.

3) Copy of delegated design professional's current, valid personal design professional license and registration for the same jurisdiction as the Site. Such documents shall indicate the individual's name, license or registration number, and dates for which the license or registration is valid.

4) Other information reasonably requested by Engineer.

1.6 GENERAL PROVISIONS FOR DELEGATED DESIGN SUBMITTALS

A. Under the Division 02-49 Specifications section(s) where delegated design Work is required, furnish to Engineer Submittals such as:

1. Action Submittals:

a. Delegated design professional's instruments of service Submittals.

2. Informational Submittals:

a. When delivered to Engineer, the following must bear delegated design professional's Submittal approval stamp:
   1) Shop Drawings, product data Submittals, Samples, testing plans.
   2) Results of source quality control and field quality control activities.
b. Delegated design professional's calculations.
c. Reports of delegated design professional's visits to the Site, bearing delegated design professional's dated signature.
d. Other Informational Submittals required for the subject delegated design Work.

B. Limitations of Engineer's Review of Delegated Design Submittals:
   1. Delegated Design Professional's Instruments of Service Submittals:
      a. Engineer's review of delegated design instruments of service Submittals is for the limited purposes indicated in the General Conditions, as maybe modified by the Supplementary Conditions
      b. The following disclaimer applies to Engineer's responses to delegated design professional's instruments of service Submittals:
         1) Engineer's review and approval of delegated design instruments of service is only for the limited purpose of verifying that performance and design criteria given in the Contract were used in the delegated design, and checking for compliance with the Engineer's design concept expressed in the Contract Documents.
         2) Contractor is solely responsible for complying with: the Contract Documents, Subcontractor and Supplier instructions consistent with the Contract Documents, Owner's directions, and Laws and Regulations.
         3) Contractor is solely responsible for obtaining, correlating, confirming, and correcting dimensions at the Site; quantities; information and choices pertaining to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the Work of all trades.
         4) Engineer is not responsible for the effects of resubmittals or tracking progress of resubmittals.
   2. Delegated Design Informational Submittals:
      a. Other provisions of the Contract Documents notwithstanding, Engineer's review of delegated design Informational Submittals is limited to only:
         1) Verifying the Submittal was furnished as required; and
         2) Submittal generally appears complete (except for calculations); and
         3) Submittal bears delegated design professional's approval stamp; or, for calculations prepared by or for delegated design professional, that such calculations bear delegated design professional's seal, signature, and date; or, for delegated design professional's reports of visits to the Site, that such report is legible, and bears delegated design professional's signature with date.
      b. Engineer receives such Submittals, including delegated design professional's calculations, on behalf of Owner, for Owner's records.
      c. Engineer, Owner, and others involved in the Project have the right to rely on delegated design professional's approval stamp as meaning that the delegated design professional has performed and appropriate review of the Submittal and determined it to be complete, in accordance with delegated design professional's instruments of service approved by Engineer, in accordance with delegated design professional's design intent, and in accordance with the Contract Documents.
   3. Engineer's Other Comments on Delegated Design Submittals:
      a. Despite the limitations of Engineer's review of Submittals for delegated design Work, should Engineer become aware of, or reasonably suspect existence of, potential of associated delegated design Work to adversely affect health, safety, or welfare of persons, or pose reasonable potential for damage to the Work, work of other

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

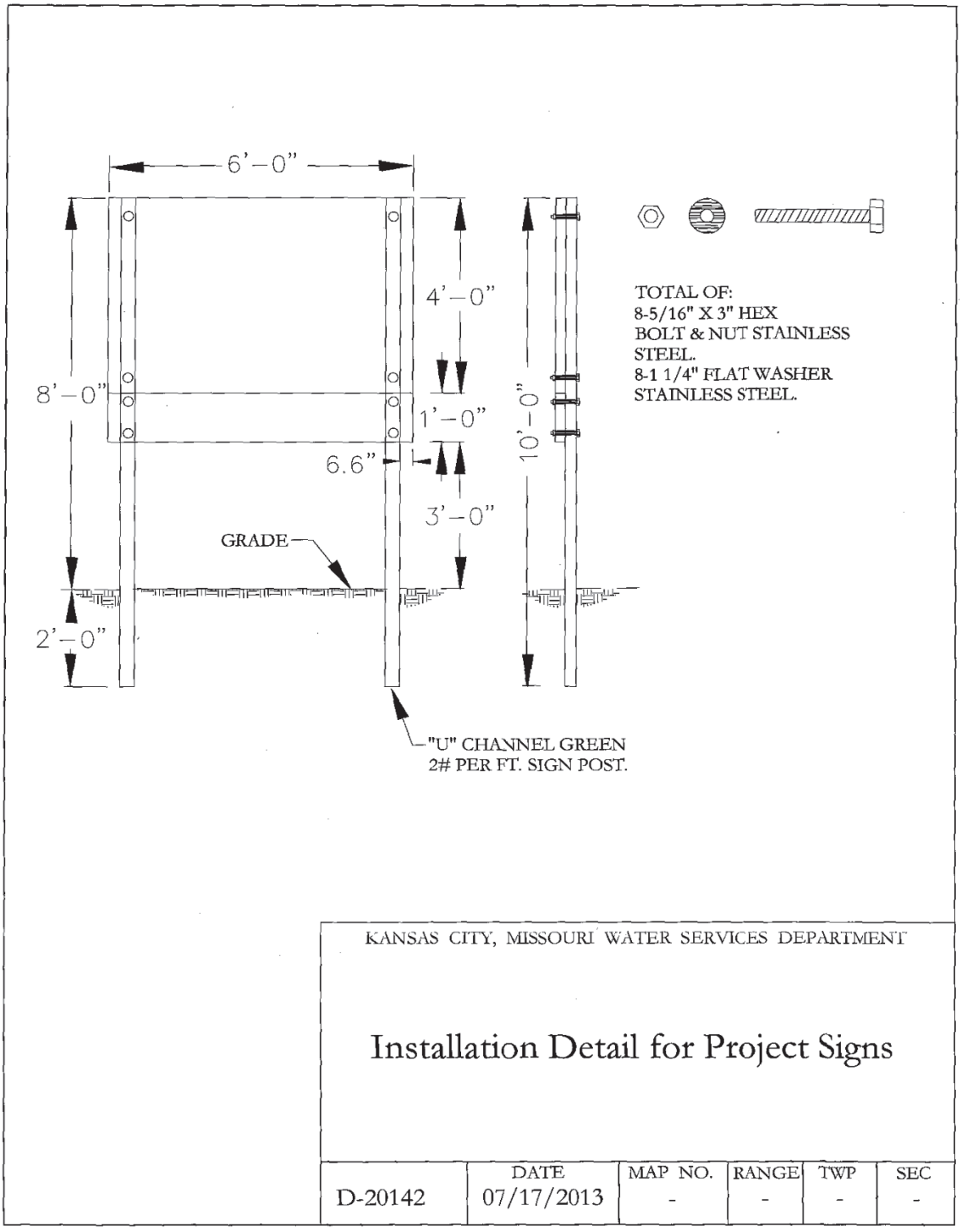


Figure 3 – Installation Detail for Project Signs

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.

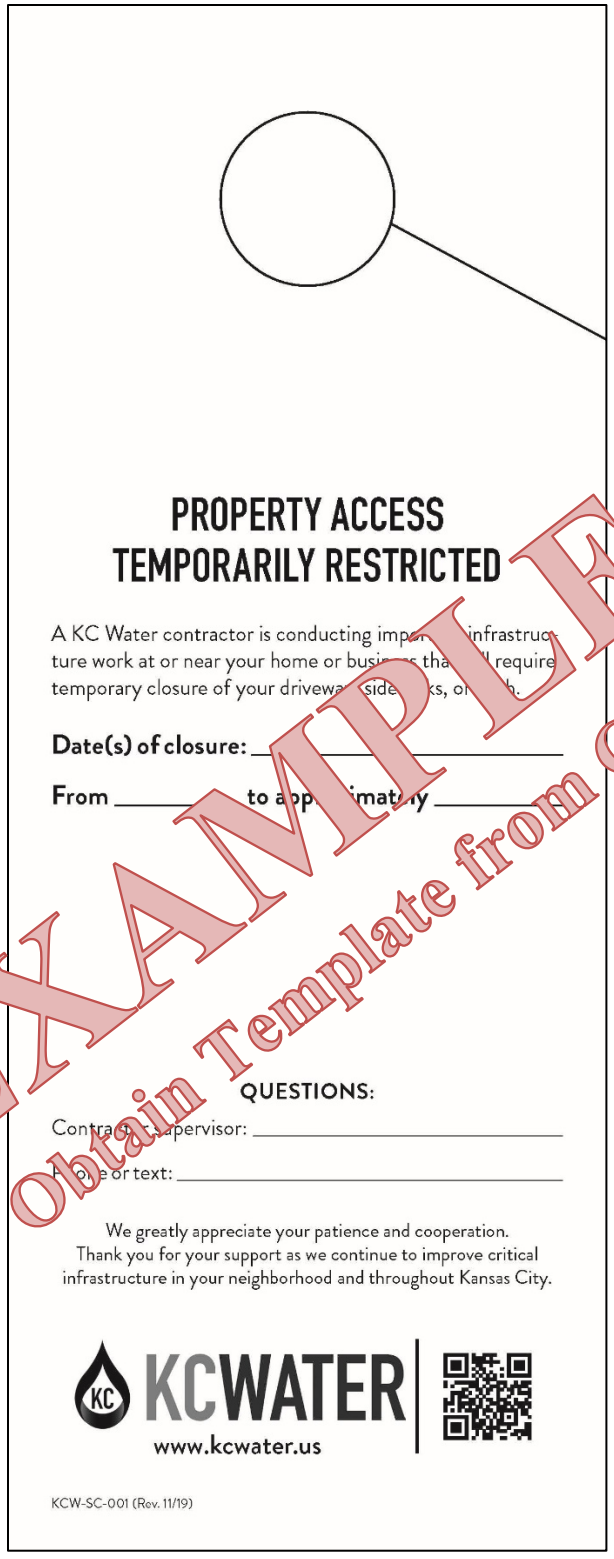
PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

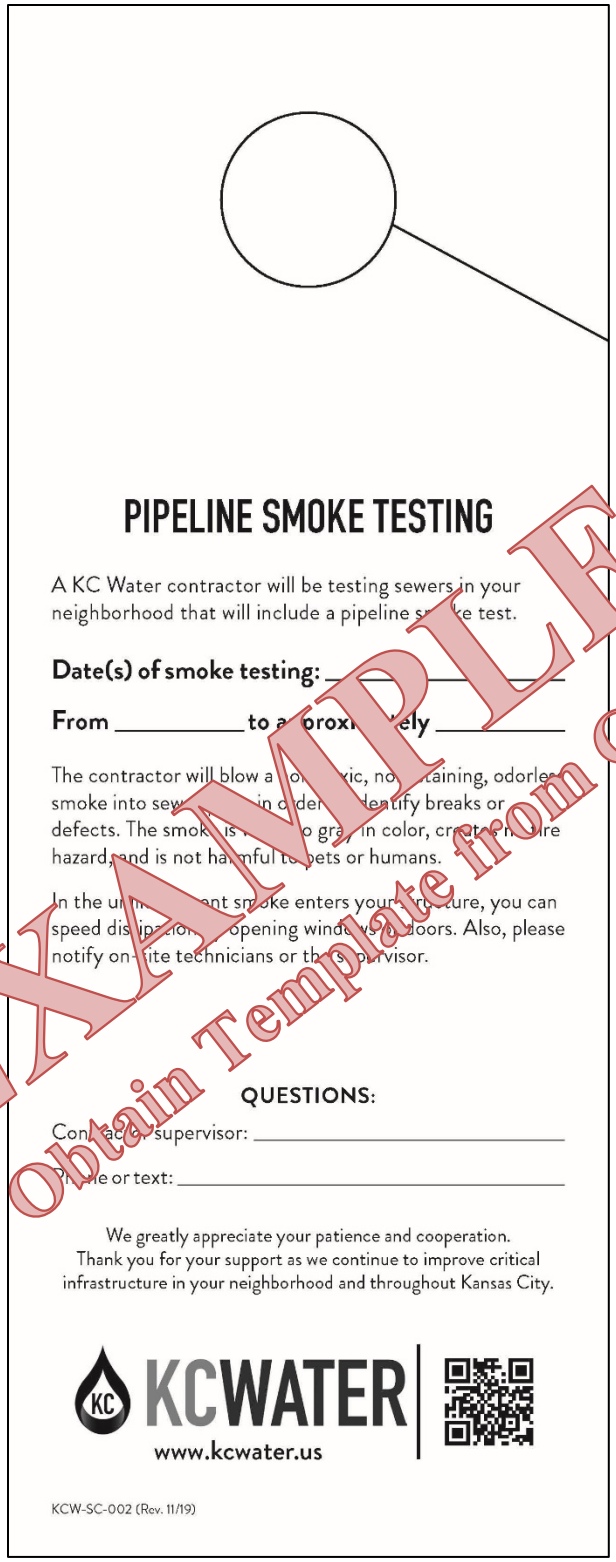
Not used.

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]den[illegible]dentify breaks or defects. The smok[illegible]is [illegible]o gra[illegible]in color, cr[illegible]re hazard, and is not ha[illegible]mful t[illegible]pets or humans.

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

QUESTIONS:

Con[illegible]ac[illegible] supervisor: _____

[illegible]e or text: _____

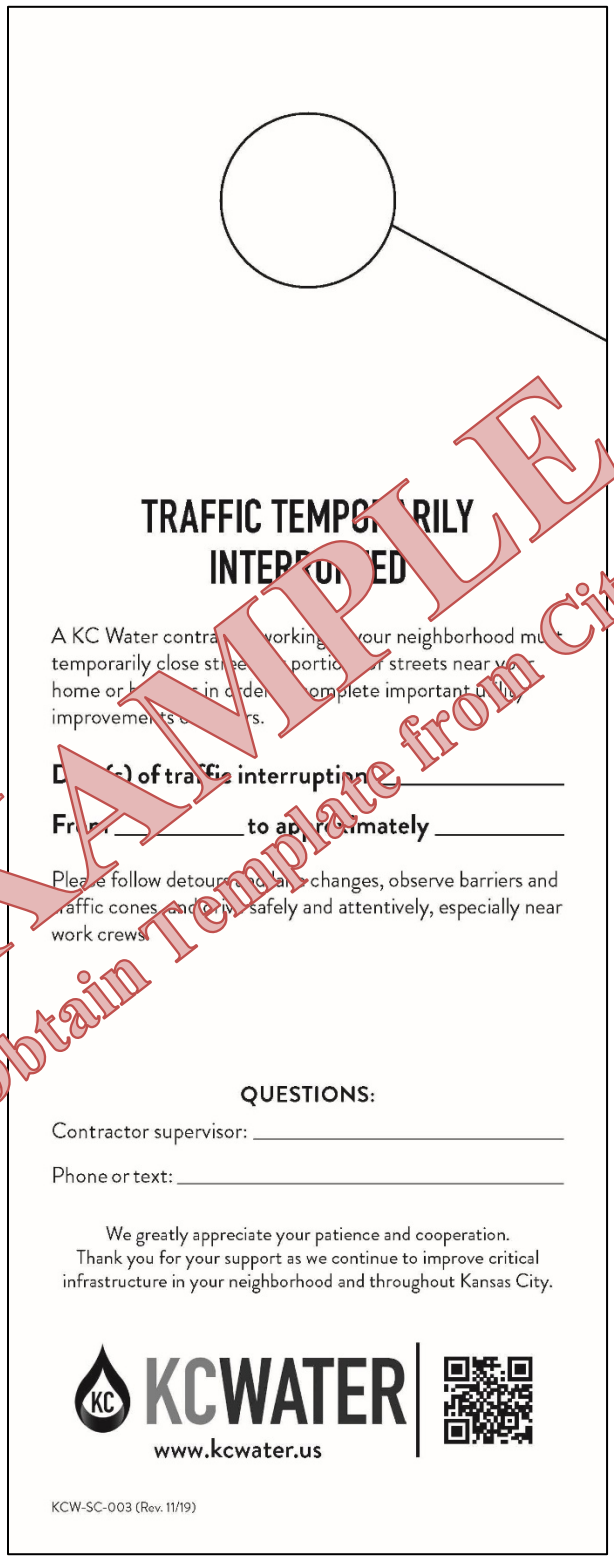
We greatly appreciate your patience and cooperation.
Thank you for your support as we continue to improve critical infrastructure in your neighborhood and throughout Kansas City.

KCWATER
www.kcwater.us

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

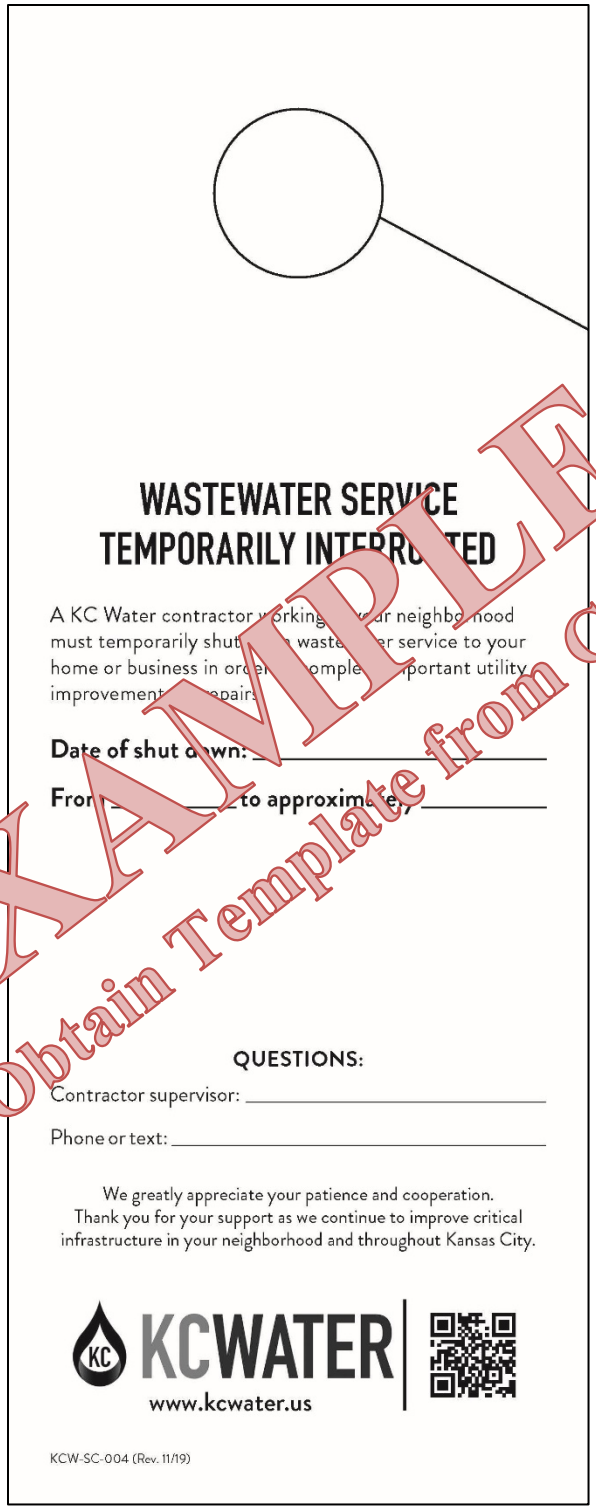
EXAMPLE
Obtain Template from City

Figure 2 – Smoke Testing Door Hanger



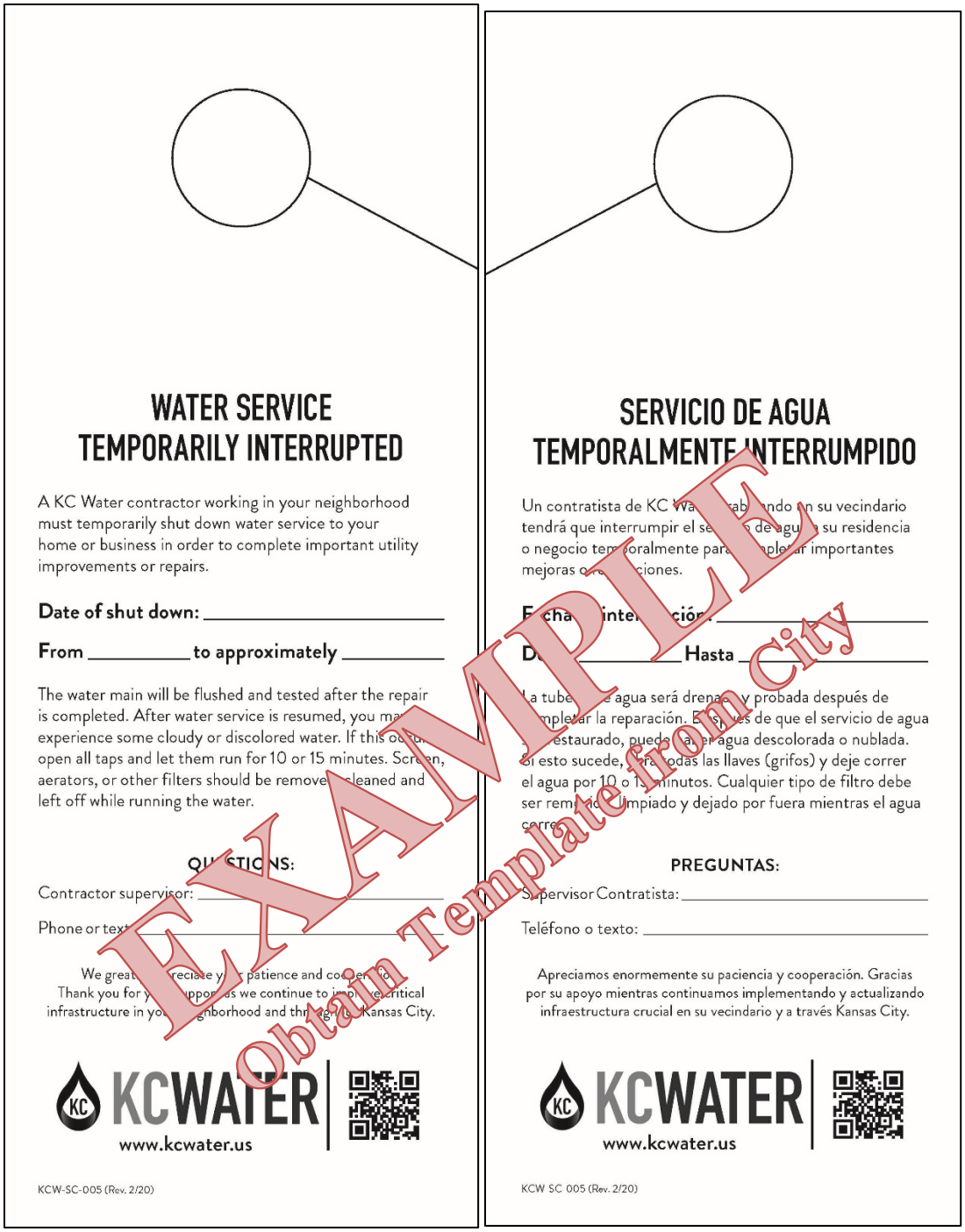
EXAMPLE
Obtain Template from City

Figure 3 -Traffic Interruption Door Hanger



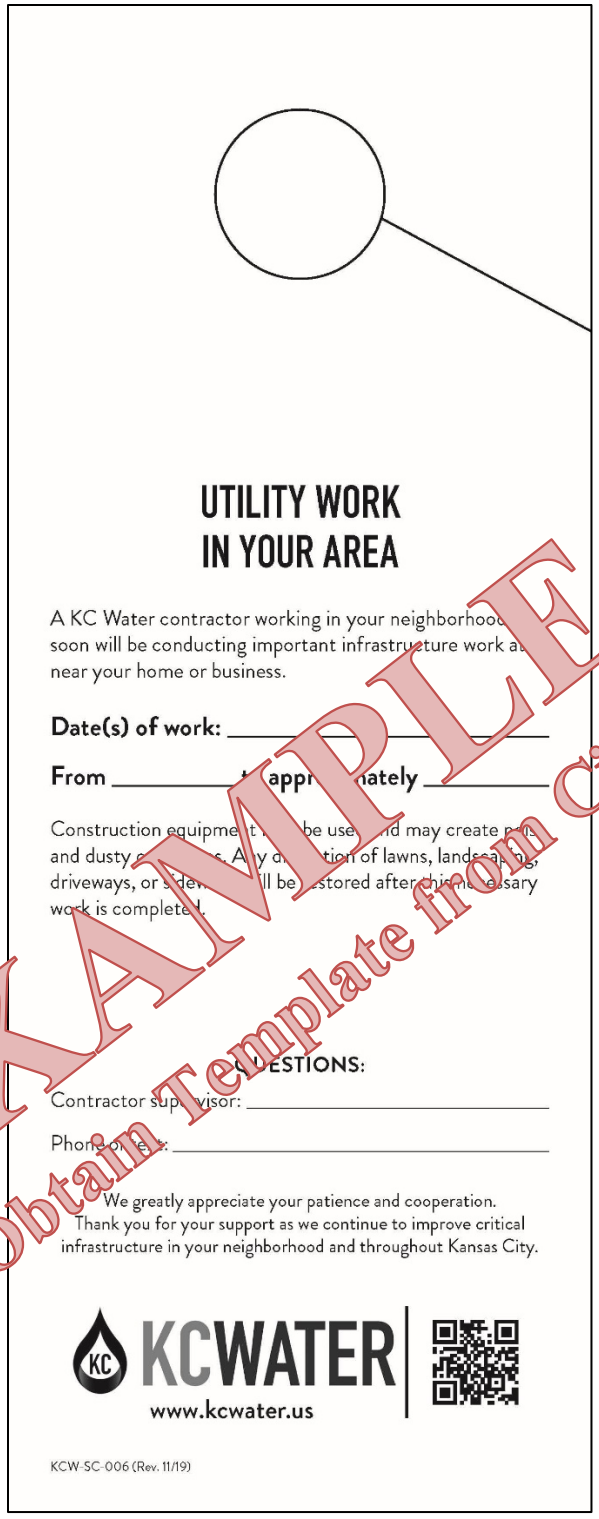
EXAMPLE
Obtain Template from City

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

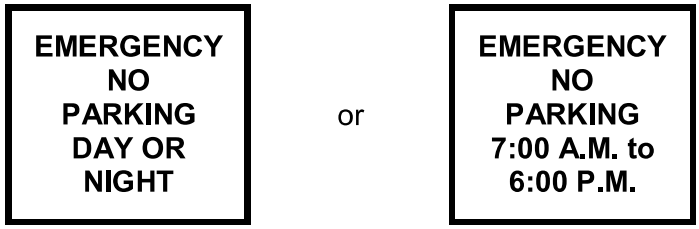
A. The Contractor shall consult with the City (Water Services Department and Public Works Department) to establish public thoroughfares to be used for haul routes and site access.
B. Residential streets shall not be used as part of the proposed haul routes.

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 01782
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for Contractor-furnished, manufacturers' operation and maintenance (O&M) data, including:
   a. Required operation and maintenance data groupings into operation and data manuals and timing of such Submittals.
   b. Requirements for paper copies of operation and maintenance data and related Electronic Documents.
   c. Content of operation and maintenance data Submittals.

B. Scope:

1. Contractor shall submit operation and maintenance data, and related information, in accordance with this Section and requirements elsewhere in the Contract Documents, as instructional and reference information for use by: Owner's operation and maintenance personnel, and (b) others retained by or working for Owner.
2. In addition to operation and maintenance data expressly required elsewhere in the Contract Documents, also submit operation and maintenance data for:
   a. All equipment and systems, including facility equipment, electrical equipment, communications equipment, electronic safety and security systems.
   b. Valves, gates, actuators, and related accessories.
   c. Instrumentation and control devices and systems.
   d. Building materials, systems, and finishes that need post-construction troubleshooting, cleaning, or maintenance, such as, paint, finishes and coatings.

C. Related Requirements:

1. Section 01300 - Submittals
2. Section 01335 – Document Management.
3. Section 01 78 36 - Warranties.

1.2 SUBMITTALS

A. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data:
   a. Submit operation and maintenance data, required by the Contract Documents, grouped into operation and maintenance manual Submittals indicated in Table 01782-A.
   b. Where operation and maintenance data required by the Contract Documents, is not expressly indicated in table 01782-A, obtain written clarification or interpretation from Engineer prior to preparing and transmitting such Submittal.
   c. For each required operation and maintenance manual Submittal, furnish preliminary Submittal and final Submittal. Timing of preliminary and final operation and maintenance manual Submittals, and differences between preliminary and final Submittals, are indicated in this Section.

Table 01782-A
Required Groupings of Operation and Maintenance Data Submittals

Name of O&M Manual/Data	For Materials or Equipment Specified in Section(s)
GSI Maintenance	Section 02937
Underground Storage Chambers	Section 03500
Stormwater Treatment Facility (STF)	Section 03500
Lighting	Section 265000
Continuous Monitoring and Adaptive Controls	Section 406900

B. Timing of Submittals and Quantity Required:

1. Preliminary Operation and Maintenance Manual Submittals:
   a. Submit in accordance with Section 01300 – Submittals, by the earlier of: 90 days following approval of Shop Drawings and product data Submittals, or 14 days prior to starting training of operation and maintenance personnel, or 14 days prior to field quality control testing at the Site.
   b. Do not perform checkout, startup, and training without Engineer's acceptance of preliminary operation and maintenance data Submittals for the associated Work.
2. Final Operation and Maintenance Manual Submittals: Furnish final Submittal prior to Substantial Completion of the associated Work, unless submittal is required prior to an interim Milestone.
   a. Submit in accordance with Section 01300 - Submittals
   b. Work will not be eligible for Substantial Completion until associated, required final operation and maintenance data Submittals are accepted by Engineer.
   c. If Contractor (whether or not via Subcontractor or Supplier), revises program code or configuration files between acceptance of Submittal by Engineer and end of the Contract's correction period and Contractor's general warranty obligation, and configuration files to Owner. Before modifying program code and configuration files after Substantial Completion, verify with facility manager that Owner- or facility manager modifications of program code or configuration files were incorporated into the modified files, subject to the provisions of this Section.

1.3 PAPER COPIES OF O&M MANUALS

A. Binding and Cover:

1. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy, as necessary.
2. Binders shall be not less than one inch wide and maximum of three inches wide. Binders for each copy of each volume shall be same size and color.
3. Binders shall be locking three-ring ("D"-ring) type, or three-post type. Three-ring binders shall be riveted to back cover and include plastic sheet lifter (page guard) at front and back of each volume.
4. Do not overfill binders.
5. Covers shall be oil-, moisture-, and wear-resistant, including identifying information on cover and spine of each volume.
6. Indicate the following information on cover of each volume:

a. Title: “OPERATING AND MAINTENANCE INSTRUCTIONS”. For submittal of preliminary operation and maintenance data, include the word, “PRELIMINARY” in the title.
b. Name or type of material or equipment covered in the manual.
c. Volume number, if more than one volume is submitted, listed as “Volume [_____] of [_____]”, with appropriate volume-designating numbers filled in.
d. Name of Project and, when applicable, Contract name and number.
e. Name of building or structure, as applicable.

7. Provide the following information on spine of each volume:
a. Title: “OPERATING AND MAINTENANCE INSTRUCTIONS”. For submittal of preliminary operation and maintenance data, include the word, “PRELIMINARY” in the title.
b. Name or type of material or equipment covered in the manual.
c. Volume number, when more than one volume is submitted, listed as “Volume [_____] of [_____]”, with appropriate volume-designating numbers filled in.
d. Project name and building or structure name.

B. Pages:

1. Print pages in paper copies of operation and maintenance manuals on 30-pound (minimum) paper, 8.5-inch by 11-inch size.
2. Reinforce binding holes in each individual paper sheet with plastic, cloth, or metal. When published, separately-bound booklets or pamphlets are part of manuals, reinforcing of pages within booklet or pamphlet is not required.
3. Furnish each page with binding margin not less than 3/4-inch wide.
4. Properly punch each paper page with holes suitable for associated binding. Provide not less than 3/8-inch of paper between outer edge of punched holes and edge of paper. Manuals with improperly punched holes will be returned to Contractor as unacceptable.
5. In paper copies of manuals, each page in each copy shall be properly bound-through by the binder’s rings or posts. Paper manuals where some pages are not so bound will be returned to Contractor as unacceptable.

C. Drawings:

1. Bind into operation and maintenance manuals drawings, diagrams, and illustrations up to and including 11-inch by 17-inch size, with reinforcing and punched holes specified for paper pages.
2. Drawings or sheets larger than 11-inch by 17-inch shall be:
a. Paper Copies: Neatly folded and inserted into clear plastic pockets bound into the manual. Neatly and permanently label each pocket with printed text indicating content and drawing numbers. Include not more than two drawings or sheets per pocket.
b. Electronic Documents Copies: Included in electronic file at appropriate location.

D. Copy Quality and Document Clarity:

1. Provide original-quality copies. Documents in operation and maintenance manuals shall be either original manufacturer-printed documents or first-generation photocopies indistinguishable from originals. If original is in color, copies shall be in color. Manuals with copies that are unclear, not completely legible, off-center, skewed, or where text or drawings are cut by binding holes, are unacceptable. Pages that contain approval or date stamps, comments, or other markings that cover text or drawing are unacceptable.

2. Clearly mark, using ink, to indicate all components of materials and equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options furnished and cross out inapplicable content. Using highlighters to so indicate options furnished is unacceptable.

E. Organization:

1. Indexed tabs between major categories of information, such as operating instructions, preventive maintenance instructions, and other major subdivisions of data in each manual.

1.4 ELECTRONIC DOCUMENTS O&M MANUALS

A. Electronic Documents of Operation and Maintenance Manuals:

1. Each Electronic Document copy of operation and maintenance data shall include all information included in the corresponding paper copy.
2. Submit Electronic Documents operation and maintenance data in accordance with Section 01300 - Submittals.
3. File Format:
   a. Unless otherwise required by 01300 - Submittals , operation and maintenance data Electronic Documents shall be “portable document format” (PDF) files.
   b. Electronic Documents shall be electronically searchable upon delivery.
   c. Electronic Documents shall not be password-protected and shall not be protected against Owner’s or facility manager’s copying and printing such files for Owner’s or facility manager’s use in operating and maintaining the facility.
   d. Electronic Documents shall open to its first page.
   e. Submit each operation and maintenance manual as a single Electronic Document file, unless file size is over-large, in which case divide into as few separate files, each with similar filename, as possible.
   f. Within each Electronic Document, provide bookmarks for the following:
      1) Each chapter and subsection indicated in the corresponding printed copy document’s table of contents.
      2) Each figure.
      3) Each table.
      4) Each appendix and attachment.

1.5 CONTENT OF OPERATION AND MAINTENANCE MANUALS

A. Operation and Maintenance Manual Content – General:

1. Prepare each operation and maintenance manual specifically for the Project. Include in each manual all pertinent instructions, as-constructed drawings as applicable, bills of materials, technical information, installation and handling requirements, maintenance and repair instructions, and other information required for complete, accurate, and comprehensive data for safe and proper operation, maintenance, and repair of materials and equipment furnished for the Project. Include in manuals specific information required in the Specification Section for the material or equipment, data required by Laws and Regulations, and data required by authorities having jurisdiction.
2. Provisions of this Article were written for equipment. Where operation and maintenance data are required for building products, such as finishes, openings, thermal and moisture protection, and similar items, comply with this Article to the extent practical and reasonable for the associated item.
3. Completeness and Accuracy:

a. Operation and maintenance manuals that include language stating or implying that the manual's content may be insufficient or stating that the manual's content is not guaranteed to be complete and accurate are unacceptable.
b. Operation and maintenance manuals shall be complete and accurate.
c. Operation and maintenance manuals shall indicate the specific alternatives and features furnished, and the specific operation and maintenance provisions for the material or equipment furnished.

4. Provide dividers and Include manufacturer's information, diagrams, schematics, and equipment cutaways. Avoid submitting catalog excerpts unless they are the only document available showing identification or description of particular component of the equipment. Where published documents, included in operation and maintenance data, pertain to multiple models or types, mark the literature to indicate specific material or equipment supplied. Marking may be in the form of checking, arrows, or underlining to indicate pertinent information, or by crossing out or other means of obliterating information that does not apply to the materials and equipment furnished.
5. Identify each equipment item consistent with names and identification numbers shown or indicated in the Contract Documents, rather than manufacturer's model numbers.
6. Neatly type data not furnished in computer-printed text. Handwriting, except for strikeouts, arrows, and the like, is unacceptable.
7. Include copy of warranty in accordance with the Contract Documents.
8. Include copy of proposed service contract, when applicable.
9. When copyrighted material is used in operation and maintenance manuals, obtain¬ copyright holder's written permission to use such material in the operation and maintenance manual.

B. Differences Between Preliminary and Final Operation and Maintenance Manuals:

1. In preliminary operation and maintenance manuals, include flysheet or placeholder for information to be included in final operation and maintenance manual Submittal.
2. In final operation and maintenance manuals, include information such as the following, as applicable for the associated materials and equipment:
   a. Equipment data that requires collection after startup, for example: (1) final settings for electrical switchgear, automatic transfer switches, and circuit breakers: and (2) materials and equipment field testing results.
   b. Equipment startup reports and Suppliers' field service reports.

C. Initial Documents in Operation and Maintenance Manuals:

1. Table of Contents:
   a. Provide table of contents in each volume of each operation and maintenance manual.
   b. In table of contents and not less than once in each chapter or section, identify materials and equipment by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is clearly indicated in a table bound at or near beginning of each volume. Using material or equipment model or catalog designations for identifying items is unacceptable.
2. Equipment Record:
   a. Provide "Equipment Record" section of operation and maintenance manual immediately following the table of contents. "Equipment Record" section is not required for operation and maintenance data for other than equipment (such as building materials and finishes).

b. Provide “Equipment Record” on forms included as this Section’s Attachments 1, 2, and 3.
c. For instrumentation and control equipment, International Society of Automation (ISA) data sheets are acceptable in lieu of the forms included as this Section’s Attachments 1, 2, and 3.
d. This Section’s Attachments 1, 2, and 3 are available from Engineer as “fillable PDF forms”.
e. Complete in detail each section of “Equipment Record”. Merely referencing the associated equipment’s operation and maintenance data for nameplate, maintenance, spare parts, lubricants, or other required information, is unacceptable.
f. For equipment or systems with multiple, separate components (for example, motor and gearbox), fully completed “Equipment Record” is required for each component.
g. Operation and maintenance data Submittals without complete and accurate “Equipment Record” sheets are unacceptable.

3. Supplier’s Field Service Reports:
a. Include in final operation and maintenance manuals copies of associated Supplier’s field services reports.
b. Include Supplier’s completed field service reports in operation and maintenance manual in section immediately following “Equipment Record” section.

D. Operation and Maintenance Instructions:

1. Safety Considerations:
a. Submit written descriptions of safety considerations relating to operation and maintenance procedures for materials and equipment.
b. Describe safety devices and alarms provided with materials and equipment and proper operation and use.
c. Indicate procedures for proper, safe operating and maintenance of materials and equipment furnished, including manufacturer’s recommended personal protection equipment, apparatus, and devices not furnished under the Contract.
d. Describe recommended safety-related training for personnel operating and maintaining the subject materials or equipment.
e. Include in appendix to operation and maintenance manual manufacturers’ relevant “safety data sheets” (SDS), formerly “material safety data sheets” (MSDS).
f. Engineer’s review of operation and maintenance data expressly does not extend to adequacy, completeness, and accuracy of SDS or other safety and protection practices and procedures indicated in the operation and maintenance data.

2. Operation:
a. Include in operation and maintenance data Submittals complete, detailed written operating instructions for each material or equipment item including: function; operating characteristics; limiting conditions; and regulation and control. Also include, as applicable, written descriptions of alarms generated by equipment and proper responses to such alarm conditions.
b. Include pre-startup instructions and checklists and complete startup instructions for each material and equipment item.
c. Indicate recommended operating instructions for all operating modes and conditions, with associated recommendations for safe operation.
d. Explain available controls and instrumentation and associated function(s).

e. Indicate required shutdown checklists and procedures for: normal shutdown, emergency shutdown, and long-term shutdowns.
f. Troubleshooting instructions.

3. Maintenance – General:
   a. Include in operation and maintenance data complete, written instructions for necessary and recommended maintenance, including mechanical maintenance and electrical/instrumentation and controls maintenance, as applicable.
   b. Include in operation and maintenance data complete instructions for necessary assembly, disassembly, installation, re-installation, storage, and shipping for materials and equipment.
   c. Tools: Include list of required maintenance tools and equipment.
   d. Spare Parts and Extra Materials:
      1) Submit complete instructions for ordering replaceable parts, including reference numbers (such as shop order number or serial number) that will expedite the ordering process.
      2) Submit manufacturer's recommended inventory levels for spare parts, extra stock materials, and consumable supplies for the initial two years of operation. Consumable supplies are items consumed or worn by operation of materials or equipment, and items used in maintaining the operation of material or equipment, including items such as lubricants, seals, reagents, and testing chemicals used for calibrating or operating the equipment. Include estimated delivery times, shelf life limitations, and special storage requirements.
      3) Also refer to this Article's provision, "Bills of Materials", below, for additional requirements regarding ordering replacement parts.
4. Routine and Preventative Maintenance:
   a. Submit complete, detailed, written instructions for routine and preventive maintenance including all information and instructions to keep materials, equipment, and systems properly lubricated, adjusted, and maintained so that materials, equipment, and systems function economically throughout their expected service life. Instructions shall include:
      1) Written explanations with illustrations for each routine and preventive maintenance task such as inspection, adjustment, anchor bolt torque checks, lubrication, calibration, cleaning, replacement of filters, and the like.
      2) Recommended schedule for each routine and preventive maintenance task.
      3) Lubricants:
         a) Provide lubrication charts indicating recommended types of lubricants, frequency of application or change, and where each lubricant is to be used or applied.
         b) Table of alternative lubricants.
5. Major Maintenance:
   a. Include detailed, written instructions and illustrations for required periodic (non-routine, non-preventative) maintenance.
   b. Indicate relative level of training and expertise required to perform such maintenance and recommended tools and equipment.
6. Special Maintenance:
   a. Include maintenance instructions for long-term shutdowns and storage.

E. Bills of Materials:

1. Include in operation and maintenance manuals complete bills of material or parts lists for materials and equipment furnished. Lists or bills of material may be furnished on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:
2. Manufacturer's name, physical address, telephone number, internet website address.
3. Manufacturer's local service representative's or local parts supplier's name, physical address, telephone number, internet website address, and e-mail addresses.
4. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.
5. For each part or piece include the following information:
    a. Parts cross-reference number. Cross-reference number shall be used to identify the part on assembly drawings, Shop Drawings, or other type of graphic illustration where the part is clearly shown or indicated.
    b. Part name or description.
    c. Manufacturer's part number.
    d. Quantity of each part used in each assembly.
    e. Current unit price of the part at the time the operation and maintenance manual is submitted. Price list shall be dated.

F. Record Copy of Shop Drawings, Product data, and Other Previously Approved and Accepted Submittals:

1. Submit original-quality copies of each approved and accepted (as applicable) Shop Drawing, product data Submittal, written results of source quality control activities, and other Submittals, updated to indicate as-installed condition. Do not include prior Submittals that were not approved or were not accepted. Reduced drawings are acceptable only when reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.

G. Electrical Schematics, Diagrams, and Information:

1. Submit complete electrical schematics and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.
2. Include as-constructed drawings of layouts of electrical panels (such as switchgear and motor control centers) and control panels.

H. NFPA 70 (National Electric Code) Documentation:

1. Include in operation and maintenance manuals for electrically-powered equipment documented calculations of: (1) arc-fault current, equipment available fault current and (2) short-circuit current rating (SCCR), provided as part of equipment Submittals.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

A. The following, bound after this Section's "End of Section" designation, are part of this Section:

1. Attachment 1 - Equipment Data and Spare Parts Summary form (one page)
2. Attachment 2 - Recommended Maintenance Summary form (one page)
3. Attachment 3 - Lubrication Summary form (one page)

END OF SECTION

ATTACHMENT 1

Equipment Record

Equipment Data and Spare Parts Summary

Project Name	Specification Section:
Equipment Name	Year Installed:
Project Equipment Tag No(s).	
Equipment Manufacturer	Project/ Order No.
Address	Phone
Website / Web Site / E-mail	
Local Representative/Service Center	
Address	Phone
Website	E-mail

MECHANICAL NAMEPLATE DATA

Equip.		Serial No.		
Make		Model No.		
ID No.	Frame No.	HP	RPM	Cap.
Size	TDH	Imp. Size	CFM	PSI
Other:				

ELECTRICAL NAMEPLATE DATA

Equip.			Serial No.					
Make			Model No.					
ID No.	Frame No.	HP	V.	Amp.	Hertz	PH	RPM	SF
Duty	Code	Ins. Cl.	Type	NEMA	C Amb.	Temp. Rise	Rating	
Other:								

SPARE PARTS PROVIDED PER CONTRACT

Part No.	Part Name	Quantity

RECOMMENDED SPARE PARTS

Part No.	Part Name	Quantity

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ATTACHMENT 2

Equipment Record

Recommended Maintenance Summary

Equipment Description	Project Equip. Tag No(s).	

RECOMMENDED BREAK-IN MAINTENANCE (FIRST OIL CHANGES, ETC.)	INITIAL COMPLETION * FOLLOWING START-UP							
	D	W	M	Q	S	A	RT	Hours

RECOMMENDED PREVENTIVE MAINTENANCE	PM TASK INTERVAL *							
	D	W	M	Q	S	A	RT	Hours

* D = Daily W = Weekly M = Monthly Q = Quarterly S = Semiannual A = Annual Hours = Run Time Interval

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ATTACHMENT 3

Equipment Record

Lubrication Summary

Equipment Description	Project Equip. Tag No(s).

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

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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

SECTION 02180 – CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 SUMMARY

A. Clearing and grubbing, within the Site and as indicated in the Contract Documents, shall consist of the removal and disposal of all trees, stumps, roots, logs, shrubs, grass, weeds, fallen timber, trash (surface and buried), buildings, foundations, fences and all other material designated for removal and disposal.

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 and as indicated in the Contract Documents.

1.03 RELATED SECTIONS

A. Section 01015 – Specific Project Requirements.
B. Section 02190 – Demolition.
C. Section 02200 – Earthwork.
D. Section 02575 – Restoration.
E. Section 02949 – Tree Protection, Removal and Replacement.

1.04 CODES AND STANDARDS

A. Note used.

1.05 DEFINITIONS

A. Clearing – The removal and disposal of all materials such as trees, brush, fallen timber and other materials found on or above the surface of the site. It shall include, but is not limited to, the removal of the following: buildings (see also Section 02190 – Demolition), fences, lumber, trash and other waste. Salvaging and disposing of the materials shall be as specified in this section and in the Contract Documents.
B. Scalping – The removal and disposal of material such as: sod, grass, weeds, agricultural crops, bushes, brush and all decayed vegetative matter from the surface of the ground without disturbing the earth more than is necessary.
C. Grubbing – The removal and disposal of all material such as stumps, roots, buried debris, foundations and trash encountered below the surface of the ground that has not been included in the description of clearing.
D. Trees – Woody growth having a diameter of 2 inches or greater as measured 4.5 feet above the ground.
E. Brush – Dense vegetation consisting of shrubs, bushes and small trees less than 2 inches in diameter as measured 4.5 feet above the ground.

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. Other Submittals:
    1. All permits required for the Work specified in this section.

2. Landfill Information. The Contractor shall submit for review and approval all proposed landfill sites to be used for the disposal of debris resulting from clearing and grubbing.

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. Salvaged materials shall be handled, stored and delivered as specified in Section 01015 – Specific Project Requirements.

1.10 LIMITS OF WORK

A. The limits of clearing and grubbing shall extend to the construction limits unless otherwise shown on the Drawings. Clearing should only occur in those areas required for construction within a six-month period.
B. Large projects shall be cleared and grubbed as construction progresses. Mass clearing and grubbing shall be avoided.
C. An undisturbed strip of not less than 25 feet in width consisting of existing grass or other vegetation shall be kept in place around the perimeter of the construction site and protected from damage. The Contractor shall scalp only those areas necessary for the construction of the project.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 PERIMETER EROSION AND SEDIMENT CONTROLS

A. Perimeter erosion and sediment controls shall be installed prior to the start of clearing and grubbing the Site.
B. When needed for the installation of perimeter controls, limited clearing and grubbing will be allowed to accommodate the Contractor's perimeter installation operation.

3.02 PRESERVATION OF TREES

A. All work associated with trees shall be done in accordance with Section 02949 - Tree Protection, Removal and Replacement. No trees shall be removed outside the excavated area or outside filled areas, unless their removal is indicated on the Drawings or as authorized by the City in accordance with Section 02949.
B. Trees left standing shall be protected from permanent damage by construction operations in accordance with Section 02949 - Tree Protection, Removal and Replacement.

3.03 NOTIFICATIONS

A. The Contractor shall notify property owners at least one (1) week in advance of removing any special plantings (flowers, ornamental trees, bushes, plants, etc…) so that the property owner has a reasonable opportunity to transplant prior to the Contractor's work activities.

3.04 CLEARING

A. Trees located within the permanent easement and temporary construction easement shall be removed as indicated on the Drawings and in accordance with Section 02949.

B. Clearing shall consist of removing all materials such as trees, brush, downed timber, trash, waste and other objectionable materials found on or above the surface of the site.
C. The Contractor shall tag or identify existing trees, shrubs and landscape materials to be removed; and obtain City approval prior to removal in accordance with Section 02949.

3.05 SCALPING

A. Scalping shall include the removal and disposal of material such as: sod, grass, weeds, agricultural crops, bushes, brush and all decayed vegetative matter from the surface of the ground without disturbing the earth more than is necessary.

3.06 GRUBBING

A. Grubbing shall consist of the removal and disposal of all material such as stumps, roots, buried debris, foundations and trash encountered below the surface of the ground that has not been included in the description of clearing.
B. The vegetative matter shall be removed to the following depths:
   1. A minimum depth of 12 inches below ground line or subgrade, whichever is lower.
   2. A minimum depth of 18 inches below ground line or subgrade, whichever is lower, at water containment areas (berms, dams, levees, lagoons, ponds, dikes etc.).
C. Remove and dispose of all stumps, roots and other vegetative matter larger than 2 inches in diameter.
D. When materials encountered below grade that are detrimental to the proposed improvement, the material shall be removed to a depth necessary to provide adequate space for installation and support for the proposed improvement.

3.07 EMBANKMENT AREAS

A. Unless otherwise noted on the plans, where undisturbed stumps and roots are encountered and the fill depth will exceed 3 feet, the stumps and roots may be left in place provided they do not extend above final grade.

3.08 BORROW AREAS

A. 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 and restored in accordance with Section 02575 – Restoration.

3.09 BACKFILL

A. Backfill all holes, pits and depressions resulting from clearing and grubbing.
B. Backfill with suitable material placed and compacted in conformance with Section 02200 – Earthwork and grade the area to drain.

3.10 DISPOSAL OF MATERIAL

A. Dispose of all materials from the clearing and grubbing operations at a City approved location, as arranged for by Contractor, at no additional cost to City.
B. Unless otherwise specified in Section 01015 – Specific Project Requirements or other portions of the Contract Documents, the Contractor may claim and salvage any material which the Contractor may consider of value but shall not delay any work associated with the Contract by the salvaging operations.
C. Open burning of brush or debris on the Site is not allowed unless approved by the City. If approved by the City, the Contractor shall obtain all permits required for open burning.

END OF SECTION

SECTION 02190 - DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers miscellaneous site demolition (i.e., curbs, gutters, sidewalks, pavement, fencing, structures, etc...) and the disposal of the demolition debris associated with the Work.

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 indicated in the Contract Drawings.

1.03 RELATED SECTIONS

A. Section 00700 – General Conditions.
B. Section 01015 – Specific Project Requirements.
C. Section 02575 – Surface Restoration.
D. Section 02676 – Sewer Line Cleaning.
E. Section 02949 – Tree Protection, Removal and Replacement.

1.04 CODES AND STANDARDS

A. All applicable OSHA standards.

1.05 DEFINITIONS

A. Demolition Debris:
    1. Site clearing debris, materials resulting from excavation, building demolition and waste materials from the construction of buildings. Demolition debris includes, but is not limited to, concrete, asphalt, brick, reinforcing steel, existing pipe and fittings.
    2. Demolition debris shall not include environmental pollutants, hazardous substances, contaminated products, by-products, samples or waste materials of any kind that are regulated under environmental laws.
    3. Demolition debris shall not include waste material resulting from sewer cleaning activities. This material shall be disposed in accordance with Section 02676 – Sewer Line Cleaning.
B. Earthen and Rock Materials – Soil, rock and gravel are not considered demolition debris and shall be disposed of in accordance with Section 02200 – Earthwork.

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. Other Submittals:
    1. Landfill Information – The Contractor shall submit for approval all proposed landfill sites to be used for the disposal of demolition debris. Submittals shall include a copy of the permit authorizing disposal at each landfill and whether the

landfill is within or outside the corporate city limits of the City of Kansas City, Missouri.

1.08 QUALITY ASSURANCE

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

1.09 MATERIAL DELIVERY, STORAGE AND HANDLING

A. As specified in the Contract documents.

1.10 APROVED LANDFILLS

A. All demolition debris shall be disposed of at a legal landfill or at a site where dumping of such materials is allowed under federal, state and local laws.
B. Legal landfills for demolition debris are permitted by the Kansas City Board of Zoning Adjustment. For further information on approved dumpsites contact the City Planning and Development Department:

Development Management Division
Phone: (816) 513-1500.

C. No demolition work shall be initiated until the landfill to be used for disposal has been approved in accordance with paragraph 1.07 SUBMITTALS.

1.11 USE OF UNAUTHORIZED LANDFILLS

A. The disposal of demolition debris in an unauthorized landfill (whether intentional or inadvertent) is a violation of local ordinances and is prohibited. Failure to immediately remedy such a violation will be a considered a failure of the Contractor to perform the Work in accordance with the Contract Documents.
B. In the event of such a violation, the Contractor shall be subject to all local ordinance penalties.
C. If illegal dumping is suspected, the City will provide notice of the violation to the Contractor in accordance with Section 00700 – General Conditions, Article 17.
D. Upon receipt of the notification, the Contractor shall have five (5) working days to submit documentation that an authorized landfill was used or to submit a Remediation Plan to correct the violation.
E. Remediation Plan:
    1. The Contractor shall submit a plan and schedule to relocate the demolition debris from the unauthorized landfill to an approved landfill and restore the unauthorized landfill to its previous condition.
    2. Upon approval of the plan by the City, the Contractor shall have no more than 15 calendar days to complete the work associated with the Remediation Plan.
F. The work associated with the Remediation Plan and all penalties assessed for the violation is the sole responsibility of the Contractor. No additional payment will be made by the City and no adjustments to the Project Schedule will be made.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 DEMOLITION

A. Remove existing structures, materials and debris as required to perform the Work and to install the improvements as shown on the Drawings.

B. Equipment and Materials to be returned to the City:
   1. Equipment and materials that are to be removed and returned to the City shall be as specified in Section 01015 – Specific Project Requirements.
   2. Carefully remove or dismantle, in a manner to avoid damage, all materials and equipment indicated to be relocated or returned to the City.
   3. Any material or equipment which is specified or indicated to be relocated or returned to the City that is damaged by the Contractor, an assessment of condition/damage shall be made by the City/Design Professional and it shall be repaired or replaced at the Contractor's sole expense.

C. Re-use of Materials and Equipment:
   1. Equipment and materials that are to be re-used on the Project shall be as specified in Section 01015 – Specific Project Requirements.
   2. Remove and store in a manner to avoid damage, staining and corrosion of materials; refurbish materials and equipment as required and reinstall as indicated in the Contract Documents.

D. Materials not indicated or specified to be reused, relocated or returned to the City shall become the property of the Contractor and shall be disposed of as specified in this Section.

E. Perform demolition work in such a manner to protect existing facilities, utilities, structures and property which are to remain, against damage from the Contractor's operations. Existing structures within or adjacent to the Site which are not to be removed or demolished shall be protected by the Contractor during construction. All private facilities, such as water service lines or sanitary sewer service laterals, which are disturbed or damaged by the Contractor's work shall be repaired by the Contractor prior to the close of the workday. The temporary repair shall be made in a manner sufficient to restore utility service to that property. The permanent repair shall be made the next calendar day.

F. Make provisions for temporarily accommodating flows in existing facilities that are to be relocated or disturbed.

G. Take precautions to guard against movement or settlement and provide shoring and bracing as necessary.

H. If at any time the safety of the existing structure to remain is endangered, cease operations, notify the City/Design Professional and do not resume operations until receiving the City's/Design Professional's approval.

I. Remove concrete by jack hammering, sawing, core drilling or other approved method.

J. Remove existing pavement by jack hammering, sawing, digging or other approved methods. Pavement shall be sawed at points where indicated on the Drawings. If not indicated on the Drawings, pavement shall be sawed at points to meet the requirements of applicable permits and the requirements of Section 02575 - Surface Restoration.

END OF SECTION

SECTION 02200 – EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers earthwork associated with general excavation, backfill and compaction required for the Work.

B. This section also covers the handling, storage, transportation and disposal of all excavated material; sheeting and shoring, subgrade preparation, dewatering as necessary or required, protection of adjacent property, construction of fills and embankments, surfacing and grading; and other appurtenant work.

C. Additional requirements for excavation, backfill and compaction for trenching can be found in Section 02250 – Trenching, Pipe Embedment and Backfill.

1.02 SPECIFICATION MODIFICATIONS

A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

A. Section 00700 – General Conditions.

B. Section 01000 – General Project Requirements.

C. Section 01015 – Specific Project Requirements.

D. Section 02180 – Clearing and Grubbing.

E. Section 02190 – Demolition.

F. Section 02250 – Trenching, Pipe Embedment and Backfill.

G. Section 02230 – Geotextiles.

H. Section 02930 – Seeding.

I. Section 02931 – Sodding.

1.04 CODES AND STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft3).
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
ASTM D4546	Standard Test Method for One-Dimensional Swell or Collapse of Soils.
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

C. City of Kansas City, Missouri Department of Public Works, Construction and Material Specifications (http://kcmo.gov/publicworks/design-construction-standards/) KCMO PW 2202, Subsection 2202, Untreated Compacted Aggregate.
D. Kansas Department of Transportation, Standard Specification and Construction Manual, Division 1100, Aggregates.
E. Missouri Department of Transportation, Missouri Standard Specifications for Highway Construction, Division 1000, Materials Details.

1.05 DEFINITIONS

A. Paved Areas – Areas for which the final surfacing will be street pavement, shoulders, driveways, parking lots, curbs, gutters, sidewalks, gravel roads or other surface features.
B. Unpaved Areas – Areas for which the final surfacing will be in a green space.

1.06 INFORMATION PROVIDED BY THE CITY

A. As provided in the Contract Documents.

1.07 SUBMITTALS

A. Submit as specified in Section 01300 – Submittals.
B. Shop Drawings:
   1. Sheeting and Shoring Plan – Prior to excavation, the Contractor shall submit a shoring design that is signed and sealed by a registered professional engineer in the State of Missouri for all excavations greater than twenty (20) feet in depth (in accordance with 29 CFR Past 1926 - OHSA Subpart P - Excavations and Trenches). Submittal will be for informational purposes only.
C. Testing Reports:
   1. Laboratory testing results for proposed Borrow Materials.
   2. Laboratory testing results and quarry control reports for Granular Material.
   3. Laboratory testing results for and quarry control reports Granular Bedding.
   4. Moisture-density (Proctor) test results.
   5. In-Place Density test results.
D. Other Submittals:
   1. Commercial Laboratory – submit name, contact information and certification of the commercial testing laboratory required by paragraph 1.08.
   2. Blasting (as applicable):
      (a) Pre-blast survey.
      (b) Monitoring Plan.
      (c) Permit for blasting.
      (d) Post-blast survey.

1.08 QUALITY ASSURANCE

A. The Contractor is responsible for the quality assurance and quality control of the Work.
B. Sampling and Testing:
   1. Tests to determine conformance with all requirements of this Specification for quality and properties of all Contractor-secured materials, including borrow materials proposed for use, shall be performed by an independent, state-certified, commercial laboratory retained and compensated by the Contractor and approved by the City/Design Professional.

2. All work associated with QUALITY ASSURANCE shall be included in the Bid Price and will be incidental to the Work. No separate measurement or payment will be made.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

A. The City will furnish the Site in accordance with Section 00700 – General Conditions.
B. See Section 01000 – General Project Requirements, paragraph EASEMENTS AND RIGHT-OF-WAY for use of private property for delivery, storage and handling.
C. Perform in a manner to prevent contamination or segregation of materials.

1.10 EXISTING UTILITES

A. The Contractor shall notify utilities prior to excavation in accordance with Section 00700 – General Conditions, Article 6 – Contractor's Responsibilities, paragraph NOTIFICATION OF ULTILITIES.
B. Movement of construction machinery and equipment over pipes and utilities during construction is at the Contractor's sole risk.
C. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand, start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured.
D. Support uncovered lines or other existing work affected by the excavation until approval for backfill is granted by the City.
E. Report damage to utility lines or subsurface construction immediately to the City.

PART 2 - PRODUCTS

2.01 MATERIALS ENCOUNTERED

A. Suitable Materials – Materials suitable for use in backfill, fill and embankment include job excavated or borrow material that is free of debris, roots, organic matter, frozen matter and shale particles/rock/stone or gravel with all dimensions less than 2 inches:
   1. Cohesion-less materials include gravels, gravel-sand mixtures, sands and gravelly sands; generally exclusive of clayey and silty material with the following properties:
      (a) Free-draining.
      (b) Impact compaction will not produce a well-defined moisture-density relationship curve.
      (c) Maximum density by impact methods will generally be less than by vibratory methods.
      (d) Generally less than 15% by dry weight of soil particles pass a No. 200 sieve.
   2. Cohesive materials include materials made up predominately of silts and clays generally exclusive of sands and gravel with the following properties:
      (a) Impact compaction will produce a well-defined moisture-density relationship curve.
      (b) Are not free draining.
B. Unsuitable Materials – Materials unsuitable for use in backfill, fill and embankment include all material that contains debris, roots, organic matter, frozen matter, shale particles/rock/stone or gravel with any dimension greater than 2 inches.

Additionally, as determined by the City/Design Professional, any other materials that are too wet or otherwise unsuitable for providing a stable subgrade or stable foundation for structures or trenches.

C. Material used for embankment or fill:
   1. For soils used below structural elements (such as: footings, slabs, pavements and mats), the portion of material passing the No. 40 sieve shall have a liquid limit not exceeding 40 and a plasticity index not exceeding 25 when tested in accordance with ASTM D4318.

2.02 TOPSOIL

A. On-Site Topsoil – Surface soil stripped and stockpiled on site and modified as necessary to meet the requirements specified herein. When available, topsoil must be existing surface soil stripped and stockpiled on the Site.

B. Off-Site Topsoil – Conform to requirements specified herein. Additional topsoil must be furnished by the Contractor.

C. Composition – Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than 1- inch diameter, brush, weeds, toxic substances and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.

D. Topsoil shall be of a quality at least equal to the existing topsoil in adjacent areas, free from trash, stones, debris and well suited to support plant growth.

2.03 SOIL CONDITIONS

A. All Materials encountered, regardless of type, character composition and condition shall be considered "unclassified" for the purpose of payment. Determine quantity of various materials to be excavated prior to submitting Bid. Rock encountered shall be handled at no extra cost to City.

2.04 WASTE MATERIALS

A. Waste materials, as described for purposes of this Section, consist of unsuitable materials such as: rock, surplus excavated material, demolition debris and other materials considered unacceptable for use as fill.

B. Waste materials shall not include environmental pollutants, hazardous substances, contaminated products, by-products, samples or waste materials of any kind that are regulated under environmental laws.

C. Dispose of Demolition Debris in accordance with Section 02190 – Demolition. Dispose of other waste materials in accordance with Paragraph DISPOSAL OF EXCAVATED MATERIALS.

2.05 BORROW MATERIALS

A. Suitable fill materials, granular materials and topsoil obtained from locations arranged for by Contractor (off the Site) are required to the extent sufficient suitable materials cannot be obtained from excavation and trenching.

B. Borrow materials shall not exhibit characteristics of high shrink or swell potential as determined from Atterberg limit tests (ASTM D4318) and/or swell tests (ASTM D4546) unless otherwise specified herein.

2.06 GRANULAR FILL MATERIAL

A. Granular fill material shall consist of crushed stone, sand and gravel or reclaimed asphalt or concrete. The aggregate shall not contain more than 15 percent deleterious

rock and shale. The fraction passing the No. 40 sieve shall have a plasticity index not to exceed six. Any sand, silt, clay and any deleterious rock and shale shall be uniformly distributed throughout the material.

B. Reclaimed asphalt or concrete materials meeting the requirements of aggregate must be approved for use by the City.

C. Granular fill material shall be in accordance with the following gradation requirements defined in Table 1 below:

Table 1. Gradation for Granular Fill Material

Sieve Size	Mass Percent Passing		
	MoDOT Type 5	KDOT Type AB-3	KCMO PW 2202**
2 inch		100	
1 ½ inch		95 to 100	
1 ¼ inch			100
1 inch	100		72 to 100
¾ inch		70 to 95	60 to 90
½ inch	60 to 90		
3/8 inch			43 to 74
No. 4	35 to 60	40 to 65	28 to 60
No. 8		30 to 55	
No. 10			16 to 40
No. 30	10-35		
No. 40		16 to 40	3 to 22
No. 200	0-15	8 to 20*	0 to 15**

* For Type AB-3, the fraction passing the No. 200 sieve shall not exceed ¾ of the fraction passing the No. 40 sieve.

** For KCMO PW 2200, the difference between Mass Percent Passing of successive sieve sizes shall not exceed 25%. That fraction of material passing the No. 40 sieve shall have a plasticity index not to exceed 8.

1. MoDOT Type 5 material shall conform to Missouri Department of Transportation, Standard Specifications for Highway Construction, Section 1007, Type 5 Aggregate.
2. KDOT Type AB-3 material shall conform to Kansas Department of Transportation, Standard Specification and Construction Manual, Division 1100, Aggregates.

2.07 GEOTEXTILE

A. Geotextile shall conform to the requirements of Section 02230 – Geotextiles.

2.08 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

A. See Section 02250 – Trenching, Pipe Embedment and Backfill.

PART 3 - EXECUTION

3.01 DEMOLITION

A. Demolition shall be conducted in accordance with Section 02190 – Demolition.

3.02 CLEARING AND GRUBBING

A. Perform clearing and grubbing, in accordance with Section 02180 – Clearing and Grubbing, as indicated and as required to perform the Work.

3.03 STRIPPING

A. Stripping shall consist of scraping areas clean of all brush, grass, weeds, roots and other materials.
B. Remove topsoil from areas within limits of excavation, trenching, borrow and areas designated to receive fill.
C. Strip to a minimum depth of 6 inches, but to a sufficient depth to remove excessive roots in heavy vegetation, unsuitable material or brush areas and as required to remove all soil containing organic material or segregate topsoil.
D. Stockpile topsoil in areas designated or approved by the City/Design Professional where it will not interfere with construction operations or existing facilities. Stabilize and protect stockpiles from runoff per the SWPPP plan.

3.04 GENERAL REQUIREMENTS FOR OPEN EXCAVATIONS

A. Excavations shall be restored to the level of the adjacent surfaces as soon as practicable.
B. Unsupervised or unprotected excavations are prohibited. The Contractor shall adhere to the City's no open excavation policy.
C. Protective Measures in Paved Areas:
    1. Excavations within paved areas shall be protected and secured in accordance with existing federal, state and local codes and standards. This includes, but not limited to, the most current edition of the Manual of Uniform Traffic Control Devices.
D. Protective Measures Unpaved Areas:
    1. Supervision – As a temporary measure, the Contractor may provide personnel to supervise an open excavation that is not otherwise protected. Supervision shall ensure that the public is protected and shall serve the same function as a protective cover or fencing. A protective cover or fencing shall be installed for all excavations that are not supervised.
    2. Protective Cover – A protective cover shall be installed over the excavation so that it can sustain the weight of any persons and/or objects placed upon it. The cover shall be of sufficient weight or fixed to the ground so it cannot be moved. Protective covers shall have no opening(s) or protuberance(s) of sufficient size to cause a fall or injury. Advance warning devices shall be installed as required by the City/Design Professional.
    3. Fencing – Any excavation that is not covered shall be fenced in so that it surrounds the entire excavation area and prevents entry. The fencing shall be a minimum of 42 inches in height. The fence shall be secured and upright at all times.
E. Inspection and Maintenance – Protective measures (coverings and fences) shall be inspected by the Contractor at least daily to assure integrity. Protective measures in heavy traffic areas shall be inspected more often as necessary.

F. Excavation permits shall be secured prior to starting the work.

3.05 EXCAVATION

A. Excavations shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms.
B. In no case shall excavation faces be undercut for extended footings.
C. Subgrade surfaces shall be clean and free of loose material of any kind when concrete is placed thereon.
D. Classification of Excavated Materials – No classification of excavated materials will be made. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition or condition thereof.

3.06 BLASTING

A. Unless otherwise noted in Section 01015 – Specific Project Requirements, blasting or other use of explosives for excavation will not be permitted
B. If allowed, blasting shall conform to all applicable ordinances, rules, regulations, permit requirements including Kansas City, Missouri Ordinance 180591 and the Missouri Blasting and Safety Act.
C. Contractor shall provide a plan for pre-blast surveys, monitoring during blasting and post blast surveys to City prior to use of explosives.
D. All existing safety regulations, permits, laws and ordinances regarding the storage, transportation and use of explosives shall be observed.
E. Blasting will be permitted only when proper precautions are taken for the protection of all persons, the work, private property and public utilities from damage or injury. Any damage done by blasting will be repaired by the Contractor at no additional cost to the City.

3.07 DEWATERING

A. Dewatering equipment shall be provided to remove and dispose of all surface water and groundwater entering excavations, trenches or other parts of the Work.
B. To prevent damage from hydrostatic pressure, flotation or other cause, all excavations shall be protected and kept dry during subgrade preparation and continually thereafter until the structure is built or the pipe is installed and the area is backfilled.
C. All excavations for concrete structures or trenches which extend down to or below groundwater shall be dewatered by lowering and keeping the groundwater level beneath such excavations 12 inches or more below the bottom of the excavation.
D. Surface water shall be diverted or otherwise prevented from entering excavations or trenches to the greatest extent possible without causing damage to adjacent property.
E. If the material within the excavation becomes unsuitable or unstable as a result of the Contractor's inability to implement adequate surface diversion or dewatering measures, then the Contractor shall remove unsuitable materials and replace with approved compacted fill material as directed by City and at no additional cost to the City.
F. Surface water and groundwater that contains silt and soil shall not be disposed of without pre-treatment.
G. The Contractor is responsible for the condition of any pipe, conduit or drainage way which is utilized for drainage purposes. Any such pipe, conduit or drainage way utilized shall be left clean and free of sediment.

3.08 SHEETING AND SHORING

A. The Contractor shall provide all shoring, bracing, cribbing, trench boxes, underpinning and sheeting as necessary to support excavations.

B. The Contractor shall provide a Sheeting and Shoring Plan that includes provisions that will accomplish the following:
   1. Prevent undermining of pavements, foundations and slabs.
   2. Prevent slippage or movement in banks or slopes adjacent to the excavation.
   3. Allow for the abandonment of shoring and sheeting materials in place in critical areas as the Work is completed. In these areas, backfill the excavation to within 3 feet of the finished grade and remove the remaining exposed portion of the shoring before completing the backfill.
   4. Except where banks are cut back on a stable slope, excavations for structures shall be supported as necessary to prevent caving or sliding.
   5. Excavations shall provide adequate working space and clearances for the Work to be performed.
   6. Undercutting of excavation faces is prohibited.

3.09 BACKFILL AND COMPACTION

A. See Section 02250 – Trenching, Pipe Embedment and Backfill for additional requirements.

B. Fills and embankments shall be constructed to the lines and grades indicated on the Drawings, using suitable material or as specified in Section 01015 – Specific Project Requirements.

C. Weather Limitations – Construction of fills and embankments during freezing weather shall not be done except by permission of the City/Design Professional. No fill or embankment materials shall be installed on frozen surfaces, nor shall froze material, snow or ice be placed in the fill or embankment.

D. To the extent possible, excess suitable material obtained from trench excavation can be used for the construction of fills and embankments. Additional material shall be provided as required.

E. After preparation of the fill or embankment site, the subgrade shall be leveled and rolled so that surface materials of the subgrade will be compacted and well bonded with the first layer of the fill or embankment and for subsequent layers.

F. All fill and embankment materials shall be placed in layers not to exceed 8 inches in un-compacted thickness.

G. Material deposited in piles or rows by excavating and hauling equipment shall be spread and leveled before compacting.

H. No shale particles, rock, gravel or stone with any dimension greater than 2 inches shall be placed in the upper 18 inches of any fill or embankment. Rocks or stones within the allowable size limit may be incorporated in the remainder of fills and embankments, provided they are distributed so that they do not interfere with proper compaction.

I. The material in each layer shall be wetted or dried as required and thoroughly mixed to ensure uniform moisture content and adequate compaction. Each layer shall be thoroughly compacted as follows:
   1. Unpaved Areas:
      (a) 90% of maximum dry density at moisture content range from 3% below optimum to 2% above optimum as determined by ASTM D698.
      (b) If the material fails to meet the density specified, compaction methods shall be altered.

2. Paved Areas:
   (a) All subgrades below paved area and within 1 foot of a paved areas shall be compacted to 95% of maximum dry density at moisture content range from 3% below optimum to 2% above optimum as determined by ASTM D698 for the subgrade 1 foot outside of paved areas.
   (b) If the material fails to meet the density specified, compaction methods shall be altered.
3. Project specific requirements for backfill and compaction may be modified in Section 01015 – Specific Project Requirements.

J. Trenches in Embankments – Wherever a trench is to pass through a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation not less than 36 inches above the top of pipe elevation before the trench is re-excavated.

K. Unless otherwise specified in Section 01015 – Specific Project Requirements, trenches and pipes that pass through a water-containing embankment shall eliminate the granular embedment material and the trench bottom shall be graded to provide uniform and continuous support for the pipe. The pipe shall be embedded in embankment material containing no rocks, stones or other pervious material. The embedment material shall be compacted as specified for the embankment.

3.10 GRANULAR FILLS

A. See Section 02250 – Trenching, Pipe Embedment and Backfill for additional requirements.

B. Granular fill material shall be provided where indicated on the drawings.

C. Granular fill material shall be placed on suitably prepared subgrades and compacted by vibration.

D. Backfill and Compaction – The material in each layer shall be wetted or dried as required and thoroughly mixed to ensure uniform moisture content and adequate compaction. Each layer shall be thoroughly compacted with a vibratory compactor to 95% of maximum dry density at moisture content range from 3% below optimum to 2% above optimum as determined by ASTM D698.

E. If the material fails to meet the density specified, compaction methods shall be altered.

F. Where granular fills are to be covered with concrete, the top surface shall be graded to the required subgrade.

3.11 FIELD QUALITY CONTROL

A. See Section 02250 – Trenching, Pipe Embedment and Backfill for additional requirements.

B. Compaction Tests:
1. Two initial gradation tests shall be made for each type of embedment, fill and backfill material used and one additional gradation test shall be made for each additional 500 tons of each material. At the sole expense of the Contractor, moisture-density (Proctor) tests, relative density tests on the materials and all in-place field density tests shall be performed by the Contractor. All tests performed shall be done in accordance with ASTM D698.
2. The method of in-place compaction testing including density and moisture content shall be as follows:

(a) Density - Cohesive materials: ASTM D2167, ASTM D1556 or ASTM D6938.
(b) Density - Cohesion-less materials: ASTM D6938.
(c) Moisture Content: ASTM D6938.

3. The minimum frequency of in-place compaction testing including density and moisture content will be as follows:
   (a) At least one test for every 2,000 cubic yards of material placed in a mass fill.
   (b) At least one test when the City suspects the quality of moisture control or effectiveness of compaction.
4. Any material/fill failing to meet required densities shall be removed, replaced and compacted as necessary to achieve specified results.
5. Removal of in-place material and replacement with approved new material will be required if scarifying and re-compaction do not produce the required densities.

3.12 EQUIPMENT

A. The Contractor shall utilize appropriate equipment to obtain the compaction requirements specified. Acceptable equipment includes, but is not limited to, the following:
   1. Tamping Rollers.
   2. Pneumatic Rollers.
   3. Vibratory Rollers.
   4. Other methods that have been tested and have been shown to meet the specified compaction rates.

B. Power tampers or rammers shall be used for the compaction of material in areas where it is impractical or unsafe to use heavy equipment or as recommended by the City.

C. Vibratory plate compactors, manual or attached to excavation equipment, may be used for consolidation of embedment and compaction of granular fill in areas where it is impractical or unsafe to use heavy equipment or as recommended by the City.

D. All compaction equipment is subject to the approval of the City/Design Professional.

3.13 FINAL GRADING AND PLACEMENT OF TOPSOIL

A. After all trenching, backfilling, compaction and embankments to be constructed have been rough graded, all areas shall be final graded to the indicated elevations, slopes and contours.

B. All cuts, fills, embankments and other areas which have been disturbed or damaged by construction operations shall be surfaced with at least 6 inches of topsoil to meet final grade.

C. Use of graders or other power equipment will be permitted for final grading and dressing slopes, provided the result is uniform and equivalent to manual methods.

D. All surfaces shall be graded to provide effective drainage. Unless otherwise indicated, a slope of at least 1 percent shall be provided.

E. Final grade shall be smooth, even and free from clods, rocks, stones, weeds, brush and other debris.

3.14 DISPOSAL OF EXCESS EXCAVATED MATERIALS

A. Except as otherwise permitted, all excess excavated materials shall be disposed of off-site.

B. Demolition Debris, see Section 02190 – Demolition.

C. Rock – Excavated rock in excess of the amount permitted to be installed in trench backfill (see Section 02250 – Trenching, Pipe Embedment and Backfill) shall be disposed of off-site.
D. Other Debris – Waste material and other debris encountered in during excavation shall be disposed of off-site.
E. The disposal of waste and surplus excavated materials, including hauling, handling and grading is incidental to Earthwork. No separate measurement or payment shall be made.

3.15 SEEDING AND SODDING

A. All areas disturbed by the Contractor's operations shall be seeded or sodded according to the requirements of Section 02930 – Seeding or Section 02931-Sodding.

3.16 SETTLEMENT

A. The Contractor is solely responsible for all settlement which may occur within the correction period (as stipulated in the General Conditions and Supplementary Conditions). Within 30 days after notice from the City, the Contractor shall make all settlement repairs and the associated restoration caused by correcting the settlement.

END OF SECTION

SECTION 02230 – GEOTEXTILES

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers the furnishing of all labor, materials and equipment for the placement of geotextiles. This section is suitable for applications where the geotextile is used as a separation material to prevent mixing of dissimilar material and to control migration of backfill material through granular pipe embedment and joints in structural elements. Applications include, but are not limited to, the following:
   1. Geotextile above granular drainage layers.
   2. Geotextile below granular drainage layers.
   3. Geotextile around granular pipe embedment.
   4. Geotextile above the cover soil.
   5. Geotextile below the cohesive material layer.
   6. Geotextile as a bedding material for riprap.

B. This section does not cover geotextiles used for temporary silt fence, permanent erosion control, erosion control blankets, turf reinforcement mats or pavement applications.

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 02200 – Earthwork.
C. Section 02250 – Trenching, Pipe Embedment and Backfill.
D. Section 02273 – Riprap.

1.04 CODES AND STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

B. American Association of State Highway and Transportation Officials (AASHTO):

AASHTO M288	Standard Specification for Geotextile Specification for Highway Applications.

C. American Society for Testing and Materials (ASTM):

ASTM D4873	Standard Guide for Identification, Storage and Handling Geotextile Rolls and Samples.

1.05 SUBMITTALS

A. Submit as specified in Section 01300 – Submittals.
B. Product Data submittals:
   1. Geotextile Material:
      (a) 12-inch square sample of fabric.
      (b) Manufacturer's descriptive product data.

(c) Manufacturer's installation instructions.

C. Certificates submittals:
   1. Geotextile Material – Furnish manufacturer's certification for each lot of material furnished. Certificate shall state the name of the manufacturer and the chemical composition of all materials, filaments or yarns used to manufacture. The Certificate shall state that the material supplied is in accordance with this specification. The certification shall also include the results of tests from specific lots for all specified requirements. Additionally, the certification shall contain a statement by the manufacturer that the material meets the requirements of AASHTO M288 and the Class/Classes specified for the project.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store and handle geotextiles according to ASTM D4873. Do not use torn or punctured geotextiles.
B. Receive, store and handle geotextile materials as recommended by manufacturer.
C. Completely cover all materials while being stored on-site.
D. Damaged material shall be cut out and removed from the site.

PART 2 - PRODUCTS

2.01 GEOTEXTILE

A. A fibrous filter fabric shall be installed below the bedding material to increase soil stabilization.
B. Geotextile shall be manufactured with new, high quality materials designed specifically for filtering out soil fines while maintaining good drainage characteristics.
C. Geotextile shall be manufactured and packaged so as to be free of tears, punctures and contamination by foreign matter. Any such defect found in the material on-site shall be repaired or replaced in accordance with the manufacturer's recommendations.
D. Geotextile shall be woven or nonwoven, polyester or polypropylene material that complies with the physical and geotextile property requirements for subsurface drainage, separation and stabilization in accordance with AASHTO M288.
   1. Subsurface Drainage Geotextile:
      (a) Subsurface drainage geotextile shall be used as a filter to protect drainage media from clogging with fines from adjacent soil. Typical applications include the lining of drainage trenches and the wrapping of drain pipes.
      (b) The minimum permittivity shall be 1.0 sec-1.
      (c) Material shall be AASHTO M288, Class 2.
   2. Separation Geotextile:
      (a) Separation geotextile shall be used as a material to prevent the mixing of dissimilar material and to control migration of backfill material through granular pipe embedment or joints in structural elements. Additionally, separation geotextiles shall be used as a bedding material/filter layer for riprap.
      (b) The minimum permittivity shall be 1.0 sec-1.
      (c) The material shall be AASHTO M288, Class 1.
E. The type of geotextile (either woven or nonwoven) shall be as indicated on the Drawings or as specified in Section 01015 – Specific Project Requirements.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

A. Prepare subgrade in accordance with Section 02200 – Earthwork or Section 02273 – Riprap.
B. All surfaces to be lined shall be smooth, free of all debris, foreign material and sharp objects.
C. All surfaces to be lined shall have a firm foundation with no sharp or abrupt breaks in grade.
D. Do not place fabric on snow or standing water. Prior to fabric installation, all surfaces to be lined shall be dry – free of standing water and surface moisture.

3.02 INSTALLATION

A. Install geotextile on prepared surfaces following procedures specified herein and in accordance with the manufacturer's installation instructions.
B. Unroll panels as close to their final position as possible.
C. Filter fabric joints shall be lapped in accordance with the manufacturer's installation instructions, but not less than least 3 feet.
D. A minimum 2 percent slack shall be provided in both directions.
E. Fabric shall be installed in conformity with all other manufacturer's requirements.
F. Adhere to the following stipulations while working with or near geotextile fabric:
    1. Smoking is prohibited.
    2. Remove all glass, metal and other sharp objects from the application area.
    3. No construction installation equipment shall pass over any exposed fabric.
    4. Geotextile shall be covered within 5 calendar days after placement.
    5. As applicable, the placement of cover soil shall be by low pressure equipment (2-4 psi). Place cover soil in the direction of the seam overlaps and in a manner that does not pull, separate or puncture the geotextile. Spreading equipment and hauling equipment shall not make sudden stops or sharp turns when spreading cover soil over the geotextile.

3.03 INSTALLATION FOR TRENCH APPLICATIONS

A. See Section 02250 – Trenching, Pipe Embedment and Backfill for additional requirements.

END OF SECTION

SECTION 02250 – TRENCHING, PIPE EMBEDMENT AND BACKFILL

PART 1 - GENERAL

1.01 SUMMARY

A. This section specifies requirements for trench excavation, pipe embedment, backfill and compaction for the installation of water, sanitary sewer and storm water piping.

1.02 SPECIFICATION MODIFICATIONS

A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise modified in the Contract Documents.

1.03 RELATED SECTIONS

A. Section 01000 – General Project Requirements.
B. Section 01015 – Specific Project Requirements.
C. Section 02180 – Clearing and Grubbing.
D. Section 02190 – Demolition.
E. Section 02200 – Earthwork.
F. Section 02230 – Geotextiles.
G. Section 02575 – Surface Restoration.
H. Section 02930 – Seeding.
I. Section 02931 – Sodding.

1.04 CODES AND STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
B. American Society for Testing and Materials (ASTM):

ASTM C33	Standard Specification for Concrete Aggregates.
ASTM C150	Standard Specification for Portland Cement.
ASTM C494	Standard Specification for Chemical Admixtures for Concrete.
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
ASTM C940	Method of Determination of Purity by Measurement of Freezing Points.
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft3).
ASTM D4253	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
ASTM D4254	Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

ASTM D4832	Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.05 DEFINITIONS

A. Paved Areas – Areas for which the final surfacing will be traffic-bearing surface treatments such as street pavement, shoulders, driveways, parking lots, curbs, gutters, gravel roads or other surface treatments for traffic (pavers, etc…). Sidewalks and trails are excluded from the definition.
B. Unpaved Areas – Areas for which the final surfacing will not be a Paved Area.
C. Downtown Loop – The area of the city bounded on the north by Interstate 70, on the east by U.S. 71, on the south by Interstate 670 and on the west by Interstate 35.

1.06 INFORMATION PROVIDED BY THE CITY

A. As provided in the Contract Documents.

1.07 SUBMITTALS

A. Submit as specified in Section 01300 – Submittals.
B. Shop Drawings:
   1. Sheeting and Shoring Design – Contractor shall submit, in accordance with 29 CFR Past 1926 - OHSA Subpart P - Excavations and Trenches, a shoring design sealed by a registered professional engineer in the State of Missouri for all excavations greater than twenty (20) feet in depth prior to excavation. Submittal will be for informational purposes only.
C. Testing Reports:
   1. Laboratory testing results for proposed Borrow Materials.
   2. Laboratory testing results and quarry control reports for Granular Material.
   3. Laboratory testing results for and quarry control reports Granular Bedding.
   4. Laboratory testing results for compression testing of CLSM.
   5. Moisture-density (Proctor) test results.
   6. In-Place Density test results.
D. Other Submittals:
   1. Commercial Laboratory – submit name, contact information and certification of the commercial testing laboratory required by paragraph QUALITY ASSURANCE.
   2. Mix Design for CLSM.
   3. Concrete Plant – submit the name and location of the concrete plant which will provide the CLSM.

1.08 QUALITY ASSURANCE

A. The Contractor is responsible for the quality assurance and quality control of the Work.
B. Sampling and Testing:
   1. Tests to determine conformance with all requirements of this Specification and for the quality and properties of all Contractor provided materials, including borrow materials proposed for use. The aforementioned testing shall be performed by an independent, state-certified, commercial laboratory retained and compensated by the Contractor and approved by the City.

2. All work associated with QUALITY ASSURANCE shall be included in the Bid Price and will be incidental to the Work.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Stockpile materials in other areas or offsite when adjacent structures, easement limitations or other restrictions prohibit storage adjacent to the Work.
B. Offsite areas shall be arranged for by the Contractor in accordance with Section 01000 – General Project Requirements.
C. Granular fill and granular bedding material shall be stored so that it is protected from freezing and significant changes in moisture content.

PART 2 - PRODUCTS

2.01 MATERIALS ENCOUNTERED

A. Suitable Materials – As defined by, Section 02200 – Earthwork, paragraph MATERIALS ENCOUNTERED.
B. Unsuitable Materials – As defined by, Section 02200 – Earthwork, paragraph MATERIALS ENCOUNTERED.
C. Topsoil – As defined by, Section 02200 – Earthwork, paragraph MATERIALS ENCOUNTERED.
D. Rock – Unless otherwise specified in Section 01015 – Specific Project Requirements, all Materials encountered, regardless of type, character composition and condition shall be considered "unclassified" for the purpose of payment. Contractor shall determine the quantity of various materials to be excavated prior to submitting their Bid. Rock encountered shall be excavated at no extra cost to City.

2.02 WASTE MATERIALS

A. As defined by, Section 02200 – Earthwork, paragraph WASTE MATERIALS.

2.03 BORROW MATERIALS

A. As defined by, Section 02200 – Earthwork, paragraph BORROW MATERIALS.

2.04 GRANULAR BEDDING

A. Granular bedding for pipe bedding or embedment shall be clean crushed rock with not less than 95 percent passing a ½-inch sieve and not more than 5 percent passing a #No. 4 sieve. The gravel mixture shall contain no clay lumps or organic matter. The fraction passing the No. 4 sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 5 when tested in accordance with ASTM D4318.
B. Granular bedding material shall contain no cinders, clay lumps or other material which may cause pipe corrosion.

2.05 JOB EXCAVATED MATERIAL

A. Material excavated from the trench.
B. Meets the requirements of suitable material, except that it may include shale particles gravel or stone with any dimension up to 2 inches.

2.06 GRANULAR FILL MATERIAL

A. Granular Fill Material shall be as defined by, Section 02200 – Earthwork, paragraph GRANULAR FILL MATERIAL.

2.07 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

A. Materials:
   1. Portland cement Type I or Type II conforming to ASTM C150.
   2. Fly ash conforming to ASTM C618 for Class C.
   3. Fine aggregate conforming to ASTM C33.
   4. Water, clean and potable conforming to ASTM C1602.
   5. Shrinkage compensation shall be proportioned in accordance with the manufacturer's recommendations and as tested by ASTM C940.
   6. Admixtures for air entrainment or for other purposes shall conform to ASTM C494 or other appropriate standards referenced by the manufacturer. Admixtures shall only be used when specified in the Contract Documents.

B. Mixture Design:
   1. Mix design for CSLM shall meet the requirements of Kansas City Public Works Department Specification Section 2600, except that the maximum compressive strength shall be from 50 to 125 psi and shall be removable without using a breaker and without damaging the utility.
   2. The unit weight of the CLSM shall be a maximum of 120 pounds per cubic foot.

C. Quality Control:
   1. CLSM material shall be provided from a City-approved concrete plant. Contractor shall submit name and location of plant to be used.
   2. One set of cylinders for compressive strength testing shall be obtained once per day or for every 100 cubic yards of flowable backfill placed.
   3. Cost for Quality Control shall be included in the Bid Price. No separate measurement or payment shall be made.

2.08 TOPSOIL

A. Topsoil shall be as defined by Section 02200 – Earthwork.

PART 3 - EXECUTION

3.01 DEMOLITION

A. Demolition shall be conducted in accordance with Section 02190 – Demolition.
B. Waste materials resulting from the cutting of pavement shall be considered demolition debris and disposed in accordance with Section 02190 – Demolition.

3.02 PAVEMENT REMOVAL AND RESTORATION

A. See additional requirements in Section 01000 – General Requirements, paragraph CUTTING AND PATCHING.
B. Public Right of Way:
   1. Kansas City, Missouri Public Works Department Standard Detail SR-1, Street Cut Restoration is hereby incorporated by reference.
   2. See Section 01015 – Specific Project Requirements for additional detail.
C. Other Pavement Cut and Restoration:
   1. Removal and replacement on private property shall be done in accordance with paragraph STREET CUT RESTORATION.
   2. Pavement removal shall be no larger than necessary to provide adequate working space for the proper installation of pipe and appurtenances.
   3. Pavement removal for connections to existing lines or structures shall not exceed the extent necessary for their installation.

4. Where the trench parallels the length of concrete walks and the trench location is all or partially under the walk, the entire walk shall be removed and replaced. Where the trench crosses drives, walks, curbs or other hard surfaces, the hard surfaces shall be removed and subsequently replaced between existing joints or between saw cuts as specified for pavement.

D. Driveways:
   1. Demolition and restoration of driveways will be as indicated in Section 01015 – Specific Project Requirements or as shown on the Drawings.

3.03 CLEARING AND GRUBBING

A. Perform clearing and grubbing as indicated or as necessary to perform excavation or trenching.
B. Clearing and grubbing shall conform to Section 02180 – Clearing and Grubbing.

3.04 STRIPPING

A. Stripping shall conform to the requirements of Section 02200 – Earthwork, paragraph STRIPPING.

3.05 GENERAL REQUIREMENTS FOR OPEN EXCAVATIONS

A. See Section 02200 – Earthwork for additional requirements on open excavations.

3.06 BLASTING

A. Blasting is prohibited unless approved by the City. If approved, Blasting shall conform to the requirements of Section 02200 – Earthwork, paragraph BLASTING.

3.07 DEWATERING

A. Dewatering of trench excavations shall conform to the requirements of Section 02200 – Earthwork, paragraph DEWATERING.

3.08 SHEETING AND SHORING

A. Sheeting and shoring for trench excavations shall conform to the requirements of Section 02200 – Earthwork and as specified herein.
B. Excavations shall provide adequate working space and clearances for the Work to be performed.
C. In no case shall excavation faces be undercut for extended footings. Trench sheeting shall be removed only if the pipe strength is sufficient to carry trench loads based on the trench width to the back of sheeting. Trench sheeting shall not be pulled until backfilling is completed.
D. With the written approval from the City, sheeting may be left permanently in the trench. Where trench sheeting is left in place, such sheeting shall not be braced against the pipe, but shall be supported in a manner which will preclude concentrated loads or horizontal thrusts on the pipe. Cross braces installed above the pipe to support sheeting may be removed after pipe embedment has been completed.

3.09 TRENCH EXCAVATION

A. Classification of Excavated Materials – No classification of excavated materials will be made. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition or condition.

B. No more trench shall be opened than is necessary to expedite the work. Except where tunneling is indicated on the Drawings, specified or permitted by the City, all trench excavation shall be open cut.

C. Alignment, Grade and Minimum Cover:
   1. The alignment, grade and elevation of each pipeline shall be as indicated on the Drawings.
   2. Trenches for waterlines shall be excavated to a depth sufficient to provide a minimum of 42 inches of pipe cover. Sixteen inch and larger diameter water lines shall be installed with a minimum of 60 inches of pipe cover.
   3. Greater pipe cover depths may be necessary on vertical curves or to provide necessary clearance for air release vaults, existing pipes, conduits, drains, drainage structures or other obstructions.

D. Limiting Trench Widths:
   1. Trenches shall be excavated to a width which will provide adequate working space and sidewall clearances for proper pipe installation, jointing and embedment. Minimum trench widths shall be as follows:

Table 1. Ductile Iron Pipe (DIP) and Polyvinyl Chloride (PVC) Pipe and High-Density Polyethylene Pipe (HDPE)

Pipe Size (inches)	Min. Trench Width in Earth (inches)	Max. Trench Width in Earth (inches)	Min. Trench Width in Rock (inches)
4	18	24	18
6	24	30	24
8	26	32	26
12	28	34	28
16	34	40	34
20	38	44	38
24	42	48	42
≥ 27	O.D. plus 24	O.D. plus 30	O.D. plus 24

O.D. = Outside Diameter

Table 2. Prestressed Concrete Cylinder Pipe (PCCP) and Reinforced Concrete Pipe (RCP)

Pipe Size (inches)	Min. Trench Width in Earth (inches)	Max. Trench Width in Earth (inches)	Min. Trench Width in Rock (inches)
16	36	44	36
20	40	50	40
24	44	56	48
≥ 27	2 * O.D.	(2 * O.D.) + 12	(2 * O.D.) – 12

O.D. = Outside Diameter

E. Mechanical Excavation:
   1. The use of mechanical equipment will not be permitted in locations where its operation would cause damage to trees, buildings, culverts, adjoining property, utilities or other structures above or below ground. In all such locations, hand excavating methods shall be used.
   2. Mechanical equipment used for trench excavation shall be of a type, design and construction and operated so that the rough trench excavation bottom elevation can be controlled and that trench alignment is such that pipe, when accurately laid to the specified alignment will be centered in the trench with adequate sidewall clearance. Undercutting the trench sidewall to obtain sidewall clearance is not permitted.

F. Excavation Below Pipe Subgrade – The trench bottom shall be over excavated below the proposed pipe, as indicated in 02250-1 and 02250-2 of this Section, to provide for the installation of granular embedment.

G. Foundations in Trenches:
   1. Whenever unsuitable or unstable soil conditions are encountered, trench subgrades shall be over-excavated until the trench subgrade is suitable as determined by the City/Design Professional.
   2. Adjustments may be made in the Contract Price in accordance with the provisions of the General Conditions.

H. Bell Holes:
   1. Bell holes shall provide adequate clearance for tools and methods used in installing pipe.
   2. No part of any bell or coupling shall be in contact with the trench bottom, trench walls or granular embedment when the pipe is jointed. Place embedment around the joint connection after joining the pipe.

3.10 TRENCH SUBGRADE

A. Subgrades for trench bottoms shall be firm, dense and thoroughly compacted and consolidated.

B. Protect and maintain the trench subgrade when natural suitable materials are encountered.

C. Remove rock fragments and materials disturbed during excavation and stripped from trench walls.

D. Subgrades shall be free from mud and muck and shall be sufficiently stable to remain firm and intact.

3.11 FOUNDATION

A. Description – A foundation is necessary when the native soils are unsuitable. For such a condition, the trench shall be over-excavated and a layer of supportive material shall be placed and compacted to provide a firm foundation for the subsequent pipe embedment material.

B. The Foundation layer is shown on 02250-1 and 02250-2.

C. Subgrades for trench bottoms which are otherwise solid, but which become mucky on top due to construction operations, shall be reinforced with trench stabilization material.

D. Material – If the trench foundation is an unsuitable foundation for the pipe, the Contractor shall submit a plan, to the City/Design Professional for review and approval, to include the proposed material to be used for the foundation.

E. Layer Thickness – Unsuitable material shall be over-excavated until the trench subgrade is suitable as determined by the City/Design Professional.

F. Bedding:

1. Description – A layer of supportive compacted material to provide even support of the pipe at the grade indicated on the Drawings.
2. The Bedding layer is shown on 02250-1 and 02250-2.
3. Material – Granular Bedding.
4. Layer Thickness:
   (a) A minimum of 3 inches below the pipe or pipe bell when the pipe is placed on a foundation or suitable material.
   (b) A minimum of 6 inches below the pipe or pipe bell when the pipe is placed on rock.

3.12 HAUNCHING

A. Description – Extends from the bottom of the pipe to the spring line of the pipe. Haunching provides the most resistance to pipe deflection.

B. The Haunching layer is shown on 02250-1 and 02250-2.

C. Material – Granular Bedding.

D. Layer Thickness – One half the outside diameter of the pipe or pipe bell.

3.13 INITIAL BACKFILL

A. Description – Extends from the spring line of the pipe to a point above the top of the pipe.

B. Bedding Material:
   (a) Class A Bedding – Granular Bedding.

3.14 FINAL BACKFILL

A. Description – The zone from the top of the Initial Backfill to the bottom of final surfacing.

B. The Haunching layer is shown on 02250-1 and 02250-2.

C. Material:

1. Paved Areas within the Downtown Loop – For areas where the final surfacing is a paved area, the final backfill shall be Controlled Low Strength Material (CLSM).
2. Paved Areas – For areas where the final surfacing is a paved area, the final backfill shall be Granular Fill Material. CLSM may be substituted for Granular Fill Material as approved by the City or as indicated in the Contract Documents.
3. Unpaved Areas:
   (a) For areas where the final surfacing is an unpaved area, the final backfill material shall be a suitable material.
   (b) Where the pipe cover is 8 feet or more, job excavated material may be used as backfill if the following requirements are met:
      (i) The final surfacing is unpaved.
      (ii) The minimum clearance from the top of the initial backfill is 36 inches or 42 inches from the top of the pipe.
      (iii) The job excavated material shall not be placed within 18 inches of the finished grade.

D. Layer Thickness – Varies with pipe depth.

3.15 EMBEDMENT

A. Class A Embedment shall be used for all pipes.

3.16 BACKFILL PLACEMENT

A. Granular Bedding and Granular Fill Material shall be placed in lifts not exceeding 12 inches in loose thickness.
B. Suitable Material shall be placed in lifts not exceeding 12 inches in loose thickness.
C. Bedding – Bedding Granular bedding material shall be spread and the surface graded to provide a uniform and continuous support beneath the pipe at all points between bell holes or pipe joints. It is permissible to slightly disturb the finished subgrade surface by the withdrawal of the pipe sling or other lifting tackle.
D. Haunches:
    1. After each pipe has been graded, aligned and placed in final position on the bedding material and shoved home, sufficient pipe embedment material shall be deposited and compacted by shovel slicing or chalking under the pipe haunches on each side of the pipe and back of the bell or end thereof to hold the pipe in proper position and alignment during subsequent pipe jointing and embedment operations.
    2. Care shall be taken to protect protective pipe coatings or wraps. If coating or wrapping is damaged, then the Contractor shall repair or replace the coating to the satisfaction of the City at no additional cost to the City.
    3. Haunching and initial backfill material shall be deposited uniformly and simultaneously on each side of the pipe to prevent lateral displacement.
E. Weather Limitations – Backfilling of trenches during freezing weather shall not be done except by permission of the City. No backfill materials shall be installed on frozen surfaces, nor shall froze materials, snow or ice be placed in the trench.
F. Pipe Encasements – A layer of backfill material not more than 8 inches deep may be placed over concrete arch encasement or concrete reaction blocking after the concrete has reached its initial set, to aid curing. No additional backfill shall be placed over arch encasement or blocking until the concrete has been in place for at least 3 days.
G. Use of Geotextile Material:
    1. Where indicated on the Drawings, migration of soil into the embedment material shall be prevented with geotextile fabric.
    2. Geotextile material shall conform to Section 02230 – Geotextiles, paragraph GEOTEXTILES on Subsurface Drainage, unless otherwise indicated on the Drawings or in Section 01015 – Specific Project Requirements.
    3. Geotextile shall be placed on the trench surfaces so that it completely surrounds the embedment material. Joints shall be lapped 12 inches.

3.17 COMPACTION

A. Granular Bedding – Vibratory compactors and shovel slicing under the haunches of the pipe.
B. Granular Fill Material – The material in each layer shall be wetted or dried as required and thoroughly mixed to ensure uniform moisture content. Each layer shall be thoroughly compacted, utilizing a vibratory compactor, to achieve the minimum allowable density of 95% of the maximum dry density (at moisture content range from 3% below optimum to 2% above optimum as determined by ASTM D698). If the granular fill material fails to meet the minimum 95% density specified, the material shall be removed and compacted to achieve 95% or greater.
C. CLSM – Not applicable.

D. Suitable Material:
   1. Cohesive Materials – As required to obtain 95% maximum dry density in accordance with ASTM D698 with a moisture content range from 3% below optimum to 2% above optimum.
   2. Cohesion-less Materials – As required to obtain not less than 85% relative density as determined by ASTM D4253 and ASTM D4254.

E. Job Excavated Material – Where job excavated material is used for trench backfill, the Contractor shall use compaction methods to ensure that settlement does not occur within the limits of trench excavation. The Contractor shall repair settlement as directed by the City at any time during the Work or at any time during the warranty period. Repairs shall be made at no additional cost to the City.

3.18 FINAL SURFACING

A. Final surfacing shall be indicated on the Drawings.
B. For unpaved areas, see Section 02200 – Earthwork, paragraph FINAL GRADING AND PLACEMENT OF TOPSOIL.

3.19 DITCH CHECK

A. Continuity of embedment material shall be interrupted by low permeability groundwater barriers to impede passage of groundwater through the embedment.
B. Materials:
   1. Unpaved Areas – Suitable material classified as GC, SC, CL or ML-CL as defined in Section 02200 – Earthwork, paragraph MATERIAL ENCOUNTERED. Barriers shall be compacted to 95% maximum dry density in accordance with ASTM D698 with a moisture content range from 3% below optimum to 2% above optimum.
   2. Paved Areas – CLSM.
C. Barriers shall be constructed the full depth of the trench and shall include the foundation, bedding, haunching, initial backfill and final backfill zones of the trench.
D. Barriers shall be the full width of the trench excavation and 3 to 5 feet in length measured along the pipe.
E. Barriers shall be placed in the trench at intervals as shown on the Drawings or as directed by City/Design Professional. Unless otherwise specified by the City/Design Professional or specified in Section 01015 – Specific Project Requirements, the spacing of the groundwater barriers shall not exceed 250 feet.
F. The installed location of all groundwater barriers shall be noted on the Field Mark-Up Drawing and Construction Record Drawing.
G. Construction of the groundwater barriers shall be incidental to trenching and backfilling. No separate measurement or payment will be made.

3.20 SPECIAL REQUIREMENTS

A. For trench excavation within paved areas that required full depth and width pavement replacement, refer to additional instruction in Section 01015 – Specific Project Requirements.
B. Suitable materials shall be approved by the City/Design Professional prior to backfill.
C. Granular Fill Material may be used for final backfill in unpaved areas to within 18 inches of the final graded surface at the option of the Contractor.

3.21 DRAINAGE MAINTENANCE

A. To the greatest extent practical, open trench excavations shall be protected from surface water. The Contractor shall conduct the Work in a manner that diverts surface water away from the open excavation.
B. Trenches across roadways, driveways, walks or other trafficways adjacent to drainage ditches or watercourses shall not be backfilled prior to completion of backfilling the trench on the upstream side of the trafficway to prevent impounding water after the pipe has been laid.
C. Bridges and other temporary structures required to maintain traffic across such unfilled trenches shall be constructed and maintained by the Contractor.
D. Backfilling shall be done so that water will not accumulate in unfilled or partially filled trenches.
E. All material deposited in roadway ditches or other water courses crossed by the line of trench shall be removed immediately after backfilling is completed; and the original cross section, grade and contour of the ditches or watercourses shall be restored.
F. Surface drainage shall not be obstructed longer than necessary.
G. If the trench subgrade becomes unsuitable or unstable after the trench is excavated and as a result of the Contractor's inability to meet the requirements for DRAINAGE MAINTENANCE, then the Contractor shall over-excavate the unsuitable material and construct a foundation to the satisfaction of the City/Design Professional and at no additional cost to the City.

3.22 FIELD QUALITY CONTROL

A. Compaction Tests:
    1. All tests shall conform to ASTM D6938. All tests required shall be made by an approved independent testing laboratory.
    2. Two initial gradation tests shall be made for each type of embedment, fill and backfill material.
    3. Storm and Sanitary Sewer Installations:
        (a) Unless otherwise specified in Section 1015 – Specific Project Requirements, the minimum frequency of in-place compaction testing including density and moisture content will be as follows:
            (i) Compaction testing is required for all trench zones where suitable material or granular fill material is placed.
            (ii) Compaction testing is not required for granular bedding material or zones of random fill.
            (iii) One compaction test shall be done every 100 feet of trench length under pavement and for every three vertical feet of backfill lifts placed. A minimum of two sets of tests are required for each trench backfilled regardless of length.
            (iv) One compaction test will be done for every 300 feet of trench length in unpaved areas and for every three vertical feet of backfill lifts placed. A minimum of two sets of tests are required for each trench backfilled regardless of length.
            (v) As required when the City/Design Professional suspects the quality of moisture control or effectiveness of compaction.
    4. Water Mains and Service Lines:
        (a) Unless otherwise specified in Section 01015 – Specific Project Requirements, the Contractor shall conduct a minimum of ten (10) in-place

compaction tests at various locations throughout the project area as designated by the City/Design Professional.

5. Backfill that fails to meet required densities shall be removed and compacted as necessary to achieve specified results at no additional cost to the City.

B. Controlled Low-Strength Material (CLSM) Tests:
   1. Determine unconfined compressive strength using cylinders of CLSM sampled, handled, cured and tested in accordance with ASTM D4832. All tests required shall be made by an acceptable independent testing laboratory at the expense of the Contractor.
   2. The minimum frequency of compressive strength testing will be one set of cylinders obtained once per day or for every 100 cubic yards of flowable backfill placed.

C. Field Quality Control shall be considered incidental to the Work associated with trenching, backfill and compaction. The Contractor shall include all costs in the Bid Price and no separate measurement or payment shall be made.

3.23 DISPOSAL OF EXCESS EXCAVATED MATERIALS

A. Except as otherwise permitted in Section 01015 – Specific Project Requirements, all excess excavated materials shall be hauled off and disposed of off-Site by the Contractor.

B. The disposal of waste and excess excavated materials, including hauling, handling, grading and surfacing shall be incidental to the work associated with trenching, backfill and compaction. No separate measurement or payment shall be made.

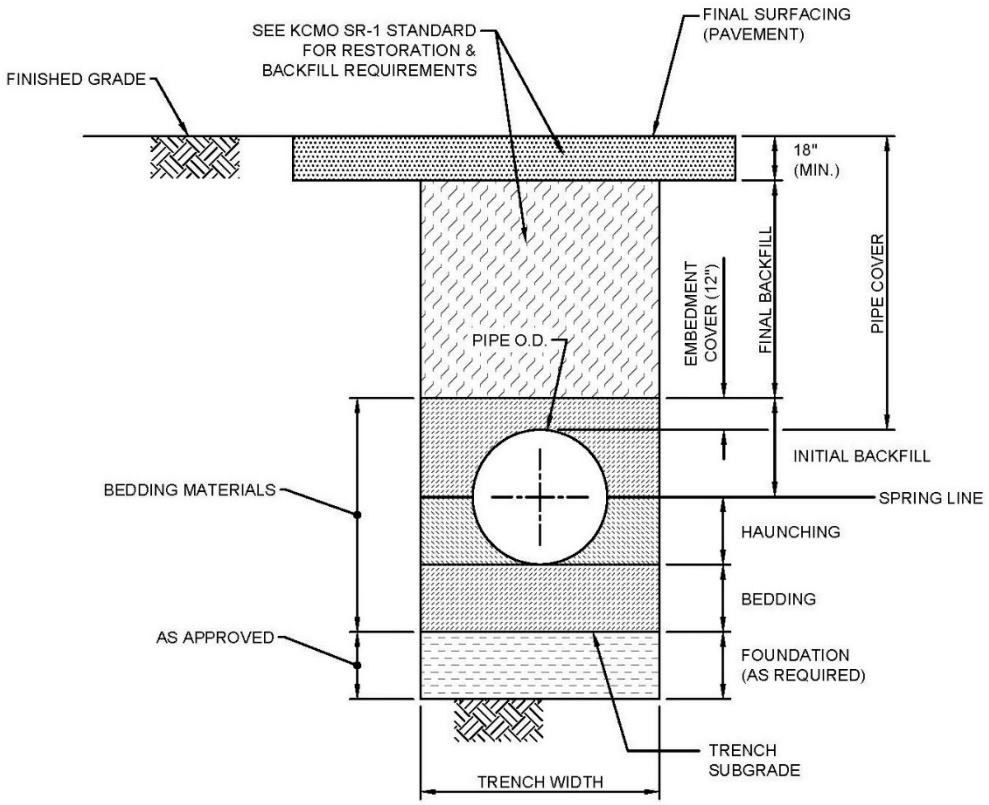
3.24 SEEDING AND SODDING

A. All areas disturbed by the Contractor's operations shall be seeded or sodded according the requirements of Section 02930 – Seeding or Section 02931 – Sodding.

3.25 SETTLEMENT

A. The Contractor is solely responsible for all settlement of backfills, fills and embankments which may occur within the correction period as stipulated in the General Conditions and Supplementary Conditions. The Contractor shall make or cause to be made, all repairs, replacements and restoration associated with settlement within 30 days after receipt of notice from the City.

Drawings 02250-1 and 02250-2 on the following 2 pages.



TRENCH DETAIL, CLASS A BEDDING, PAVED AREAS

WATER SERVICES
CITY OF KANSAS CITY, MISSOURI

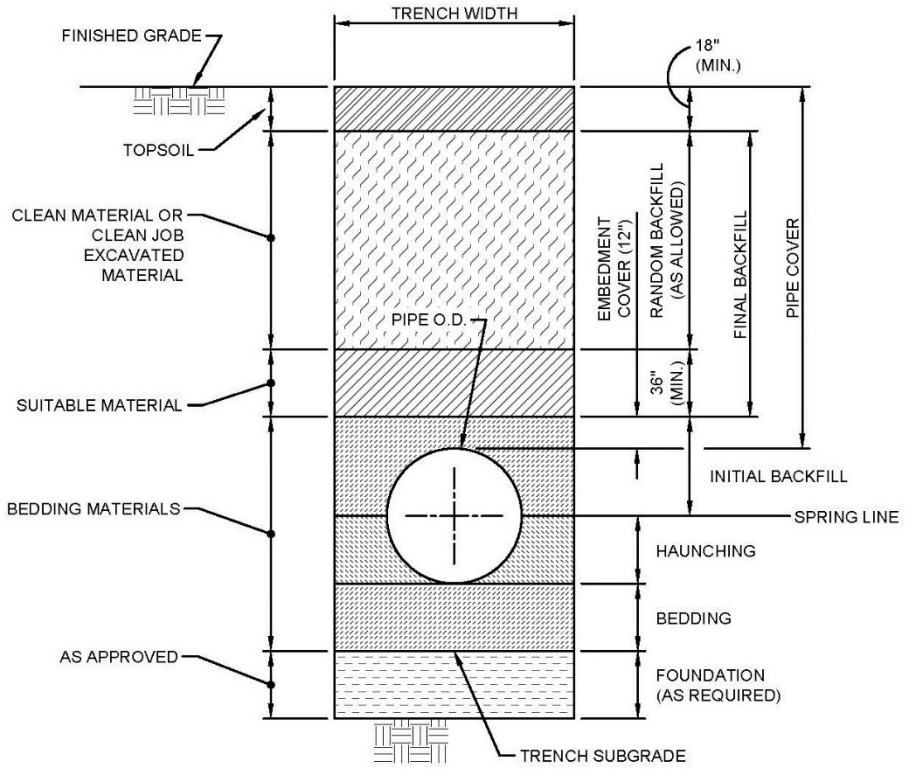
DRAWING NO. 02250-1

DEVELOPED BY: TECHNICAL ADVISORY COMMITTEE

APPROVED BY:

DATE: 09/16/2021

1 OF 1



TRENCH DETAIL, CLASS A BEDDING, UNPAVED AREAS

WATER SERVICES
CITY OF KANSAS CITY, MISSOURI
DRAWING NO. 02250-2

DEVELOPED BY: TECHNICAL ADVISORY COMMITTEE
APPROVED BY:
DATE: 09/13/2021

1 OF 1

END OF SECTION

SECTION 02575 – SURFACE RESTORATION

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers Work associated with surface restoration within the City's right-of-way, provided easements and other areas disturbed during construction.

B. The Contractor shall replace all surface material and shall restore paving, curbing, sidewalks, gutters, shrubbery, fences, sod and all other surfaces disturbed or damaged by construction activities to a condition of equal or better than before the start of the Work.

C. The Contractor shall restore the Site to conditions not less than that which existed prior to starting construction unless otherwise required by: the contract documents, permits and/or licenses.

D. Coordinate surface restoration work with the affected property owners and the City/Design Professional. Special requests for restoration should be documented in writing and provided to the City/Design Professional.

E. Private property on which the City has prior rights (i.e. easements, general utility easement, etc.) and/or has obtained easements, rights-of-way, licenses and/or agreements from the property owner shall be restored in conformance with these Contract Documents. Restore public property in accordance with the requirements of the department or public body having jurisdiction. Such entities include, but are not limited to, the following:

1. The City of Kansas City, MO Public Works Department.
2. The City of Kansas City, MO Parks and Recreation Department.
3. Missouri Department of Transportation.

1.02 SPECIFICATION MODIFICATIONS

A. It is understood that throughout this section, these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated in the contract documents.

1.03 RELATED SECTIONS

A. Section 00700 – General Conditions.
B. Section 00800 – Supplementary Conditions.
C. Section 01000 – General Project Requirements.
D. Section 01015 – Specific Project Requirements.
E. Section 01320 – Construction Progress Documentation
F. Section 01322 – Photographic and Video Documentation.
G. Section 01566 – Cleanup Operations.
H. Section 02200 – Earthwork.
I. Section 02250 – Trenching, Pipe Embedment and Backfill.
J. Section 02930 – Seeding.
K. Section 02931 – Sodding.
L. Section 02949 – Tree Protection, Removal and Replacement.

1.04 CODES AND STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The most recent version of the publications are referred to within the text by the basic designation only.

B. The City of Kansas City, Missouri Department of Public Works Construction and Material Specifications (http://kcmo.gov/publicworks/design-construction-standards/):

KCMO PW 2200*	Section 2200, Paving.
KCMO PW 2202	Subsection 2202, Untreated Compacted Aggregate.
KCMO PW 2204	Subsection 2204, Prime and Tack Coat.
KCMO PW 2209	Subsection 2209, Curbing.
KCMO PW 2211	Subsection 2211, Smoothness.
KCMO PW 2301	Subsection Section 2301, Incidental Construction, Standard. Sidewalks, Sidewalk Ramps, Driveways and Bicycle/Pedestrian Paths.
KCMO PW 2302	Subsection 2302 Asphalt Sidewalks, Driveways and Bicycle/Pedestrian Paths.
KCMO PW 2306	Subsection 2306 Pavement Markings.

C. The City of Kansas City, Missouri Department of Public Works Standard Drawings (http://kcmo.gov/publicworks/standard-drawings/):

KCMO PW C*	Standard Drawing Number C, Curbs.
KCMO PW D-1	Standard Drawing Number D-1, Driveway Entrances.
KCMO PW D-2	Standard Drawing Number D-2, Reconstructed Driveways.
KCMO PW D-US	Standard Drawing Number D-US, Driveway Unimproved Streets.
KCMO PW SR-1	Standard Drawing Number SR-1, Street Cut Restoration.

D. The City of Kansas City, Missouri Parks and Recreation Department (https://kcparks.org/services/parks-planning-and-design-services/):

KCMO PR CR*	Standard Detail Number CR, Rollback Curb and Gutter.
KCMO PR DC	Standard Detail Number DC, Commercial Driveway.
KCMO PR DR	Standard Detail Number DR, Residential Driveway.
KCMO PR SC	Standard Detail Number SC, Commercial Sidewalk.
KCMO PR SR	Standard Detail Number SR, Residential Sidewalk.
KCMO PR ARA	Standard Detail Number ARA, ADA Curb Ramp-Type A.
KCMO PR ARB	Standard Detail Number ARB, ADA Curb Ramp-Type B.
KCMO PR C	Standard Detail Number C, Curb.
KCMO PR CG	Standard Detail Number CG, Curb and Gutter.
KCMO PR CJ	Standard Detail Number CJ, Concrete Joint.

*Abbreviation used within this specification section to distinguish between the standards of the Public Works Department (PW) and the Parks and Recreation Department (PR).

E. American Society for Testing and Materials (ASTM):

ASTM D 422	Standard Test Method for Particle-Size Analysis of Soils, grain-size, hydrometer analysis, hygroscopic moisture, particle-size, sieve analysis.
ASTM C 309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
ASTM A 615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
ASTM D 977	Standard Specification for Emulsified Asphalt.
ASTM D 2397	Standard Specification for Cationic Emulsified Asphalt.

ASTM D 2027	Standard Specification for Cutback Asphalt (Medium-Curing Type).
ASTM D 2028	Standard Specification for Cutback Asphalt (Rapid Curing Type).
ASTM E11	Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves.
ASTM D448	Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

F. Missouri Department of Transportation:

MoDOT	Missouri Standard Specifications for Highway Construction (https://www.modot.org/missouri-standard-specifications-highway-construction).

1.05 DEFINITIONS

A. Established Lawn: An Unpaved Area of soil-covered land planted with grasses which are maintained at a height of 5 inches or less. Established lawns include, but are not limited to, grassed areas associated with residential lots, businesses, parks, cemeteries, etc.
B. Improved Street: A paved, public street, or portion thereof, that incorporates a curb and a gutter.
C. Paved Areas: Areas for which the final surfacing will be street pavement, shoulders, driveways, parking lots, curbs, gutters, sidewalks, gravel roads, or other surface construction or structures.
D. Site: Lands or areas indicated in the Contract Documents as being furnished by the City upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by the City which are designated for the use of the Contractor, or as defined in Section 00700 – General Conditions.
E. Unpaved Areas: Areas for which the final surfacing will not be a Paved Area.
F. Unimproved Street: A public street, or portion thereof, that does not incorporate a curb and gutter.

1.06 INFORMATION PROVIDED BY THE CITY

A. As provided in the Contract Documents.

1.07 SUBMITTALS

A. Submit as specified in Section 01300 – Submittals.
B. Shop Drawings:
   1. Submit as required by the contract documents.
C. Product Data:
   1. Submit as required by the contract documents.
D. Samples:
   1. Submit as required by the contract documents.

E. Other Submittals:
   1. The Contractor's Restoration Plan and Schedule adhering to all requirements of the contract documents.
   2. All applicable Department of Public Works standard specifications used to complete the Work.

3. All applicable Department of Public Works standard details used to complete the Work.
4. All applicable Parks and Recreation Department standard details used to complete the Work.

1.08 QUALITY ASSURANCE

A. The Contractor is responsible for the quality assurance and quality control of the Work.
B. All areas disturbed by the Contractor's operations shall be restored in accordance with the contract documents, applicable permits and as directed by the City/Design Professional.
C. All Work shall be performed by a Contractor, with a proven record of performance for the required restoration work. The Contractor shall submit the following:
   1. The materials to be used to restore the surface.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of materials shall be in manufacturer's original unopened and undamaged packages. They shall be clearly marked to identify brand name, contents and order number on each package. Packages showing indication of damage that may affect condition of contents are not acceptable.
B. Storage of material shall provide protective cover from damage and stored at temperatures in accordance with manufacturer's recommendation. Materials shall be staked or stored in accordance with manufacturer's recommendations.

1.10 RESTORATION SCHEDULE

A. Project milestones and restoration schedule criteria shall be as specified in the following sections:
   1. Section 00800 – Supplemental Conditions.
   2. Section 01015 – Specific Project Requirements.
B. The specified milestone and/or restoration schedule criteria shall be incorporated in the project schedule as required by Section 01320 – Construction Progress Documentation.

1.11 PROPERTY-SPECIFIC RESTORATION

A. Easements provided by the City for the construction of the Work may include property-specific restoration requirements. These requirements are noted on the Contract Drawings or included in Section 01015 – Specific Project Requirements.

PART 2 - PRODUCTS

2.01 INCIDENTAL CONCRETE CONSTRUCTION

A. Incidental concrete construction includes curbs, gutters, sidewalks, sidewalk ramps, ADA ramps, driveways, bicycle/pedestrian paths and other Work indicated in the Contract Documents.
B. Parks and Recreation Department Standards: Incidental concrete surface restoration for Work having jurisdiction of the City of Kansas City, Missouri Parks and Recreation Department shall comply with the standards listed in paragraph CODES AND STANDARDS. All materials and construction standards are noted on the standard details.
C. Public Works Department Standards: All materials and construction for incidental concrete surface restoration for Work having jurisdiction of the City of Kansas City, Missouri Public shall comply with the standards listed in paragraph CODES AND STANDARDS:
   1. Sidewalks: KCMO PW 2301.
   2. Sidewalk ramps: KCMO PW 2301.

3. Driveways: KCMO PW 2301.
4. Bicycle/pedestrian paths: KCMO PW 2301.
5. Curbs: KCMO PW 2209.
6. Curb and gutters: KCMO PW 2209.

2.02 GRANULAR SUBBASE MATERIAL

A. Granular subbase material for incidental concrete construction shall conform to the requirements of Section 02200-Earthwork.

2.03 INCIDENTAL ASPHALT CONSTRUCTION

A. Incidental asphalt work includes, but is not limited to, the construction of asphaltic concrete sidewalks, driveways, bicycle/pedestrian ramps and other Work indicated in the Contract Documents.
B. Materials and construction for incidental asphalt surface restoration shall comply with the standards listed in paragraph CODES AND STANDARDS, KCMO PW 2302.

2.04 PAVEMENT

A. Restoration of pavements shall include, but is not limited to, streets, parking lots, alleys, and other areas subject to traffic and other Work indicated in the Contract Documents.
B. All materials and construction shall comply with the standards listed in paragraph CODES AND STANDARDS, KCMO PW 2200 and KCMO PW SR-1.
C. Pavement shall be restored with the type of material existing prior to the Work unless otherwise noted in the Contract Documents.

2.05 PAVEMENT MARKINGS

A. Materials and construction for incidental asphalt surface restoration shall comply with the standards listed in paragraph CODES AND STANDARDS, KCMO PW 2306.
B. Paragraph Method of Measurement shall not apply.
C. Paragraph Basis of Payment shall not apply.

2.06 AGGREGATE FOR SURFACING

A. Aggregate for surfacing shall meet the requirements of Section 02200-Earthwork, paragraph GRANULAR FILL MATERIAL.

2.07 SEEDING SODDING

A. Seeding shall conform to Section 02930 – Seeding.

2.08 SODDING

A. Sodding shall conform to Section 02931 – Sodding.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall restore all permanent type pavements, sidewalks, driveways, curbs, gutters, and surface structures, lawns, landscaped areas, and other land covers that are removed or disturbed as a result of construction operations (unless otherwise requested in writing by the property owner).

3.02 FINAL GRADING

A. Final grading shall conform to Section 02200 – Earthwork, paragraph FINAL GRADING AND PLACEMENT OF TOPSOIL.
B. Finish grade the area to lines and grades which existed prior to the area being disturbed, with special attention directed to proper surface drainage, and the refilling of settled excavations with earth or fill compacted to the appropriate densities required.
C. Eroded areas and areas having inadequate drainage, as indicated by ponding of water, shall be filled.
D. Ruts, deep tracks, dead furrows, and ridges shall be eliminated.
E. The area shall be smoothed by raking and/or dragging.
F. Before placing topsoil, remove and dispose of excess gravel to the satisfaction of the City. Leave no stones larger than 1 inch on the surface.
G. Flower and vegetable gardens in existence prior to this project shall have the separately stored topsoil restored unless otherwise requested in writing by the property owner.
H. Cultivated areas shall be left in tillable condition; compacted areas shall be plowed or cultivated to loosen and aerate the soil.

3.03 AGGREGATE SURFACING

A. Unless otherwise indicated on the Drawings, gravel surfaces shall be restored with a minimum 6 inches of compacted aggregate,

3.04 ESTABLISHMENT OF TURF

A. Sodding
   1. Sodding shall be conducted in accordance with Section 02931 – Sodding.
   2. Unless otherwise specified in Section 01015 – Specific Project Requirements or on the Drawings, all unpaved areas that are established lawns prior to construction that are disturbed by construction shall be sodded (temporary seeding as approved by the City/Design Professional).
   3. If the Contract Documents do not identify the type of sod to be placed, then the sod type shall be the same as the type removed or damaged as part of the Work, or as directed by the City's representative (unless otherwise requested in writing by the property owner).
   4. Section 02931 – Sodding provides specification for the following sod types
      (a) Fescue Turf:
         (i) Type 1 Sod – Turf Type Tall Fescue.
         (ii) Type 2 Sod – Kentucky Blue Grass and Turf Type Tall Fescue.
      (b) Bermuda Turf: Type 3 Sod – Bermuda Grass.
      (c) Zoysia Turf: Type 4 – Zoysia Grass.
B. Seeding:
   1. Seeding shall be conducted in accordance with Section 02930 – Seeding.
C. Maintenance:
   1. The Contractor shall be responsible for maintaining all turfed areas disturbed by construction activities.
   2. Maintenance Period: The Contractor shall maintain turfed areas until all of the following conditions have been met:
      (a) The turf, including repairs, has been established as defined herein.
      (b) The turf meets the requirements of paragraph ACCEPTABLE CONDITIONS to the satisfaction of the City.
      (c) The minimum establishment period for all new turf, including repairs has passed.
      (d) The Contractor shall be responsible for maintenance of turfed areas until establishment.

(e) If specified in Section 01015 – Specific Project Requirements, the Contractor has provided notification in accordance with paragraph NOTIFICATION OF PROPERTY OWNERS.
(f) As approved by the City in accordance with paragraph EARLY RELINQUISHMENT OF MAINTENANCE RESPONSIBILITIES.

3. All turfed areas shall be kept in a healthy growing condition by watering, weeding, mowing, trimming, edging, repairs, etc.
4. Watering and Water Usage:
   (a) Promptly after seeding or sodding, wet the area thoroughly. Watering shall continue so as to keep all areas moist as needed to promote healthy growth.
   (b) Water used in this work shall be furnished by the Contractor and shall be suitable for irrigation and free from ingredients harmful to plant life.
   (c) All watering equipment required for the work shall be furnished by the Contractor.
   (d) Water may be taken from adjacent fire hydrants or public water lines only through metered and backflow protected hydrant connections permitted and issued by the City.
5. Mowing:
   (a) All turfed areas within the limits of the Site shall be mowed with approved mowing equipment to a height of 3 inches whenever the average height of vegetation becomes 5 inches.
   (b) Grass clippings shall be bagged with the mowing processes and clippings shall be disposed of off-site.

D. Establishment Period:
1. The establishment period for turfed areas shall be no less than 30 calendar days from the time of planting or last time of repair.
2. The Contractor may not request the Final Inspection (as specified in Section 00700 – General Conditions, Article 14) until all turfed areas have completed the minimum establishment period.

E. Acceptable Conditions:
1. Turfed areas will be acceptable when grasses are growing, are in good condition, and no area more than 20 percent of the total areas is bare; of which no single area shall be more than 1-foot square in area. Any bare area larger than this will not be acceptable and shall be re-seeded or re-sodded (as applicable) at no additional cost to the City.
2. For sodded areas, the grass shall be sufficiently rooted so that that sod pads cannot be lifted from the sod bed.

F. Early Relinquishment of Maintenance Responsibilities:
1. The Contractor may request in writing the early acceptance of turfed areas and a return of maintenance responsibilities to the property owner prior to the end of the maintenance period.
2. Limitations on Acceptance of Turf:
   (a) Acceptance of this request is at the sole discretion of the City.
   (b) Acceptance of the turf for the purposes of transferring maintenance responsibilities does not constitute acceptance of the Work as a whole, Substantial Completion, Partial Utilization, or a Final Inspection as define in Section 00700 – General Conditions and modified in Section 00800 – Supplementary Conditions.
3. Before the request is made, the following conditions must be met:
   (a) The turf, including repairs, has been established.
   (b) The minimum establishment period has passed for the turf, including repairs.
   (c) Work has substantially been completed within the area, and no other construction activities are anticipated that will disturb or damage the turf.

(d) The Contractor has demobilized all labor and equipment from the area.
(e) All construction materials have been removed from the area.

4. The Contractor shall submit a written request to the City indicating the area of the Site for which turf maintenance responsibilities are to be transferred to the property owners.
5. The Contractor shall schedule and inspection with the City and /or their representative to determine if the turfed areas are acceptable as specified above.
6. If the all turf within the defined area is acceptable, then the City will provide written notification to the Contractor documenting acceptance.
7. After acceptance of the request for relinquishment of maintenance, the Contractor shall perform the following:
   (a) Within 5 working days of acceptance, document the condition of the turfed areas in accordance with Section 01322 – Photographic and Video Documentation. Photographic documentation of conditions shall be conducted at no additional cost to the City.
   (b) Notify all affected property owners in accordance with paragraph NOTIFICATION OF PROPERTY OWNERS.
   (c) Provide written notification to the City that all affected property owners have been notified of the relinquishment of maintenance responsibilities.
8. After all the requirements listed above have been meet, then the City will consider maintenance responsibility of the identified turfed areas to be transferred to the respective property owners.

G. Notification of Property Owners: In accordance with Section 01581 – Public Communications, the Contractor shall notify all affected property owners that the Work on their property has been completed, that turf has been established and that maintenance of the turfed area is now the property owner's responsibility.

3.05 TREES, BUSHES AND PLANTS: PROTECTION AND REPLACEMENT

A. Protection:
   1. The protection of trees, bushes and plants shall be done in accordance with Section 02949 – Tree Protection, Removal and Replacement.
B. Transplanting shall be done in accordance with Section 02949:
   1. Existing trees, bushes, and hedges which cannot be tied back or trimmed to prevent damage and require removal because of the proposed construction shall be transplanted with a tree spade or replaced.
   2. Tree removal shall include the removal of stump and roots as specified in Section 02949.
   3. Transplanting shall be at the location directed by the City/Design Professional or as applicable by the Parks and recreation Department.
   4. After digging the plants, properly store them until they can be transplanted.
C. Pruning or Replacement:
   1. Pruning or replacement of trees shall be done in accordance with Section 02949 – Tree Protection, Removal and Replacement.
   2. Replacement plants shall not be delivered until they can be planted.
D. Plant during the proper seasons. Do not plant in frozen soil or during unfavorable weather conditions. Dig tree pits of such size as to provide ample space for the entire root system, as the tree comes from the nursery, without crowding or bending the roots. The pits shall be 12 inches wider than the ball diameter, have vertical sides, and be six inches deeper than the thickness of the ball. Thoroughly loosen the soil in the bottom of the pit by spading to a depth of six inches. Dig holes immediately before planting. Dispose of soil earth dug from the tree pits off the project site.

3.06 STREET CUT RESTORATION

A. All pavement restoration work in streets shall conform to KCMO PW SR-1 with the following exceptions:
   1. Pipe bedding material and installation shall conform to Section 02250 – Trenching, Pipe Embedment and Backfill.
   2. Backfill material and installation shall conform to Section 02250 – Trenching, Pipe Embedment and Backfill.
   3. With respect to DETAIL 1 – ASPHALT PAVEMENT SURFACE (SR-1, page 1 of 3), the Contractor may pour the Portland cement concrete cap to finish grade. If poured to finish grade, the Contractor shall mill the top of the Portland cement concrete cap a uniform 2 inches ensuring a 2" vertical profile at edge prior to installing the 2" Patch (Type-5-01).

B. Smoothness:
   1. The finish of the pavement surface shall be substantially free from waves or irregularities and shall be true to the established crown and grade.
   2. The final surface of pavement will comply with KCMO PW 2211.
   3. Testing for smoothness shall be conducted as directed by the City/Design Professional.
   4. Measurements for smoothness shall be pass or fail at the sole discretion of the City or their representative. No pay adjustments will be considered.

C. Provide a straight joint between the existing and new surface per KCMO PW SR-1. All joints shall be at right angles. Diagonal cutting of pavement is prohibited.

D. Unless the top 2" will be milled, cure and protect all exposed concrete installed under this contract in accordance with the referenced standard.

E. Unless additives are used to accelerate curing, concrete shall achieve 70% of maximum strength before allowing traffic or construction equipment on the concrete (as proven by cylinder breaks).

3.07 CONCRETE SIDEWALKS, TRAILS, DRIVEWAY APPROACHES, AND RAMPS

A. Remove concrete to the nearest joint. Removal of partial squares shall not be allowed.

B. Saw-cut existing sidewalks at construction joints. Patching existing sidewalk squares damaged during construction activities shall not be allowed.

C. Construct in accordance with all applicable KCMO Public Works and Parks and Recreation Standards.

D. Minimum concrete thickness for residential sidewalks, trails, driveway approaches, ADA ramps, etc. shall be in accordance with the applicable KCMO Public Works or Parks and Recreation Standard.

E. All concrete shall be constructed on a minimum of 4 inches of compacted granular sub-base material.

F. Where sidewalks are constructed across aggregate driveways, increase the thickness to a minimum of six inches across the width of the driveway.

G. At locations where sidewalks intersect with streets and sidewalk restoration is required, the Contractor shall construct sidewalk ramps in accordance with KCMO PW 2301.

3.08 CONCRETE CURB AND GUTTER

A. Curb and Gutter dimensions and cross sections shall conform to existing installations. Construct new curbs and gutter in accordance with KCMO PW C.

B. Expansion joints with dowels shall be placed where the new curb abuts existing curb and as required by KCMO PW C.

3.09 DRIVEWAY ENTRANCE/APPROACH RESTORATION

A. Driveways shall be restored to a width matching preconstruction conditions, as indicated on the Drawings, or as indicated Section 01015 – Specific Project Requirements.

B. Subgrades for driveway entrance restoration shall be in accordance with Section 02200 – Earthwork, paragraph BACKFILL AND COMPACTION.

C. The Contractor shall provide full driveway flare/approach replacement if any of the following conditions are met:
   1. The Work requires removal of a portion of the driveway which includes the driveway flare/approach.
   2. The Contractor damages the driveway flare/approach.
   3. As indicated on the Drawings.
   4. As specified in Section 01015 – Specific Project Requirements.

D. The Contractor may remove the drive approach and driveway pavement within the right-of-way and/or easements necessary to facilitate the Work.

E. The limits of restorations beyond disturbed areas shall be as follows:
   1. To the Nearest Joint: The Contractor shall restore paved driveway surfaces from the street pavement to the nearest existing driveway joint.
      (a) The Contractor shall saw cut the full depth of pavement to be removed.
      (b) In no case shall the joint created by saw cutting be less than 3 feet from an existing joint. Adjust the location of the saw cut accordingly.

F. Driveway Entrance Replacement Standards: Driveways entrances that abut improved streets shall be reconstructed in accordance with the following standards:
   1. Public Works Department Standards:
      (a) KCMO PW D-1.
      (b) KCMO PW D-2.
      (c) Construction shall be in accordance with KCMO PW 2301.
   2. Parks and Recreation Department Standards:
      (a) KCMO PR DC.
      (b) KCMO PR DR.
      (c) Construction shall be in accordance with KCMO PW 2301.
   3. Asphalt Driveway Entrances Abutting Unimproved Streets: Asphalt driveway entrances that abut unimproved streets shall be reconstructed in accordance with the following standards:
      (a) KCMO PW D-US.
      (b) Construction shall be in accordance with KCMO PW 2302.
   4. Concrete Driveways abutting Unimproved Street: Concrete driveway entrances that abut unimproved streets shall be reconstructed in accordance with the following standards:
      (a) KCMO PW D-US, except that the material for construction shall be concrete.
      (b) Construction shall be in accordance with KCMO PW 2301.
      (c) The concrete thickness shall be a minimum of 6 inches.
      (d) Expansion and contraction joints shall conform to the details shown on KCMO PW D-1.
      (e) New joints shall match existing joint patterns (finished the same as existing), but shall be spaced at a maximum distance of 10 feet in both directions ($\leq$ 100 square feet).

3.10 DRIVEWAY PATCHING

A. Driveway patching will be allowed if any of the following conditions are met:
   1. The Work does not require the removal of the driveway flare.
   2. The Contractor does not damage the driveway flare/approach.

3. As indicated on the Drawings.
4. As specified in Section 01015 – Specific Project Requirements.
5. As requested in writing from the City.

B. The Contractor may remove and replace a portion of the driveway necessary to facilitate the Work and the existing driveway flare may remain. Pavement shall be removed and replaced in accordance with the following:
   1. To the Nearest Joint:
      (a) The Contractor shall remove and replace damaged driveway surfaces from the joint of the driveway flare/approach to the nearest joint of the driveway.
         i. If the nearest joint is beyond the right-of-way or easement, the Contractor may saw cut the driveway if permitted by the City/Design Professional. In no case shall the joint created by saw cutting be less than 3 feet from an existing joint.
   2. The Contractor shall saw cut the full depth of pavement to be removed.

C. Subgrades for driveway patching shall be in accordance with Section 02200 – Earthwork, paragraph BACKFILL AND COMPACTION.

D. The Contractor shall replace all paved surfaces damaged or removed for the Work.

E. Concrete Driveways:
   1. Construction shall be in accordance with KCMO PW 2301.
   2. The thickness of the concrete shall be the same as the pavement removed or 6 inches; whichever is greater.

F. Asphalt Driveways:
   1. Construction shall be in accordance with KCMO PW 2302.
   2. The thickness of the concrete shall be the same as the pavement removed or 6 inches; whichever is greater.

3.11 ASPHALTIC CONCRETE PAVEMENT

A. Construction of asphaltic concrete pavement shall conform to KCMO PW 2200.

B. The limits of asphaltic concrete replacement shall be noted on the Drawings.

C. Applicable details for asphaltic concrete pavement reconstruction shall be as indicated on the Drawings or Section 01015 – Specific Project Requirements.

3.12 PORTLAND CEMENT CONCRETE PAVEMENT

A. Construction of Portland Cement Concrete pavement shall be in accordance with KCMO PW 2200. The limits of asphalt concrete replacement shall be noted on the Drawings.

B. The limits of Portland Cement Concrete pavement replacement shall be as indicated on the Drawings.

C. Applicable details for Portland Cement Concrete pavement reconstruction shall be as indicated on the Drawings or Section 01015 – Specific Project Requirements.

3.13 SUBSTANTIAL COMPLETION/ACHIEVEMENT OF FULL OPERATION

A. When the Contractor considers the Work ready for its intended use, the Contractor shall notify the City in accordance with Section 00700 – General Conditions, Article 14 – Payments to the Contractor and Completion.

3.14 CLEANUP

A. Cleanup operations shall be conducted in accordance with Section 01566 – Cleanup Operations.

3.15 SAFETY SIGNS, BARRICADES, LIGHTS AND PROJECT SIGNS

A. Maintain adequate safety signs, barricades and lights until final restoration is completed.

B. The Contractor shall install and maintain all project signs for the duration of the Work.

3.16 MAIL BOXES

A. Mail boxes shall be maintained through the duration of the project in accordance with Section 01000 – General Project Requirements, paragraph MAIL BOXES.

END OF SECTION

SECTION 02605 – DRAINAGE STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers the furnishing of all labor, materials and equipment required to install drainage structures, frames and covers, access hatches and all appurtenances as shown on the Drawings and as specified herein. All materials and construction shall be in compliance with the latest revision of the standards referenced in this section and Section 2600 of the "KCMO Standard Drawings and Specifications", except as amended herein.

1.02 SPECIFICATION MODIFICATIONS

A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements, or as otherwise indicated in the Contract Documents.

1.03 RELATED SECTIONS

A. Section 01000 – General Project Requirements.
B. Section 01015 – Specific Project Requirements.
C. Section 02200 – Earthwork.
D. Section 02702 – Testing Requirements for Sanitary Sewer: Mains and Manholes.
E. Section 02940 – GSI Inlets.
F. Section 02955 – GSI Outlets.
G. Section 03000 – Miscellaneous Concrete.
H. Section 03370 – Sanitary Sewer Manhole Construction.
I. Section 05011 – Stormwater Castings.

1.04 CODES AND STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only

B. American Concrete Institute (ACI):

ACI 350	Code Requirements for Environmental Engineering Concrete Structures.
ACI 350-06	Code Requirements for Environmental Engineering Concrete Structures and Commentary.
ACI 350.5-12	Specifications for Environmental Concrete Structure.

C. American Society for Testing and Materials (ASTM):

ASTM A48	Standard Specification for Gray Iron Castings.
ASTM C150	Standard Specification for Portland Cement.
ASTM C443	Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
ASTM C478	Standard Specification for Precast Reinforced Concrete Manhole Sections.

ASTM C990	Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealant.

1.05 INFORMATION PROVIDED BY THE CITY

A. As provided in the Contract Documents.

1.06 SUBMITTALS

A. Submit as specified in Section 01300 – Submittals.
B. Shop Drawings:
   1. Base sections, riser sections, eccentric conical top sections, flat slab tops, grade rings, including a certificate indicating compliance with ASTM C478.
   2. Pipe connections to precast concrete elements.
   3. Manhole frame and cover with certification of compliance with the specified ASTM standard and Class designation.
   4. Method of repair for minor damage to precast concrete sections.
C. Product Data:
   1. Precast concrete sections:
      (a) Sectional plan(s) and elevations showing dimensions and reinforcing steel placement.
      (b) Concrete design mix.
      (c) Structural Calculations, including assumptions.
      (d) Structural design calculations and fabrication drawings shall be prepared and stamped by a professional engineer registered in the State of Missouri.
   2. Non-Precast Concrete Drainage Structures including but not limited to FRP, Plastic, or approved equal
D. Test Reports:
   1. Precast concrete boxes:
      (a) Concrete test cylinder reports from an approved testing laboratory certifying conformance with this Item.
   2. Results of leakage tests.

1.07 QUALITY ASSURANCE

A. The Contractor is responsible for the quality assurance and quality control of the Work.
B. All material shall be new and unused.
C. Materials' quality, manufacturing process and finished sections are subject to inspection and approval by the City/Design Professional. Inspection may be made at place of manufacture, at the work site following delivery, or both.
D. Materials will be examined for compliance with this Section and approved manufacturer's drawings.
E. Materials shall be rejected for failure to meet any requirements specified herein. Rejection may occur at place of manufacture, at work site, or following installation. Mark for identification rejected materials and remove from work site immediately. Rejected materials shall be replaced at no additional cost to Owner.
F. Repair minor damage to precast concrete sections by a submitted and approved method, if repair is authorized by the City/Design Professional.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle materials and other accessories in such manner as to ensure delivery to the installation location in a sound undamaged condition.

B. Non-shrink grout: Deliver Materials to the project in manufacturer's original, unopened packaging, with labels clearly identifying product name, manufacturer, and expiration date. Store grout in a cool, dry place and out of the sun.
C. Precast concrete sections shall not be delivered to the job until the concrete control test cylinders have attained strength of at least 80 percent of the specified minimum.
D. Precast concrete sections shall be handled carefully and shall not be bumped or dropped. Hooks shall not be permitted to come in contact with joint sections.
E. Precast concrete sections shall be inspected when delivered. All cracked or otherwise visibly defective units will be rejected. City reserves the right to inspect the production of the units at the manufacturing plant.

PART 2 - PRODUCTS

2.01 GENERAL

A. Reference to a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.
B. Like items of materials/equipment shall be the end products of one manufacturer in order to provide standardization for appearance, operation, maintenance, spare parts and manufacturer's service.
C. Provide lifting lugs or holes in each precast section for proper handling.
D. Cement shall conform to ASTM C150, Type II cement or equal.
E. Concrete Materials (acceptable mixes, MCIB, KCMMB).
F. Precast concrete sections shall be properly cured prior to shipping. Precast concrete sections shall not be shipped before concrete has attained a compressive strength of 3200 psi or 80% of design strength minimum.
G. Mark date of manufacture, name and trademark of manufacturer on the inside of each precast section.

2.02 DESIGN CRITERIA

A. Precast concrete:
   1. Minimum compressive strength shall be 4000 psi at 28 days.
   2. Maximum water-to-cement ratio shall be 0.45 by weight.
   3. Minimum cement content shall be 564 lbs. of cement per cubic yard of concrete.
   4. For Precast Manhole Sections, design precast concrete base and flat slab top for their own weight, weight of soil at 130 pcf, and a live load equal to AASHTO H-25 truck loading applied at finished grade.
B. Design of Manufactured products (Precast Concrete or approved equal):
   1. Analyze walls and slabs using accepted engineering principals. Design walls for internal fluid pressures and external soil pressures independently.
   2. When “fy” exceeds 60,000 psi, “z” (per ACI 350-01, Chapter 10) shall not exceed 95 kips/in, and “fs” shall be computed and shall not exceed 50 percent of “fy”.
   3. Design products to support their own weight, weight of soil at 130 pcf, and a live load equal to AASHTO HS-25 truck loading applied to top slab.
   4. Design walls of the precast boxes for the governing case from the following load conditions:
      (a) An external lateral pressure based on an equivalent fluid with a unit weight of 90 pounds per cubic foot (pcf). Originate the pressure diagram at the finished ground surface or top of pavement surface, as applicable. When designing by the Strength Design Method, environmental durability factors,

as defined in ACI 350-01, need not be included for this load condition. When designing by the Alternate Design Method (Service Loads), allowable stresses may be increased by one-third for this load condition.

(b) An external lateral pressure based on an equivalent fluid with a unit weight of 60 pcf. Include a live load surcharge pressure equal to 2 feet of earth above the finished ground surface or top of pavement surface, as applicable.

(c) An internal lateral pressure based on a fluid with a unit weight of 63 pcf. Assume internal fluid to the bottom surface of the top slab, unless otherwise noted or shown. Design of walls shall account for effects of tension due to internal fluid pressure.

5. Locate access openings, wall sleeves and pipe penetrations as shown on Drawings or as recommended by manufacturer and approved by Design Professional.
6. Locate horizontal wall joints 8-in minimum from edge of wall openings unless otherwise approved by the City/Design Professional.
7. Consider discontinuities in structure produced by openings and joints. Provide additional reinforcing around openings. Frame openings to carry full design loads to support walls.

2.03 PRECAST CONCRETE MANHOLE SECTIONS

A. Precast manholes shall be in accordance with City Standards (https://www.kcmo.gov/city-hall/departments/public-works/standard-drawings), except as modified herein.

B. Precast concrete base sections, riser sections, transition top sections, flat slab tops and grade rings shall conform to ASTM C478 and shall meet the following requirements or the KCMO City Standards whichever is more stringent:
   1. Bottom slab thickness shall be no less than the riser wall thickness.
   2. Construct precast concrete bases as shown on the Drawings.
   3. Base, riser and transition top sections shall have tongue and groove joints.
   4. Top section shall be a flat slab where cover over top of pipe is 4-ft or less.
   5. Provide integrally cast knock-out panels in precast concrete manhole sections at locations, and with sizes shown on Drawings. Knock-out panels shall have no steel reinforcing.

2.04 PRECAST CONCRETE BOX STRUCTURES

A. Precast concrete box structures shall conform to the requirements of ACI 350 and the following additional requirements:
   1. Minimum reinforcing bar size shall be No. 5, and shall be Grade 60 or higher.
   2. Maximum spacing of reinforcing bars shall be 12 inches, center to center.

B. Structural design calculations and fabrication drawings shall be prepared and stamped by a professional engineer registered in the State of Missouri.

2.05 PIPE CONNECTIONS

A. Connect pipe to precast structure using one of the following methods:
   1. Grout in place - Precast section shall have a formed, tapered circular opening larger than the pipe outside diameter. Grout shall be non-shrink and waterproof equal to Hallemite, Waterplug or Embeco. Plastic pipe shall have a water stop gasket secured to pipe with a stainless steel clamp.
   2. Flexible sleeve – An integrally cast sleeve in precast section or install sleeve in a formed or cored opening. Fasten pipe in sleeve with stainless steel clamp(s). Coat stainless steel clamp(s) with bituminous material to protect from corrosion.

Flexible sleeve shall be Lock Joint Flexible Manhole Sleeve; Kor-N-Seal connector; PSX Press-Seal Gasket or equal.

3. Compression gasket - Integrally cast compression gasket in precast manhole section. Insert pipe into compression gasket. Compression gasket shall be A-Lok or equal.

2.06 MANHOLE FRAME AND COVER

A. Manhole frames and covers shall be per Section 05011 – Stormwater Castings.

2.07 JOINTING PRECAST SECTIONS

A. Seal tongue and groove joints of precast sections with either rubber O-ring gasket or preformed flexible joint sealant. O-ring rubber gaskets shall conform to ASTM C443. Preformed flexible joint sealant shall conform to ASTM C990 and shall be Kent Seal No. 2 by Hamilton-Kent; Ram-Nek by K.T. Snyder Company or equal.

B. Completed joint shall withstand 15 psi internal water pressure without leakage or displacement of gasket or sealant.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All Drainage Structures shall be provided, installed and constructed at the location shown on the Drawings.

B. Manhole and Precast Box Installation:

1. Manholes and precast boxes shall be constructed to the dimensions shown on the Drawings and as specified herein. Construct cast-in-place bases in accordance with the requirements of the contract documents and KCMO Standard details.
2. Place base on a bed of 8-in structural fill as shown on the Drawings. Set base grade so that a maximum grade adjustment of 8-in is required to bring the structure to final grade.
   (a) Use precast concrete grade rings to adjust manhole frame and cover to final grade.
3. Set precast concrete sections plumb with a 1/4-in maximum out of plumb tolerance allowed. Seal joints of precast sections with either a rubber O-ring set in a recess or preformed flexible joint sealant in sufficient quantity to fill 75 percent of the joint cavity. Fill the outside and inside joint with non-shrink mortar and finish flush with the adjoining surfaces. Caulk the inside of any leaking joints with lead wool or non-shrink grout to the satisfaction of the City/Design Professional.
4. Allow joints to set for 14 hours before backfilling, unless a shorter period is specifically approved by the City/Design Professional.
5. Plug holes in the concrete sections required for handling with a non-shrink grout or non-shrink grout in combination with concrete plugs. Finish flush on the inside.
6. Cut holes in precast sections to accommodate pipes prior to setting precast sections in place to prevent jarring that may loosen the mortar joints.
7. Backfill carefully and evenly around manholes and precast boxes.

C. Pipe Connections:

1. Construct pipe connections, including pipe stubs, as specified above in section 2.05. Close or seal pipe stubs for future connections with a gasketed watertight plug.

D. Setting Manhole Frame and Cover:
   1. Set manhole covers and frames in a full mortar bed. Utilize precast concrete grade rings, a maximum of 8-in thick, to assure frame and cover are set to the finished grade. Set manhole frame and cover to final grade prior to placement of permanent paving.

3.02 LEAKAGE TESTS

A. Test each liquid-containing structure for leakage. City/Design Professional shall observe each test. Perform exfiltration test as described below.
B. Assemble structure in place; fill and point all lifting holes and exterior joints within 6-ft of the ground surface with an approved non-shrinking mortar. Test prior to placing the shelf and invert and before filling and pointing the horizontal joints below 6-ft of depth. Lower ground water table below bottom of the structure for the duration of the test. Plug all pipes and other openings into the structure and brace to prevent blow out.
C. Fill structure with water to the top of the structure. If the excavation has not been backfilled and no water is observed moving down the surface of the structure, the structure is satisfactorily water-tight. If the test, as described above is unsatisfactory as determined by the City/Design Professional, or if the structure excavation has been backfilled, continue the test. A period of time may be permitted to allow for absorption. Following this period, refill structure to the top of the structure, if necessary and allow at least 8 hours to pass. At the end of the test period, refill the structure to the top of the structure again, measuring the volume of water added. Extrapolate the refill amount to a 24-hour leakage rate. The leakage for each structure shall not exceed one gallon per vertical foot for a 24-hour period. If the structure fails this requirement, but the leakage does not exceed three gallons per vertical foot per day, repairs by approved methods may be made as directed by the City/Design Professional. If leakage due to a defective section of joint exceeds three gallons per vertical foot per day, the structure shall be rejected. Uncover the rejected structure as necessary and to disassemble, reconstruct or replace it as directed by the City/Design Professional. Retest the structure and, if satisfactory, fill and point the interior joints.
D. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorptions, etc. It will be assumed that all loss of water during the test is a result of leaks through the joints or through the concrete.
E. An infiltration test may be substituted for an exfiltration test if the ground water table is above the highest joint in the structure. If there is no leakage into the structure as determined by the City/Design Professional, the structure will be considered water-tight. If the City/Design Professional is not satisfied, testing shall be performed as previously described.
F. Regardless of whether leakage testing is required, visible leaks which occur after backfilling shall be sealed by approved means.

3.03 CLEANING

A. Thoroughly clean all new manholes, precast boxes and drainage structures of all silt, debris and foreign matter of any kind, prior to final inspections.

END OF SECTION

SECTION 02624 – POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers all work, materials and testing for the installation of PVC gravity sewer pipe by the open-cut method as shown on the Drawings and in conformity with these specifications. All pipelines shall be constructed to proper line and grade as shown on the Drawings and shall result in an unobstructed, smooth and uniform conduit.

B. This section does not cover PVC pipe associated with pipe bursting. See Section 02580 – Pipe Bursting for Gravity Sewers.

1.02 SPECIFICATION MODIFICATIONS

A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Drawings.

1.03 RELATED SECTIONS

A. Section 01015 – Specific Project Requirements.
B. Section 01300 – Submittals.
C. Section 02250 – Trenching, Pipe Embedment and Backfill.
D. Section 02580 – Pipe Bursting for Gravity Sewers.
E. Section 02702 – Sewer Pipe and Manhole Testing.

1.04 CODES AND STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):
   1. D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
   2. D2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
   3. D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   4. D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
   5. F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
   6. F679 – Standard Specification for Type PSM Poly Vinyl Chloride (PVC).

1.05 SUBMITTALS

A. Submit as specified in Section 01300 – Submittals.
B. Shop Drawings and Laying Schedule as required by City/Design Professional.
C. Product Data:
   1. Submit manufacturer's product data for all pipe, fittings and accessories to be used.
   2. Manufacturer's report of the test results.

3. A manufacturer's certification shall be submitted indicating that the pipe and fittings were manufactured, sampled, tested and inspected in accordance with this specification and meet the minimum requirements. Each certification furnished shall be signed by an authorized agent of the manufacturer.

1.06 QUALITY ASSURANCE

A. The Contractor is responsible for the quality assurance and quality control of the Work.
B. Manufacturer:
   1. Certification of the minimum experience requirements. A minimum of five (5) years' experience in the design, manufacture and commercial supplying of the size and type of piping and fittings specified for the project.
   2. Inspection and testing shall be performed by the Manufacturer's quality control personnel in conformance with all applicable standards. Testing may be witnessed by City, Design Professional or approved independent testing laboratory. The Contractor shall provide certified test reports indicating that materials conform to these specifications.

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Inspect all materials delivered to the site for damage. Damaged pipe shall be replaced at no additional cost to the City.
B. Store materials (piping, jointing materials, rubber gaskets, etc…) with the minimum amount of handling possible. Store materials on site in enclosures or under protective coverings out of direct sunlight. Do not store materials directly on the ground.
C. Keep the interior of pipes and fittings free of dirt and debris.
D. Handle pipe, fittings and other accessories in such manner as to ensure delivery to the trench in a sound, undamaged condition. Hand carry, use slings or other approved devices designed to protect the pipe (do not drag pipe) when moving the materials.

PART 2 - PRODUCTS

2.01 REQUIREMENTS

1. Furnish pipe materials, joint types, sizes and strength classes as indicated and specified by the contract documents. The pipe shall be made of PVC plastic having a cell classification of 12454 or 12364 as defined in ASTM D1784.
2. Higher strengths Materials: may be furnished at the Contractor's option at no additional cost to the City.

2.02 PIPE, FITTINGS, JOINTS, COATINGS

A. Pipes and fittings eight (8) inches through fifteen (15) inches in diameter shall conform to ASTM D3034 except as otherwise specified herein.
   1. The minimum pipe wall thickness shall be as shown in Table 1 unless a thicker wall is noted in the contract documents.
   2. Color for pipe and fittings shall be green.
   3. Furnish maximum pipe length normally produced by the manufacturer. Fittings, closures and specials shall be as specified in the contract documents.
   4. All pipe shall have an integral bell and spigot joint.

5. Joints shall conform to ASTM D3212. Joints shall be push-on type only with the bell-end grooved to receive a gasket.

Table 1. Minimum Pipe Wall Thickness for Pipes 8 inches through 15 inches in Diameter

Depth of Pipe Cover (feet)	Pipe SDR
Less than or equal to 15 feet	26
15 to 30 feet	21
Greater than 30 feet	PVC pipe is not allowed

6. PVC pipe shall contain the markings required by ASTM D3034.
7. The spigot end of the pipe shall be marked with a reference line to facilitate assembly and installation inspection.
8. Elastomeric seals (gaskets) shall conform to ASTM F477. Natural rubber gaskets shall not be used.
9. Fittings (tee or wye connections) suitable for four (4) inch and six (6) inch sanitary service lines shall be bell-end with a minimum wall thickness conforming to SDR 26 unless a thicker wall is noted in the contract documents.
10. A special design is required for sanitary service connections 8 inches and larger. Special designs shall conform to the contract documents.
11. Saddle connections are not be allowed for sanitary sewer service lines.

B. Pipes and fittings eighteen (18) inches through (60) inches in diameter shall conform to ASTM F679 except as otherwise specified in the contract documents.
1. Furnish maximum pipe length normally produced by the manufacturer. Fittings, closures and specials shall be as specified in the contract documents.
2. Pipe shall have an integral bell and spigot joint to form a water tight seal.
3. Pipe shall have a minimum wall thickness conforming to ASTM F679 (PS115) unless a thicker wall is noted in the contract documents.
4. Joints shall conform to ASTM D3212. Joints shall be push-on type only with the bell-end grooved to receive a gasket.
5. Elastomeric seals (gaskets) shall conform to ASTM F477. Natural rubber gaskets shall not be used.
6. The minimum wall thickness of the fittings shall be the same as the minimum wall thickness of the equivalent size of the pipe for the project, specified in ASTM F679 or as otherwise specified in the contract documents, whichever is greater.
7. The minimum pipe stiffness shall be as specified in ASTM F679 (PS115) when tested at 5% deflection in accordance with Test method D2412.

PART 3 - EXECUTION

3.01 HANDLING

A. Pipe and accessories shall be handled in a manner that will ensure their finished installation keeps the materials in a sound, undamaged condition. Equipment, tools and methods used in loading, unloading, hauling and laying the pipe and fittings shall be such that the material is not damaged.

B. Pipe shall be handled in such a manner that no weight, including the weight of the pipe itself, will bear on or be supported by the spigot end or bell end at any time. Pipe and fittings which have been damaged to any degree will not be accepted and shall be removed from the project site.

3.02 TRENCHING AND BACKFILL.

A. Trenching, backfill, compaction and other efforts related to earthwork shall conform to Section 02250 – Trenching, Pipe Embedment and Backfill.

3.03 PIPE INSTALLATION

A. Install pipe and fittings in accordance with the requirements of ASTM D2321 for laying and joining pipe and fittings.

B. Inspect each pipe and fitting before and after installation; replace those found damaged or defective and remove from the trench and site.

C. Provide proper equipment and tools for lowering sections of pipe into the trench.

D. Lay pipe with the bell ends in the upgrade direction (bells ahead). Adjust spigots in the bells to give a uniform space all around. Blocking or wedging between bells and spigots is not allowed. Replace the pipe or fitting with one of the proper dimensions to allow uniform space for the proper installation of the joint.

E. At the end of each work day, temporarily seal the open ends of the pipe with a manufacturer's watertight plug or cap.

F. Provide batter boards not more than 25 feet apart in trenches for checking and ensuring that pipe invert elevations are as indicated in the contract documents. A laser beam may be used in lieu of batter boards for the same purpose.

G. Pipe shall be protected from lateral displacement by means of granular bedding material as provided in Section 02250 – Trenching, Pipe Embedment and Backfill.

H. Under no circumstances shall pipe be laid in water and no pipe shall be laid in unsuitable weather conditions or unsuitable trench conditions.

I. When the pipe is jointed in the trench, the main shall form a true and smooth line. Pipe shall not be trimmed except for closures. Pipe not providing a good fit shall be removed and replaced.

3.04 ALIGNMENT AND GRADE

A. All pipe shall be laid straight and true between changes in alignment and at a uniform grade between the changes in grade.

B. All lines shall be laid so that each section between manholes will fully lamp.

C. Pipe shall be aligned and constructed to the line and grade as shown on the Drawings.

3.05 JOINTING

A. All instructions and recommendations of the pipe manufacturer, relative to gasket installation and other jointing operations, shall be observed and followed by the Contractor. All joint surfaces shall be heavily lubricated with a vegetable soap solution immediately before the joint is completed.

3.06 CUTTING PIPE

A. Cutting of the pipe shall be done in a neat manner without damage to the pipe.
B. All cutting of pipe shall be done with a mechanical pipe cutter of an approved type by the manufacturer; except in locations where the use of mechanical cutters would be impracticable. Existing pipe may be cut with diamond point chisels, saws or other tools which will cut the pipe without damaging the pipe by impact or shock.
C. Pipe cuts shall be smooth, straight and at right angles to the pipe axis.

3.07 CLEANING

A. The interior of all pipe shall be cleaned of all foreign matter before being installed and shall be kept clean until the work has been accepted. All lumps, blisters and excess coating shall be removed from the exterior surface of the spigot and the interior surface of the bell. Such surfaces shall be brushed, wiped clean, dry and free from dirt, oil and grease before placing the spigot in the bell. All joint contact surfaces shall be kept clean until the jointing is complete.
B. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being installed. No debris, tools, clothing or other materials shall be placed or left in the pipe.
C. Whenever pipe laying is stopped at the end of the work day, the open end(s) of the line shall be sealed with a watertight plug or cap. Whenever a tie-in to the existing collection system is being made, plugs shall be installed to prevent groundwater and debris from entering the collection system and removed just prior to installing the closure.

3.08 FIELD QUALITY CONTROL

A. All pipelines shall be tested in accordance with Section 02702 - Sewer Pipe and Manhole Testing.

END OF SECTION

SECTION 02630 – STORMWATER PIPE AND STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers all labor, work, materials and equipment required for the installation of stormwater pipe, structures and all associated appurtenances.

1.02 SPECIFICATION MODIFICATIONS

A. It is understood that throughout this section these Specifications may be modified by appropriate items in section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

A. 01000 – General Project Requirements.
B. 01015 – Specific Project Requirements.
C. 01016 – Water Mains Near Sewers.
D. 01300 – Submittals.
E. 01320 – Construction Progress Documentation.
F. 02200 – Earthwork.
G. 02250 – Trenching, Pipe Embedment and Backfill.
H. 02575 – Surface Restoration.
I. 02605 – Drainage Structures.
J. 02624 – PVC Gravity Sewer Pipe.
K. 02686 – Cleaning and Assessment of Gravity Lines.
L. 02702 – Testing Requirements for Sanitary Sewer: Mains and Manholes

1.04 CODES AND STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
B. American Association of State Highway and Transportation Officials (AASHTO) standards as cited or referenced herein.
C. American Society for Testing and Materials (ASTM):

ASTM C76-19a	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM F3219	Standard Specification for 6 to 30 in. Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe
ASTM F2764	Standard Specification for 6 to 60 in. Polypropylene (PP) Corrugated Double and Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
ASTM D2412-21	Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
ASTM D3212-20	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM F477-14	Standard Specification of Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F2306	Standard Specification for 12 to 60 in. Annular Corrugated Profile-Wall Polyethene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications

ASTM D3350-14	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
ASTM D3034-16	Standard Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM F679-16	Standard Specification for Polyvinyl Chloride (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.

1.05 INFORMATION PROVIDED BY THE CITY

A. As provided in the Contract Documents.

1.06 SUBMITTALS

A. Submit in accordance with Section 01300 – Submittals.
B. Submittals include, but not limited to, the following:
   1. Pipe Certifications.
   2. Joint Sealant and/or Gaskets.
   3. Product Data.

1.07 QUALITY ASSURANCE

A. The Contractor is responsible for the quality assurance and quality control of the Work.
B. Manufacturer:
   1. Shall be experienced in the design, manufacture and commercial supplying of the specified material for a minimum period of five (5) years.
   2. Shall be experienced in the design, manufacture, and commercial supplying of the specified size of pipe for a minimum period of three (3) years.
   3. Inspection and Testing shall be performed by the Manufacturer's quality control personnel in conformance with applicable standards. Testing may be witnessed by City, Design Professional, or approved independent testing laboratory. The Contractor shall provide certified test reports indicating that materials conform to all standards and specifications.
   4. Shall certify to the above minimum experience requirements.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Pipe, fittings, and accessories shall be handled in accordance with the pipe manufacturer's recommendations.
B. Equipment, tools, and methods used in handling and installing pipe and fittings shall not damage the pipe and fittings.
C. Pipe shall not be stored uncovered in direct sunlight.
D. Pipe materials delivered or stored on site shall be free of all damage, chips, cracks, gouges or ultraviolet (UV) degradation. Damaged materials shall be removed from the site and replaced at no additional cost to the City.
E. See also Section 01000 – General Project Requirements.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials and construction shall be in compliance with KCMO Water's Standard Specifications and Manufacturer's recommendations.
B. Reinforced Concrete Pipe: All reinforced concrete pipe (RCP) as called out on the Contract Drawings, shall be of standard manufacture in accordance with the applicable sections of the Standard Specifications. Pipe materials shall meet or exceed ASTM C76, Class II, III, IV, or

V (per the design), wall B, Reinforced Concrete Pipe (RCP). Reinforced concrete storm sewer pipe shall use synthetic rubber "O-ring" gasketed joints where specified on the plans.

C. Polyvinyl Chloride Pipe: All Polyvinyl Chloride (PVC) pipe for storm sewer pipe shall be a minimum of SDR 21 and comply with Section 02624 with the exception of the color requirement.

D. Dual Wall and Triple Wall Polypropylene Storm Sewer Pipe: Dual wall pipe and fittings 12 inch through 24 inch diameter shall conform to ASTM F3219 and triple wall pipe 30 inch through 60 inch shall conform to ASTM F2764, except as otherwise specified herein. Dual wall polypropylene pipe shall have a smooth interior and annular exterior corrugation. Triple wall polypropylene pipe shall have a smooth interior and exterior with annular inner corrugations. Pipe shall have a minimum pipe stiffness of 46 psi when tested in accordance with ASTM D2412. Pipe shall be joined with an integral bell and spigot joint on all sizes. The joints shall be watertight in accordance with ASTM D3212. The spigot shall have two gaskets meeting the requirements of ASTM F477. The gaskets shall be installed by the pipe manufacturer and shall be covered with a removable, protective wrap to ensure the gaskets are free from debris. A joint lubricant shall be used on the gasket and pipe bell during assembly. Pipe shall have a reinforced bell with a polymer composite band installed by the manufacturer.

E. High Density Polyethylene Pipe (For use outside of roadways): High density polyethylene (HDPE) pipe and fittings shall conform to ASTM F2306 with annular corrugations and an integral bell and spigot. The manufacturer of the pipe must participate in the AASHTO/National Transportation Product Evaluation Program (NTPEP). The maximum cover depth shall be 30 feet.

   Material for pipe and fitting production shall be HDPE conforming with the minimum requirements of cell classification 435400C for 12" to 60" diameters as defined in ASTM D3350, except carbon black content shall not exceed 4%. Joint tightness shall conform to ASTM D3212. Elastomeric seal (gasket) shall have a basic polymer of synthetic rubber conforming to ASTM F477. Natural rubber gaskets will not be used. Bells shall span over three corrugations.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Storm sewer pipe structures and appurtenances shall be provided, installed and constructed at the locations shown on the Drawings. Materials and construction shall be in compliance with this Section, Related Sections listed in paragraph 1.03 and Section 2600 of the "KCMO Standard Construction Specifications and KCMO Standard Drawings", except as amended herein.

B. Prior to constructing new sewers, the Contractor shall physically locate all utilities within ten (10) feet of the proposed sewers. If there is a utility conflict with the proposed sewers, the Contractor shall notify the City/Design Professional and survey the existing service top elevation and horizontal coordinates. Certified as-built redlines and the utility investigation surveying are the sole responsibility of the Contractor.

C. The Contractor is responsible for determining all conflicted crossings for the proposed storm sewer and submit their service-relocation shop drawings and/or certified sketches for the City/Design Professional's review and approval. (Contractor is also responsible for providing field electronic data such as the location coordinates and spot elevations for the City/Design Professional's use.) It shall be the responsibility of the Contractor to obtain necessary field information for aiding in determining the required minimum length of the existing sanitary or

any other services necessary to clear for the construction of proposed sewers. See also Section 01016 – Water Mains Near Sewers for additional requirements.

D. Existing sewer mains, sanitary sewer service laterals and water service lines that require relocation or adjustment, in the vertical or horizontal alignments shall be performed by the Contractor. Repairs to the damages caused by the Contractor are the sole responsibility of the Contractor.

E. Connection(s) to an Existing System pipe and structures shall be installed per manufacturer's guidelines and recommendations. Where a storm sewer pipe is being connected to an existing drainage structure, the work shall be constructed by sawing and chipping a hole through its sidewall to allow a minimum of three-inches of new concrete around the pipe. The invert shall be chipped away and replaced to shape a new doghouse collar and invert. The interior concrete surfaces shall be grouted smooth with non-shrink grout. Depending on the method and extent of the sidewall demolition, reinforcing bars may need to be doweled into the existing structure at the direction of the City/Design Professional.

F. Pipe Trimming: Pipes connecting to structures shall be cut parallel with the inside face of structures with plane walls. Pipes connecting to other pipes shall be cut parallel with the spring line of the pipe. Projection of the pipe beyond the inside face shall not exceed one inch. Voids shall be grouted with non-shrink grout.

G. Connection of Existing Pipes to New Pipes: Connection to and/or extension of an existing pipe shall be accomplished by using a fabricated non-shear coupling. The connection shall be properly supported to prevent settlement. All work shall be performed to the satisfaction of the City/Design Professional.

H. Pipe Abandonment: Any abandoned pipes left in place shall be filled with Fly Ash Slurry and both ends plugged with concrete or as otherwise specified in the Contract Drawings.

I. Tunneling under or near a tree: Storm sewer pipes within the drip line of a tree marked "Save" shall be installed by tunneling under the roots. Drip line is defined as the diameter of the tree in inches x 10 = drip line diameter in feet. One joint of RCP may be pushed with the excavator bucket. Boring and jacking shall be accomplished in accordance with KCMO 2600; steel casing may not be required for RCP, per the design. There will be no separate payment for tunneling operations of 30' or less.

3.02 ACCEPTANCE TESTING

The Contractor shall perform acceptance testing for all manholes, structures, pipe and all appurtenances in accordance with Section 02702 – Testing Requirements for Sanitary Sewer: Mains and Manholes. The Contractor shall furnish all labor, equipment, materials and provide the testing reports for the required acceptance tests. Pipelines that do not conform to the requirements shall be repaired and/or replaced and shall be retested until the pipeline meets the project requirements. Testing shall be performed in the presence of the City/Design Professional. Testing shall be recorded by the Contractor and a copy shall be submitted to the City/Design Professional. The mandrel or laser profiling testing shall be performed after backfill and compaction operations have been completed and in accordance with Section 02702.

3.03 POST CONSTRUCTION CCTV

A. Contractor shall provide post-construction CCTV video footage for all completed pipe, in accordance with Section 02686 – Cleaning and Assessment of Gravity Lines.

END OF SECTION

SECTION 02631 – POLYVINYL CHLORIDE (PVC) PRESSURE PIPE FOR STORMWATER AND WASTEWATER

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing and installation of buried polyvinyl chloride (PVC) pressure pipe for stormwater, domestic, municipal and industrial sewage. PVC pressure pipe shall be furnished complete with all jointing materials and all other necessary appurtenances. PVC is an alternative piping material for all sewer piping shown on the drawings. See also Section 01016 – Water Mains Near Sewers for installation requirements when constructing sewers near potable water lines. All pipeline materials shall be furnished by the Contractor. All material shall be new and shall comply with the specifications described herein.

1.2 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.

1.3 RELATED SECTIONS

A. Section 01000 – General Project Requirements.
B. Section 01015 – Specific Project Requirements.
C. Section 01016 – Water Mains Near Sewers.
D. Section 01300 – Submittals.
E. Section 01320 – Construction Progress Documentation.
F. Section 02200 – Earthwork.
G. Section 02250 – Trenching, Pipe Embedment and Backfill.
H. Section 02575 – Surface Restoration.
I. Section 02702 – Testing Requirements for Sanitary Sewer: Mains and Manholes.

1.4 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 F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
ASTM D2241	Standard Specification for Polyvinyl Chloride (PVC) Pressure- Rated Pipe (SDR Series).
ASTM D3139	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

C. American Water Works Association (AWWA):

AWWA C110	Ductile-Iron and Gray-Iron Fittings, 3 Inches Through 48 Inches (75 mm through 1,200 mm) for Water and Other Liquids.
AWWA C153	Ductile-Iron Compact Fittings, 3 In. Through 24 in. (76 mm through 610 mm) and 54 In. Through 64 In. (1,400 mm through 1,600 mm), for Water Service.

AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1500 mm).
AWWA Manual M23	PVC Pipe - Design and Installation.

1.5 QUALITY ASSURANCE

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

B. Work shall be performed by a Contractor, with a proven record of performance for similar installations.

C. Manufacturer:

1. Shall be experienced in the design, manufacture and commercial supplying of the specified material for a minimum period of five (5) years.
2. Shall be experienced in the design, manufacture, and commercial supplying of the specified size of pipe for a minimum period of three (3) years.
3. Inspection and Testing shall be performed by the Manufacturer's quality control personnel in conformance with applicable standards. Testing may be witnessed by City, Design Professional, or approved independent testing laboratory. The Contractor shall provide certified test reports indicating that materials conform to all standards and specifications.
4. Shall certify to the above minimum experience requirements.

1.6 CONTRACTOR SUBMITTALS

A. Shop Drawings:

1. Pipe and joint details, including pipe sample piece.
2. Special, fitting, and coupling details.
3. Gasket material details.

B. Product Data:

1. Laying and installation schedule complete with an explanation of all abbreviations used in the schedule.

C. Certificates:

1. Affidavit of compliance with applicable standards.
2. Test certificates.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Pipe, fittings, and accessories shall be handled in accordance with the pipe manufacturer's recommendations.

B. Equipment, tools, and methods used in handling and installing pipe and fittings shall not damage the pipe and fittings.

C. Pipe shall not be stored uncovered in direct sunlight.

D. Pipe materials delivered or stored on site shall be free of all damage, chips, cracks, gouges or ultraviolet (UV) degradation. Damaged materials shall be removed from the site and replaced at no additional cost to the City.

E. See also Section 01000 – General Project Requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe:

1. Pipe shall conform to ANSI/AWWA C900, as applicable.

2. At a minimum, the dimension ratio of all pipe sizes shall be DR 21 in accordance with ANSI/AWWA C900.
3. The pipe minimum inside diameter and location shall be as indicated on the drawings.
4. Gaskets shall conform to ASTM F477 and be synthetic rubber. Natural rubber gaskets are not acceptable.
5. Pipe Color:
    i. Pipe interior and exterior shall be **GREEN** or **WHITE**. Blue pipe is not acceptable.
    ii. Color Code and sample piece shall be supplied with shop drawings prior to pipe approval.
6. Each pipe and fitting shall have the following information plainly and permanently marked with waterproof paint thereon:
    i. Date of manufacture code.
    ii. Manufacturer's name or trademark.
7. Control tests:
    i. Quality control tests shall be performed during the manufacture of the pipe as required in AWWA C900.

B. Fittings:
1. Fittings shall conform to AWWA C110 or AWWA C153 and shall be ductile iron. Fittings shall be mechanical joint or push-on-type joint.
2. Fittings shall have pressure rating of not less than that specified for the pipe.
3. All fittings shall have pressure rating and letters "DI" or "DUCTILE" cast on the fitting.

C. Joints:
1. Joints shall be push-on type and meet the requirements of ASTM D3139. Gaskets shall meet the requirements of ASTM F477. Gaskets of natural rubber are not acceptable.
2. Joint lubricant shall be a vegetable based lubricant. Petroleum or animal based lubricants are not acceptable.
3. Restrained Joint PVC 4" -24" shall be C900, Eagle Loc, Diamond Lok, Certainteed Certa-lok or Fusible C900.

PART 3 - EXECUTION

3.1 INSPECTION

A. Pipe shall be carefully examined for cracks and other defects immediately before installation; spigot ends and bells shall be examined with particular care.
B. All defective pipe and fittings shall be marked as such removed from the site of the work.

3.1 CUTTING PIPE

A. Cutting shall comply with the pipe manufacturer's recommendations and with Chapter 7 of AWWA Manual M23.
B. Cuts shall be smooth, straight, and at right angles to the pipe axis.
C. After cutting, the end of the pipe shall be dressed to remove all roughness and sharp edges and shall be beveled in accordance with the manufacturer's instructions.

3.3 JOINTING

A. Jointing shall conform to the pipe manufacturer's instructions and recommendations.

B. All surfaces for gasketed joints shall be lubricated immediately before the joint is complete.

C. Gaskets and lubricants shall be supplied by the pipe manufacturer, shall be suitable for use in potable water, shall be compatible with the pipe materials, shall be stored in closed containers, and shall be kept clean.

D. Each spigot shall be suitably beveled to facilitate assembly.

3.4 CLOSURE PIECES

A. A shop fabricated closure piece is required at the connections to existing pipe.

End of Section

SECTION 02702 – TESTING REQUIREMENTS FOR SANITARY SEWER: MAINS AND MANHOLES

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers the testing of all sewer mains and manholes. The Contractor shall provide all materials, labor and equipment to complete the testing requirements in accordance with this section. All costs pertaining to testing shall be included in the lump sum bid.

1.02 SPECIFICATION MODIFICATIONS

A. It is understood that throughout this section, these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.03 RELATED SECTIONS

A. Section 01015 – Specific Project Requirements.
B. Section 01300 – Submittals.
C. Section 02687 – Laser Profiling of Sewer Mains.
D. Section 03362 – Manhole Rehabilitation.
E. Section 03370 – Sanitary Sewer Manhole Construction.
F. Section 05010 – Sanitary Sewer Manhole Castings.

1.04 QUALITY ASSURANCE

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

1.05 INFORMATION PROVIDED BY THE CITY

A. As provided in the Contract Documents.

1.06 CODES and STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. The version of the codes and standards in effect at the time of the Notice to Bidders shall be used, except as noted on the Drawings or in the Specific Project Requirements section of these specifications.

B. American Society for Testing and Materials (ASTM):

ASTM C828 – Low-Pressure Air Testing of Vitrified Clay Pipe Lines.

ASTM C969 – Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.

ASTM C1244 – Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

ASTM F1417 – Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.

C. American Water Works Association (AWWA):

AWWA C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.07 CONTRACTOR SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals:
   1. Testing plan, procedures and schedule.
   2. Testing equipment.

PART 2 - PRODUCTS

Not Used.

PART 3 – EXECUTION

3.01 GENERAL

A. The City/Design Professional must witness the pressure and leakage test for it to be a valid test.
B. All sewer main joints and all manholes shall be watertight and free from leaks.
C. There is zero allowable leakage. All defects causing infiltration/exfiltration shall be corrected at no additional cost to the City.

3.02 SAFETY

A. All work shall be performed in accordance with applicable Occupational Safety and Health Administration (OSHA) standards.

3.03 SEWER PIPE ALIGNMENT AND GRADE TESTING

A. The alignment, grade and visible defects shall be checked as follows:
   1. Prior to inspection, the Contractor shall clean and flush the sewer main with clear water to remove excess mortar, joint sealant, dirt, debris etc.
   2. All sewer mains shall be mandrel tested to determine ovality, the presence of any misaligned, displaced, or broken pipes and other defects.
   3. All defects shall be corrected prior to conducting the pressure and leakage test.

3.04 PRESSURE AND LEAKAGE TEST FOR INFILTRATION/EXFILTRATION

A. Sewer pipe infiltration/exfiltration testing:
   1. There shall be zero leakage on the infiltration/exfiltration test.
   2. The Contractor shall perform hydrostatic or air pressure tests on all sewers before acceptance by the City. The Contractor shall provide all materials, labor and equipment required including, but not limited to, the following: water, necessary piping connections, test equipment, water meter, pressure gauges, bulkheads, and fittings required for hydrostatic or air pressure testing.
   3. Pressure and leakage testing for Infiltration/Exfiltration testing shall be conducted. Where evidence of infiltration/exfiltration is discovered by the Contractor or by the City/Design Professional, the Contractor shall repair or replace the defective reach of pipeline at no additional cost to the City. Following repair of the pipeline, the Contractor shall re-test and make additional repairs until zero infiltration/exfiltration is achieved.

4. Pressure and leakage testing for Infiltration/Exfiltration shall be performed by the Contractor using the methods as set forth below. The required testing shall be successfully performed on carrier conduits prior to filling the void between the casing and the carrier conduits with sand or the sealing of the ends of the casing conduits.
   a. Air Testing of Gravity Systems:
      (1) Each section of gravity pipeline between manholes and/or structures after backfill shall be tested as outlined below.
      (2) Contractor shall furnish all materials, labor and equipment required including necessary piping connection, test pumping equipment, pressure gauges, bulkheads, regulator to avoid over pressurization, and all miscellaneous items required.
      (3) The pipe plug for introducing air to the sewer line shall be equipped with two taps. One tap will be used to introduce air into the line being tested through suitable valves and fittings, so that the input air may be regulated. The second tap will be fitted with valves and fittings to accept a pressure test gauge indicating internal pressure in the sewer pipe. Additional valve and fitting will be incorporated on the tap used to check internal pressure so that a second test gauge may be attached to the internal pressure tap. The pressure test gauge valve may also be used to indicate loss of air pressure due to leaks in the sewer line.
      (4) The pressure test gauge shall meet the following minimum specifications:

Size (diameter)	4-1/2 inches
Pressure Range	0-15 psi
Figure Intervals	1 psi increments
Minor Subdivisions	0.05 psi
Pressure Tube	Bourdon Tube or diaphragm.
Accuracy	+/-0.25% of maximum scale
Dial	White coated aluminum with black lettering, 270degree arc and mirror edge.
Pipe Connection	Male 1/2 inch N.P.T.

      Calibration data will be supplied with all pressure test gauges. Certification of pressure test gauge will be required from the gauge manufacturer. This certification and calibration data will be available to the City/Design Professional whenever air tests are performed.
      (5) Plug ends of line and cap or plug all connections to withstand internal pressure. One of the plugs provided must have two taps for connecting equipment. After connecting air control equipment to the air hose, monitor air pressure so that internal pressure does not exceed 5.0 psig. After reaching 4.0 psig, throttle the air supply to maintain between 4.0 and 3.5 psig for at least two (2) minutes in order to allow equilibrium between air temperature and pipe walls. During this time, check all plugs to detect any leakage. If plugs are found to leak, bleed off air, tighten plugs, and again begin supplying air. After temperature has stabilized, the pressure is allowed to decrease to 3.5 psig. At 3.5 psig, begin timing to determine the time required for pressure to drop to 2.5 psig. If the time, in seconds, for the air pressure to decrease from 3.5 psig to 2.5 psig is greater than that shown in the table below, the pipe shall be presumed free of defects.

Minimum Test Times in Plastic Pipe

Pipe Diameter (in)	Minimum Time (min:secc)	Length for Minimum Time (ft)	Time for Longer Length (sec)
4	3:46	597	.380 L
6	5:40	398	.854 L
8	7:34	298	1.520 L
10	9:26	239	2.374 L
12	11:20	199	3.418 L
15	14:10	159	5.342 L
18	17:00	133	7.692 L
21	19:50	114	10.470 L
24	22:40	99	13.674 L
27	25:30	88	17.306 L
30	28:20	80	21.366 L
33	31:10	72	25.852 L
36	34:00	66	30.768 L
42	39:48	57	41.883 L
48	45:34	50	54.705 L
54	51:02	44	69.236L
60	56:40	40	85.476L

L = Total Length

If air test fails to meet above requirements, repeat test as necessary after all leaks and defects have been repaired and backfilled.

Before the manhole vacuum test is performed and in areas where ground water is known to exist, install a one-half inch diameter capped pipe nipple, approximately 10" long, through manhole wall above one of the sewer lines entering the manhole. This shall be done at the time the sewer is installed. Immediately prior to the performance of the line acceptance test, ground water level shall be determined by removing pipe cap, blowing air through pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to pipe nipple. The hose shall be held vertically and a measurement of height in feet of water shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. If the air pressure required for the test is greater than 9 psig, the air test method will not be allowed. Instead, an infiltration test shall performed by the Contractor.

(6) If Polyvinyl Chloride (PVC) gravity sewer pipe is used it shall be air-tested in accordance with the requirements of ASTM F-1417.

b. Hydrostatic Tests for Pressure Systems (Sewer Force Mains):
   (1) Conformance Procedure: The Contractor shall perform hydrostatic pressure and leakage tests for all sewer force mains. The test shall conform to AWWA C600 procedures except as modified herein. There shall be zero leakage/drop in pressure.
   (2) Sectionalizing: Test in segments between sectionalizing valves, between a sectionalizing valve and a test plug, or between test plugs. Contractor shall furnish and install test plugs at no additional cost to the City, including all anchors, braces, and other devices to withstand hydrostatic pressure on plugs. Contractor shall be responsible for any damage to public or private property caused by failure of plugs. Limit fill rate of line to available venting capacity. Fill rate shall be regulated to limit velocity in lines when flowing full to not more than 0.05 to 1.0 fps.
   (3) Pressure and Leakage Test: Conduct at 1.5 times the maximum operating pressure, but not less than 100 psi, for a minimum of two hours:

$$L = (0.0000075\ SD(P)^{1/2})/2$$ where

L = 2 hour allowable make-up water (gallons)
S = length of pipe tested (ft.)
D = nominal pipe diameter (in)
P = test pressure (psig)

3.05 SEWER PIPE DEFLECTION TESTING

A. The mandrel testing shall be conducted again thirty days after final trench backfill.
B. The mandrel device shall be cylindrical in shape and constructed with nine (9) evenly spaced arms or prongs. Mandrels with fewer arms will be rejected as not sufficiently accurate. The rigid mandrel shall have an outside diameter (O.D.) equal to 95 percent of the inside diameter (I.D.) of the pipe. The inside diameter of the pipe, for the purpose of determining the outside diameter of the mandrel, shall be the average outside diameter minus two minimum wall thicknesses for O.D. controlled pipe and the average inside diameter for I.D. controlled pipe. Dimensions shall be per appropriate standard. The "D" mandrel dimension shall carry a tolerance of + or - 0.01 inch. Allowances for pipe wall thickness tolerances or ovality (from heat, shipping, poor production, etc.) shall not be deducted from the "D" dimension but shall be counted in as a part of the five (5) percent or lesser deflection allowance. Contact length (L) shall be measured between points of contact on the mandrel arm. The length shall not be less than twelve inches.
C. The mandrel shall be hand-pulled by the Contractor through all flexible sewer lines. Any sections of sewer not passing the mandrel test shall be uncovered and the Contractor, at no additional cost to the City, shall repair or replace the sewer to the satisfaction of the Engineer. These repaired segments shall be re-tested by the Contractor.
D. Following a successful thirty day mandrel test, all sewer mains shall be Laser Profiled, see SECTION 02687.

3.06 MANHOLE TESTING

A. All new manholes and fully rehabilitated manholes with pipe end seals installed shall be tested for infiltration/exfiltration by vacuum testing. All vacuum testing shall be performed in the presence of the City/Design Professional. Notification by the Contractor to the City/Design Professional shall be made 5 days in advance of testing. All visible defects and leaks shall be repaired by the Contractor prior to testing and then again during the warranty period.

B. Vacuum testing is required on all new manholes and fully rehabilitated manholes with a main line diameter of less than 42 inches.

C. Prior to payment for new manholes and fully rehabilitated manholes rehabilitation, the manholes shall pass the vacuum test as identified in this specification.

D. The initial vacuum test on new manholes or structure shall be conducted prior to backfilling. Vacuum testing after backfilling should be performed only after a successful non-backfill test has been completed. The Contractor shall not vacuum test backfilled manholes in the presence of ground water. All pipes entering the manhole shall be plugged at least eight (8) inches into the sewer pipe. The plug must be inflated at a location beyond the manhole/pipe gasket.

(1) All plugs shall be adequately braced to prevent the plug or pipe from being dislodged and drawn into the manhole.

(2) A vacuum of at least 10-1/2 inches of mercury shall be drawn on the manhole. The valve on the vacuum line to the manhole shall be shut and the vacuum line disconnected. The vacuum line valve shall be opened and the vacuum adjusted to 10 inches of mercury.

(3) The pressure gauge shall be liquid filled having a 3.5 inch diameter face with a reading from zero to 30 inches of mercury. The test equipment shall be capable of having two gauges connected. The gauge supplied with the test equipment shall match the reading of a gauge furnished by the City/Design Professional.

(4) The time for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury shall not be less than the following values for the manhole to be considered as passing the vacuum test:

Manhole Depth	Time in Minutes
10 feet or less	2
10.1 to 15 feet	2.5
15.1 to 25 feet	3

(5) If a manhole fails the vacuum test, the manhole shall be repaired with a City approved product and re-tested. This procedure shall be continued until all defects have been repaired and the manhole successfully passes the vacuum test.

3.07 WARRANTY

A. The Contractor shall warranty all work during the Performance and Maintenance period. All defects including infiltration/exfiltration found during the warranty period shall be corrected immediately at no additional cost to the City.

END OF SECTION

SECTION 02750
DECORATIVE (EXPOSED AGGREGATE) CONCRETE PAVING

PART 1 -GENERAL

1.1 SUMMARY

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

B. Section Includes:
   1. Exposed Aggregate Finish Concrete Plaza with sawcut control joints and expansion joints.

C. Related Requirements:
   1. Section 03300 Cast-In-Place Concrete

D. Definitions
   1. Exposed Aggregate Finish: Coarse textured concrete finish resulting from the removal of the paste from floated and troweled finished concrete by applying a chemical retardant and brushing with a stiff brush while washing with water to reveal decorative aggregate added to the concrete mix design.

1.2 REFERENCES

A. American Concrete Institute (ACI):
   1. ACI 303.1 "Standard Specification for Cast-In-Place Architectural Concrete."
   2. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing of Concrete."
   3. ACI 305R "Recommended Practice for Hot Weather Concreting."
   4. ACI 306R "Recommended Practice for Cold Weather Concreting."
   5. ACI 347 “Recommended Practice for Concrete Formwork.”

B. American Society of Testing and Materials (ASTM):
   1. ASTM C31 “Practices for Making and Curing Concrete Test Specimens in the Field.”
   2. ASTM C33 “Specification for Concrete Aggregates.”
   3. ASTM C39 “Test Method for Compressive Strength of Cylindrical Concrete Specimens.”
   4. ASTM C94 “Specification for Ready-Mixed Concrete.”
   5. ASTM C143 “Test Method for Slump of Hydraulic Cement Concrete.”
   6. ASTM C150 “Specification for Portland Cement.”
   7. ASTM C172 “Practice for Sampling Freshly Mixed Concrete.”
   8. ASTM C260 “Specification for Air-Entraining Admixtures for Concrete.”

9. ASTM C309 "Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete."
10. ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."
11. ASTM D994 “Specification for Preformed Expansion Joint Filler for Concrete.”

C. Non-Specific:
1. CRSI “Manual of Standard Practice”
2. SP-66 “ACI Detailing Manual”

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s complete technical data sheets and materials certificates for the following:
1. Curing compound.
2. Sealants with Color Chart Options
3. Chemical surface retarder(s)
4. Expansion Joint
5. Decorative Aggregate

B. Design Mixes: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

C. Physical Samples: 10-LB sample of internal or seeded aggregate for special finish concrete paving. Information from aggregate supplier indicating source, type, color, and gradation of aggregate must accompany sample as product data.

D. Physical Samples: 12” length of expansion joint material with sealant color chart.

E. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
2. Laboratory Test Reports: Submit concrete test materials test reports and mix design reports certifying that each material or item complies with or exceeds the specified requirements.

F. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing compounds.

5. Applied finish materials.
6. Bonding agent or epoxy adhesive.
7. Joint fillers.

G. Field quality-control test reports.

H. Minutes of preinstallation conference.

I. Qualification Data: For firms and contractors indicated in "Quality Assurance" Article, including list of completed projects.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer with 10-years of experience in manufacture of specified products.
2. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

C. Installer Qualifications:
1. An installer with 5-years' experience with work of similar scope and quality, installing integrally exposed/seeded aggregate special finish concrete paving in climates that experience seasonal freeze-thaw cycles.
2. Installer shall demonstrate successful experience with installing exposed aggregate special finish concrete paving by citing five (5) successful installations in climates that experience seasonal freeze-thaw cycles. At least one project shall be 10,000 SF minimum. For each project, include the following information:
a. Project description
b. Project location
c. Date of installation
d. Completed project photos.

D. Comply with the requirements of ACI 301 "Specification for Structural Concrete", unless modified by requirements in the Contract Documents.

E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

F. Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.

G. Concrete Mockup:
   1. Provide under provisions of Division 01 Section "Quality Control."
   2. At location on Project site selected/approved by design professional, place and finish panels for review of 6-ft X 6-ft in size. Mockups will not be incorporated into the finished work.
   3. Mockups Required:
      a. Exposed Aggregate Finish Concrete with joints demonstrating multiple etch depth exposures capturing target depth and the next closest 'beyond target' depth for comparison selection.
   4. Construct mockups using processes and techniques intended for use on permanent work, including curing procedures and sealant. Include samples of control, construction, and expansion joints in sample panels. Mockup shall be produced by the individual workers who will perform the work for the Project.
   5. The contractor shall rework mockup or first installation until the Landscape Architect is satisfied with the finish. Rework may include, but not limited to, modification to the chemical surface retarder specification sealant selection, joint type and appearance.
   6. Accepted mockups provide visual standard for work of Section.
   7. Mockups shall remain through completion of the work for use as a quality standard for finished work and as a record of previous review and comment.
   8. Remove mockups when directed.

H. Preinstallation Conference: Conduct conference at Project site.
   1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete producer.
      d. Concrete pavement subcontractor.
      e. Landscape Architect
      f. Construction Manager

I. Specialty Pavement Design Mix Conference: Conduct conference at Project site.
   1. Prior to sample fabrication, review design intent, seeded/integral aggregate material, aggregate size and percentage of coverage. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
      a. Contractor's superintendent.
      b. Concrete pavement subcontractor.
      c. Landscape Architect
      d. Construction Manager

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in original factory unopened, undamaged packaging bearing identification of product, manufacturer, batch number, and expiration data, as applicable.

B. Store the product in a location protected from damage, construction activity, and precipitation in strict accordance with the manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
   2. Products: Subject to compliance with requirements, provide one of the products specified.
   3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
   4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
   1. Use flexible or curved forms for all curves.
   2. Material used for forming must be cleaned in advance of placement and usage.

3. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bowing or deflection.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
   1. Acceptable Materials: Clean Strip J100 VOC (www.daytonsuperior.com) or approved equal.

C. Form Ties: Where applicable, provide factory-fabricated, adjustable length, removable or snap off metal form ties, designed to prevent deflection and to prevent spalling concrete surfaces upon removal.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Cold-drawn steel wire: ASTM A82.

2.4 CONCRETE MATERIALS

A. Cementitious Material: "6-sack mix" Portland Cement per ASTM C94, ASTM C 150, Type I, "Low-Alkali" or Type IL cement unless otherwise specified. Use one brand of cement throughout the project unless otherwise approved by the Owner's representative.

B. Aggregates: ASTM C33 (Normal weight). Coarse and fine aggregates shall be "Meramec Sand and gravel" (Pea Pebbles; 3/8"), beneficiated to remove all deleterious materials. Washed gravel is not acceptable, except as noted. Provide aggregates from a single source, with documented service record data of at least 10 years' satisfactory service in similar pavement applications and service conditions using similar aggregates and cementitious materials.

C. Water: ASTM C 94/C 94M; Potable, clean, fresh, free from oils, acids, organic matter or other deleterious substances.

D. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
   1. Water-Reducing Admixture: ASTM C 494, Type A or D
   2. Mid-range water-reducing admixture: ASTM C494, Type A
   3. Air-entraining: ASTM C260
   4. High-range water-reducing admixture: ASTM C494, Type F or G.
   5. Non-chloride, non-corrosive accelerator: ASTM C494, Type C or E.

6. Fly ash or ground granulated blast-furnace slag shall not be used.
7. Calcium chloride is NOT permitted.
8. Use of admixtures other than those listed will be permitted only when approved prior to bid.

2.5 CHEMICAL SURFACE RETARDER:

A. Water-soluble, liquid-set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a specified depth.
   a. Surface retarder for Exposed Aggregate Finish Concrete capable of delaying hardening of concrete and exposing sand to a minimum depth of 1/16-1/8” without significant exposure of aggregate.
   b. Surface Retarder: Top-Cast Concrete Surface Retarder “03 Light Violet, Acid Etch Finish”, manufactured by Dayton Superior (800) 745-3700 or approved equal. Specified product code selection may be modified, pending Landscape Architect’s prior approval, by installer to achieve greater etch depth results as produced in Phase 1. Specific product selection may be modified as directed by the Owner’s representative on review of the effect produced in the mockup.
   c. Existing surface Protector: Top-Cast Site Saver SS 100
   d. Wash-off Extender: Top-Cast EX 200; or approved equal
2. Existing Surface Protector and Wash off Extender used at Contractor’s discretion shall be compatible with retarder specified.

B. CURING MATERIALS
1. Top Cast Decorative Finish System,, or approved equal: Comply with ASTM C309
   a. Penetrating Protector; top Cast PR 300
   b. Cure and Seal: Top Cast CS 400
   c. High Gloss Sealer: HG 500
2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
4. Water: Potable.
5. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete. For buff –wash finish use only as recommended by surface retarder manufacturer:
   a. Dayton Superior Corporation; Sure Film; or other recommended product.
6. Clear Waterborne Membrane-Forming Curing Compound, For buff –wash finish use only as recommended by surface retarder manufacturer: ASTM C 309, Type 1, Class B.

a. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W); or other recommended product.

C. SUBSTITUTIONS: The use of products other than those specified may be considered providing that the Contractor requests its use in writing. This request shall be accompanied by the following:
1. Certificate of compliance from material manufacturer stating that proposed products meet or exceed requirements of this Section.
2. Documented proof that proposed materials have a 10-year proven record of performance, including similar finish work

2.6 RELATED MATERIALS

A. Joint-Filler Strips: ASTM D 1751:
1. Nomaco Fastflex 4” width x 0.5” thick closed-cell polyethylene foam joint filler with tear-off strip for use with cold-applied sealants, gray.
2. W.R. Meadows Fiber Expansion Joint; asphalt-saturated cellulosic fiber with snap cap for joint sealant application.

B. Preformed joint caps: Two-part thermoplastic strip expansion joint caps with removable cap. Width to match specified expansion or isolation joint.
1. Snap Cap, manufactured by WR Meadows, (800) 342-5976
2. Voidcap, manufactured by JD Russell Company, (800) 888-9708
3. Or approved equal.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements, and as follows:
1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.7 CONCRETE MIX DESIGN

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

B. Proportion mixtures to provide normal-weight concrete with the following properties:
1. Concrete shall conform to MCIB Section 1 and shall have a design strength of 4,500 or greater in accordance with

2019 Kansas City Metropolitan Chapter of the American Public Works Association Section 2200.
2. Aggregate: Gap graded with coarse aggregate consisting of not more than 62% - 65% minimum content.
3. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.55 by weight.
4. Slump Limit: 4 inches; +/- 0.5 inches.
5. Fly Ash shall not be used to reduce the amount of cementitious material.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
1. Air Content: 4.5 to 6.5 percent.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use approved admixtures in concrete as permitted or required for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.
1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 90 to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For concrete mixes of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete mixes larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).

C. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added

PART 3 -EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 FIELD CONDITIONS

A. Schedule placements to minimize exposure to wind and hot sun before curing materials are applied.

B. Avoid placing concrete if rain, snow, or if frost is forecast within 24 hours. Protect fresh concrete from moisture and freezing.

C. Remove water from excavations.

D. Comply with professional practices described in ACI 305R and ACI 306R.

E. Install concrete and retarders in a manner, sequence and in conditions such that a uniform finish is maintained from one pour to another.

F. Comply with chemical retarder manufacturer’s recommendations for weather conditions.

G. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Clean all equipment. Wet forms, except in freezing weather, or oil properly with approved release.

B. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

C. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General:
   1. In compliance with reference standards, install reinforcement only where required in drawings.
   2. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
   1. Refer to Construction Drawings for location of joints and joint pattern.
   2. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
   1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
   2. Provide tie bars at sides of pavement strips where indicated.
   3. Butt Joints: Use bonding agent or epoxy bonding adhesive at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
   1. Locate expansion joints as indicated on Drawings.
   2. Extend joint fillers full width and depth of joint.
   3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
   4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
   5. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary

preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction (Control) Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
   1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide, unless otherwise indicated, joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
      a. Construct joints within 12-18 hours of concrete placement.
      b. Joints shall be cut to the depth noted in the drawings.
      c. Joints shall be laid out to exactly match the joint pattern depicted in the drawings. Any required variances shall be approved by the Landscape Architect in advance. Sections of concrete where joints are not in compliance with drawings shall be removed and reconstructed.
      d. Use appropriate tools to form joints that terminate at a vertical surface or another joint to prevent cut overruns.
      e. Dust and slurry residue from sawcutting shall be immediately removed from concrete and adjacent surfaces.
      f. Project sawcut joints to prevent chipping.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete.

C. Do not place concrete on frozen surfaces.

D. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

E. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

F. Vibrators, when used, shall be inserted and withdrawn vertically.

G. Concrete shall be struck to specified level with wood or magnesium straight edge or mechanical vibrating screed.

H. Concrete surface shall be further leveled and consolidated with highway magnesium straight edge and/or magnesium bull float.

I. Do not add water to concrete during delivery or at Project site.

J. Do not add water to fresh concrete after testing.

K. Do not add water to concrete surfaces during finishing operations except as described.

L. Deposit and spread concrete in a continuous operation between transverse joints.

M. Do not push or drag concrete into place or use vibrators to move concrete into place.

N. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
   1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms.

O. Use only square-tipped shovels or concrete rakes for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

P. Screed pavement surfaces with a straightedge and strike off.

Q. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

R. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

S. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

T. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 BUFF WASH FINISHING

A. Monolithic Fine Exposed-Aggregate Finish (A.K.A. “Buff Wash”): Expose fine aggregate in pavement surfaces as follows:
1. Plan sequence of placement to allow appropriate time for removal within the range recommended by the manufacturer.
2. Prior to concrete placement, protect adjacent concrete or stone surfaces with manufacturer’s recommended protectant.
3. Finish concrete with hard smooth trowel finish. Determine specific techniques for floating via mockups.
4. Immediately after final troweling, spray-apply chemical surface retarder to pavement according to manufacturer's written instructions.
   a. Apply wash-off extender product at contractor’s discretion in accordance with manufacturer’s written instructions.
5. Removal of surface paste may commence based on weather conditions and manufacturer’s recommendations of elapsed time and based on processes agreed during mockup (typically between 4 and 16 hours).
6. At the contractor’s discretion and without dislodging aggregate, remove mortar paste by lightly brushing surface with a stiff, nylon-bristle broom while rinsing with water; or by using a power scrubber and water, or

by using a power washer with the proper nozzle to minimize streaking the surface.

7. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from aggregate surfaces to depth required and that the appearance of the finish concrete matches that of the approved samples.
8. Surfaces shall have a uniform appearance when completed with no areas of paste residue.
9. Sawcut contraction joints shall be formed ‘same day’ to the specified depth while concrete is still green. Dust residue from sawcutting of joints shall be immediately removed.
10. Seal finished concrete as described in Section 3.10.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Apply penetrating sealant in accordance with manufacturer’s written instructions

D. Sealer shall be applied twice to all exposed concrete pavement surfaces per manufacturer’s recommendations. First application shall be immediately after installation and exposing operations (if applicable) are complete, the second application shall be after 28 days.

3.9 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores, where directed by Landscape Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive. Finish plugged holes to match surrounding concrete.

C. Protect concrete from damage. Exclude traffic from pavement for at least 28 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 02930 - SEEDING

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers the operations necessary to produce grass covered areas for restoration and erosion control. The Contractor shall provide all materials, labor and equipment to complete the seeding work in accordance with this section. All costs pertaining to supply, delivery, storage, site preparation, seeding, fertilization, mulching, watering, protection, seeding repair and maintenance during the establishment period shall be included in the lump sum bid.

B. The Contractor shall sod all yards and green spaces unless the owner of the property gives written permission to seed instead of sod. Written permissions shall be made part of the project documentation included at the end of the project.

1.02 DESCRIPTION

A. All areas disturbed by construction operations shall be seeded unless otherwise specified in the contract documents to be sodded. For areas requiring sod, see Section 02931 – Sodding. Seeded areas include, but is not limited to, areas of cut and fill, trenching, temporary roads, staging areas, storage areas and site specific green spaces. The sequence of work for seeding shall be cleaning the area, adding topsoil, application of fertilizer, tilling and removing rocks, seeding, covering, firming and the application of mulch. All seeded areas shall be mulched with straw or wood cellulose fiber and watered until grass has been established.

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 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 restoration and erosion 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 seeding operations.

B. Prior to commencing seeding operations, the Contractor shall submit the following to the City/Design Professional for review and approval:

1. Invoices and Analysis Labels. A copy of the supplier's invoices for all seed, mulch and fertilizer which shows the quantity by weight purchased for the project. The label bearing the manufacturer's guaranteed statement of analysis to ensure compliance with the specified requirements for quality and application rates.
2. Turf grass seed certification:
    a. Certify that each lot of seed has been tested by a testing laboratory certified in seed testing, within 6 months of the date of delivery. Include with the certification:
        1. Name and address of laboratory.
        2. Date of test.
        3. Lot number for each seed specified.
        4. Test Results:
            a. Name.
            b. Percentages of purity and of germination.
            c. Weed content and identity for each kind of seed furnished.
3. Mixtures: include proportions of each kind of seed.
4. Certification of sprig type and name.
5. Description of required maintenance activities and activity frequency.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of materials shall be in manufacturer's original unopened and undamaged packages. They shall be clearly marked to identify brand name, contents and order number on each package. Packages showing indication of damage that may affect the condition of contents are not acceptable.

B. Materials shall be stored in accordance with manufacturer's recommendations. Storage shall provide protective cover from moisture and damage. Materials shall be maintained at the temperature in accordance with manufacturer's recommendation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Top soil: The top soil shall be of a quality at least equal to that which exists in areas adjacent to the area to be repaired. Top soil shall be free from weed seeds, tree roots, clumps of clay, stones and other objectionable materials that hinder grading, planting and maintenance operations. See Section 02200 – Earthwork for additional requirements on topsoil.

B. Mulch: Mulch for application to seed bed areas shall be cereal grain straw or wood cellulose fiber.
    1. Straw mulch shall be baled, dry and show no signs of discoloration and mold damage.
        a. A minimum of 50 percent of weight of the herbage making up the material shall be 10 inches in length or longer.
        b. Mulch material containing weed seeds and crop seeds is not acceptable.
    2. Wood cellulose fiber shall be prepared from virgin wood fibers containing no substance or factor which might inhibit germination or growth of grass seed.
        a. The fiber shall be dyed an appropriate color to allow visual metering of its application and shall contain a tacking agent either combined with the product or added in the tank when making the slurry.
        b. Fibers shall have the property of becoming evenly dispersed and suspended when agitated in water.
        c. When sprayed uniformly on the surface of the soil, the fibers shall form a blotter-like groundcover which readily absorbs water and allows infiltration to the underlying soil.
        d. Weight specifications from suppliers for all applications, shall refer only to air dry weight of the fiber, at a standard equivalent of 10 percent nominal moisture content.
        e. The mulch material shall be supplied in packages having a gross weight not in excess of 100 pounds and shall be marked by the manufacturer to show the air dry weight content.
        f. Suppliers shall certify that laboratory and field testing of their product has been accomplished and that it meets all of the foregoing requirements pertaining to wood cellulose fiber mulch.
    3. Exception: Vegetative Type mulch will be the only acceptable type mulch used in areas where Type “C” seed is required, Type “C” seed is specified in paragraph 2.1.E.3 in this Section.

C. Starter Fertilizer: Fertilizer shall be pelleted or granulated and shall be an approved brand composed of a “Slow Release Nitrogen” fertilizer in the 1-2-1 range, such as 13-25-12 grade, uniform in composition free flowing and suitable for application with approved equipment, delivered to the site in convenient containers, each fully labeled, conforming to the applicable state fertilizer laws, bearing the name, trade mark, or trade name and a warranty of the producer.

D. Seed: Seed shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and Stated seed laws. Seed shall be furnished in sealed standard containers of the vendor. Each seed container shall bear 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. Seed which has become wet, moldy or otherwise damaged in transit or in storage will not be acceptable.
    1. Seed shall have a guaranteed germination rate of 95% or greater.

2. Pure Live Seed (PLS) formula: The following formula shall be used to determine PLS for each kind of seed:

PLS (%) = [Purity (percent) x Germination (percent)]/100

E. The areas and types of seeding to be used shall be specified on the plans. The types of acceptable seed, depending upon the area, is as follows:

1. Type "A" Seed: This seeding mixture will normally be used when seeding is required in areas of established yards, shoulders, slopes in street right-of-way and any other area where a high-type seeding is deemed necessary. The seed shall be sowed at a rate of 10 lbs. PLS per 1000 square feet (436 lbs. PLS per acre). The seed mixture will be 100 percent Turf-Type Tall Fescue composed of an equal mix of three of four compatible species. The mixture shall not include any varieties of the slower growing Turf-Type Tall Fescue "Dwarf". The species shall be one of the following or as approved by the City/Design Professional:

Apache	Arid	Austin
Bonanza	Carefree	Chieftan
Cimmaron	Cochise	Falcon
Guardian	Houndog	Jaguar II
Maverick II	Mustang	Olympic
Phoenix	Rebel II	Rebel 3D
Safari	Shenandoah	Thoroughbred
Titan	Tribute	Vegas

a. The seed mixture shall also include 100 percent Annual Rye grass to provide a temporary grass stand. The seed shall be sowed at a rate of 10 lbs. PLS per 1000 square feet (436 lbs. per acre) of the Turf-Type Tall Fescue and 2 lbs. PLS per 1000 square feet (87 lbs. per acre) of the Annual Rye.

2. Type "B" Seed: This seeding mixture will be used to seed areas outside of street right-of-ways that are not maintained.

Type "B" Seed	**Minimum Pure Live Seed (PLS%)**	**Rate of Pure Live Seed (lbs. per acre)**
Alta Fescue or Kentucky 31 Fescue (Festuca Elatior Var. Arundinces)	75	90
Rye grass (Lolium Perenne or L. Multiflorum)	80	50
TOTAL		**140**

3. Type “C” Seed: This seeding mixture will normally be used in public parks, wild life refuges and other areas where this seeding mixture is deemed necessary. The types of seeding mixtures for different habitats will be as follows:

Planting Habitat	Scientific Name	Common Name	Initial or Permanent Cover	Coverage
Wet Woodland	Elymus virginicus L.	Virginia Wild Rye	P	3 lbs./ac PLS
	Cinna arundinacea L.	Woodreed	P	100 lbs./ac PLS
	Sporobolis heterolepis A. Gray	Prairie Dropseed	I,P	3 lbs./ac PLS
	Elymus canadensis L.	Canada Wild Rye	P	3 lbs./ac PLS
	Festuca octoflora	Six-weeks Fescue	I	0.5 lbs./ac PLS
	Triticum aestivum L.	Winter Wheat	I	60 lbs./ac PLS
Planting Habitat	Scientific Name	Common Name	Initial or Permanent Cover	Coverage
Dry Woodland	Elymus canadensis L.	Canada Wild Rye	P	3 lbs./ac PLS
	Elymus virginicius L.	Virginia Wild Rye	P	3 lbs./ac PLS
	Sporobolis heterolepis A. Gray	Prairie Dropseed	I,P	3 lbs./ac PLS
	Triticum aestivum L.	Winter Wheat	I	60 lbs./ac PLS
Planting Habitat	Scientific Name	Common Name	Initial or Permanent Cover	Coverage
Wet Open	Elymus canadensis L.	Canada Wild Rye	P	3 lbs./ac PLS
	Echinochloa muricata Fern.	Rough Barnyard grass	I,P	2 lbs./ac PLS
	Spartina pectinata	Prairie Cordgrass	P	200 rhiz./ac
	Leersia oryzoides	Rice Cutgrass	P	200 rhiz./ac
	Triticum aestivum L.	Winter Wheat	I	60 lbs./ac PLS

F. Herbicide: Pre-emergent herbicide shall be siduron (Tupersan).
G. Water: Water used for this work shall be furnished by the Contractor.

PART 3 - EXECUTION

3.1 SAFETY

A. Perform all work in accordance with applicable Occupational Safety and Health Administration (OSHA) standards.

3.2 INSTALLATION

A. Time and Conditions: The seeding work shall not be started until all earthwork has been completed in accordance with Section 02200 – Earthwork. Backfills and fills shall be allowed to settle and the topsoil spread and finish-grading completed before seeding work is started.
B. Personnel and equipment: All seeding work shall be performed by a contractor having demonstrated experience in seeding on projects of similar size. The work shall be performed by experienced personnel who are familiar with project requirements and are under the supervision of a qualified foreman at all times when the work is in progress.
C. Equipment: The Contractor shall have access to equipment such as a fertilizer spreader, farm tractor with tilling equipment, grass seed drill or cultipacker type seeder, mulch blower, hydro-mulcher and straight serrated disk for crimping mulch into the soil.
D. Clearing: Prior to grading and tilling, vegetation that may interfere with operations shall be mowed, grubbed and raked. The collected material shall be removed from the site. The surface shall be cleared of stumps, stones larger than 1 inch, roots, cable, wire, trash and other materials that might hinder the work or subsequent maintenance.
E. Grading. Established grades, as indicated on the Drawings, shall be maintained in a true and even condition. Eroded areas and areas having inadequate drainage, as indicated by ponding of water, shall be filled. Ruts, deep tracks, dead furrows and ridges shall be eliminated.
F. Application of Fertilizer: Fertilizer as specified shall be applied within 24 hours prior to the tilling operation. The fertilizer shall be distributed over the entire area to be seeded at the rate of 200 pounds per acre and incorporated into the soil to a depth of at least 4 inches by disking or harrowing methods. Fertilizing rate is equivalent to 2.3 pounds per 500 square feet.
G. Preparation of Seed Bed: After fertilizer has been applied, the areas to be seeded shall be tilled to a depth of at least 4 inches by disking, plowing, harrowing, or other accepted methods until the soil is well pulverized and smoothed with a weighted spike-tooth harrow, railroad chains, or bridge timber float drag. When a chisel plow is used, the chisels shall be set not more than 10 inches apart and the areas shall be cross or double-tilled. All areas shall be left smooth for ease of mowing. All operations shall be done in a direction parallel to the contour lines on the slope and not uphill or downhill. Areas tilled shall be maintained until seeding and mulching is complete to insure a smooth area with no gullies or depressions.
H. Application of Seed: Seeding equipment calibration tests shall be made in the presence of the City/Design Professional to determine the equipment setting required to apply the seed at the specified rates. Markers shall be used to ensure that no skips occur between successive passes of the seeder. If unplanted skips and areas are noted after germination and the growth of the grass, the unplanted areas shall be seeded at no additional cost to the Owner. The seed

box shall be kept at least half full during seeding operations to ensure even distribution of seed over all the areas seeded.

I. Hydro-seeding:
    1. Seed and fertilizer, mixed in proportions as herein specified, can be broadcast in a hydro-mulch with water which forms an emulsion covering the prepared designated areas in a uniform manner.
    2. Areas to be hydro-seeded shall be fertilized at rates specified earlier. The seed-bed shall be free of any irregularities in the surface resulting from being fertilized, or other operations, and shall be corrected to prevent formation of water pockets.
    3. Hydro-mulch used shall be a wood fiber mulch with a tackifier, such as Conwit 2000, or approved equivalent. Hydro-mulch shall be applied at a rate of 1500 lbs. per acre.
    4. Hydro-seeder filling tank should be ½ full of water before adding seed, fertilizer and hydro-mulch components. Begin agitation while adding remaining water so that a uniform mixture is obtained. Seed, fertilizer and hydro-mulch components shall not be added to water more than four (4) hours prior to application.
    5. Discharge hydro-mulch slurry mix on prepared soil for uniform distribution.

J. All seeding work shall be done between the dates of February 1 and April 15 for spring planting or August 15 and October 15 for fall planting.

I. Sowing shall be accomplished by use of an approved mechanical seeder or drill (hand spreader can be used in small areas), making sure that successive seed strips overlap to provide uniform coverage.

J. The mixtures shall be applied in a crossing pattern of two passes, each applying half of the seed required.

K. Seed should be drilled to a depth of 1/2 inch.

L. Sprigs (rhizomes) shall be broadcast evenly and uniformly on the soil surface.

M. Compaction: Immediately following the completion of seeding operations, the entire area shall be compacted by means of a roller weighing at least 60 but not more than 90 pounds per linear foot of roller or any other method approved by the City/Design Professional.

N. Application of Herbicide: Following completion of seeding operations, pre-emergent herbicide as specified shall be applied to all seeded areas at the rate of 6 pounds active ingredient per acre.

O. Mulching: Mulching shall be done within 24 hours following the seeding operation except in the case of wood cellulose type mulch.

P. Vegetative Type Mulch:
    1. Straw mulch shall be spread uniformly in a continuous blanket at a depth of not less than 1-1/2 inches and not more than 2 inches loose measurement (approximately 1-1/2 to 2 tons per acre).
    2. Mulch shall be spread by hand or by a blower type mulch spreader.
    3. Blower type mulch spreaders shall be adjusted and operated in such a manner as to prevent excessive breakage of the mulch material. If this cannot be accomplished, the mulch shall be spread by hand.
    4. Care shall be exercised to ensure that all wire from baled hay is collected as it is removed from the bale.

5. Mulching shall be started at the windward side of relatively flat areas, or at the upper part of a steep slope and continued uniformly until the area is covered.
6. The mulch shall not be bunched.
7. No mulch shall be spread unless it can be anchored on the same day.

Q. Anchoring Straw Mulch:
1. The straw mulch shall be anchored in the soil to a depth of 2 to 3 inches be a notched disk set straight or a mulch crimping machine.
2. The machine shall be weighted and operated in such a manner to secure the mulch firmly in the ground to form a soil binding mulch and prevent loss or bunching of the hay by wind.
3. Two or more passes may be required to anchor the mulch to the satisfaction of the City/Design Professional.

R. Application of Wood Cellulose Fiber:
1. Wood cellulose fiber mulch shall be applied with a hydro-mulcher at not less than 1000 pounds per acre.
2. Precautionary measures shall be taken in preventing overspray on structures, paving and plantings.

S. Watering: Promptly after seeding and mulching, wet the seed bed thoroughly. Watering shall continue so as to keep all areas moist throughout the germination period.

T. Cleanup operations within forty-eight (48) hours after completion of the construction operations:
1. The entire area shall be cleared of excess soil and waste material, including, but not limited to, stones, stumps, roots, brush, wire, grade stakes, trash and all objects that might be a hindrance to maintenance operations or affect the visual appearance of the site.
2. All roads, over which hauling operations have been conducted, regardless of the type of surfacing, shall be clean and all debris left on the surface shall be removed.
3. The wheels of vehicles shall be cleaned to avoid leaving soil upon roads, walks and other surfaced areas.

U. Water Usage:
1. All watering equipment required for the work shall be furnished by the Contractor.
2. All water obtained from fire hydrants shall be metered. See Section 01000 – General Project Requirements.

3.3 MAINTENANCE, PROTECTION AND REPAIR

A. Maintenance of Area: The Contractor is responsible for maintaining all seeded areas until acceptance by the City/Design Professional. Maintenance of the seeded areas shall include the following:
1. Established yards, shoulders, slopes in street right-of-way and all other areas where a high-type seeding is deemed necessary. All newly seeded grassed areas shall be kept in a healthy growing condition by watering, weeding, mowing, trimming, edging, etc., until completion and acceptance by the City/Design Professional. The seeded areas shall be mowed with approved mowing equipment to a height of 3 inches whenever the average height of vegetation becomes 6 inches.

2. Turf grass of one-square foot or more that does not show definite growth and establishment shall be re-seeded by the Contractor at no additional cost to the Owner. The Contractor shall continue the care and maintenance of all seeded areas as specified above until all work of this project has been satisfactorily completed and all deficiencies have been corrected at which time final inspection shall be made.
3. Areas off of street right-of-way: All seeded areas shall be maintained until acceptance by the City/Design Professional. Maintenance shall include repair of erosion damage, re-seeding, mulching and watering.

B. Protection and Repair:
1. The seeded area shall be kept free of traffic until accepted.
2. If at any time before acceptance of the completed contract, any portion of the seeded surface becomes gullied, damaged - intentionally or otherwise, or the seeding has been damaged or destroyed, the affected portion shall be repaired to re-establish the specified condition prior to the acceptance of the work.

3.4 WARRANTY

A. Seeding shall have germinated, taken root and have established satisfactory coverage before acceptance by the City/Design Professional. The Contractor shall maintain as described in paragraph 3.3 and shall guarantee seeding for one (1) year after acceptance. The Contractor shall scarify, reseed, fertilize and mulch any barren area greater than 1 square foot. See Section 02575 – Surface Restoration for requirements on early acceptance.

END OF SECTION

SECTION 02931 - SODDING

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers the operations necessary to produce grass covered areas for restoration and erosion control. The Contractor shall provide all materials, labor and equipment to complete the sodding work in accordance with this section. All costs pertaining to supply, delivery, storage, site preparation, sodding, fertilization, watering, protection, sodding repair and maintenance during the establishment period shall be included in the lump sum bid.

B. The Contractor shall sod all yards and green spaces unless the owner of the property gives written permission to seed instead of sod. Written permissions shall be made part of the project documentation included at the end of the project.

1.02 DESCRIPTION

A. All areas disturbed by construction operations shall be sodded unless otherwise specified in the contract documents to be seeded. For areas requiring seed, see Section 02930 – Seeding. Sodded areas include, but are not limited to, areas of cut and fill, trenching, temporary roads, staging areas, storage areas and site specific green spaces. The sequence of work for sodding shall be cleaning the area, adding topsoil, application of fertilizer, tilling and removing rocks, sodding, covering, firming, watering and maintenance.

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.

1.05 QUALITY ASSURANCE

A. The Contractor is responsible for the quality assurance and quality control of the Work. The sodding work shall be performed by a qualified contractor with a proven record of performance for similar restoration and erosion 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 sodding operations.

B. Prior to commencing sodding operations, the Contractor shall submit the following to the City/Design Professional for review and approval:

1. Invoices and Analysis Labels: A copy of the supplier's invoices for all sod and fertilizer which shows the quantity by weight purchased for the project and a representative label bearing the manufacturer's or vendor's guaranteed statement of analysis to assure compliance with specified requirements for quality and application rates.
2. Sod: Certification of seed analysis, germination rate and inoculation:
    a. Certify that each lot of seed used for sod has been tested by a testing laboratory certified in sod testing, within 6 months of date of delivery. Include with the certification:
        1. Name and address of laboratory.
        2. Date of test.
        3. Lot number for each seed specified.
        4. Test Results:
            a. Name.
            b. Percentages of purity and of germination.
            c. Weed content for each kind of sod furnished.
    b. Certification of sod: include source, harvest date of sod and type of sod.
    c. Certification of sprig type and name.
    d. Description of required maintenance activities and activity frequency.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of materials shall be in manufacturer's original unopened and undamaged packages. Packaged items shall be clearly marked to identify brand name, contents and order number on each package. Packages showing indication of damage that may affect condition of contents are not acceptable. Sod shall be supplied in rolls of uniform thickness and kept covered and moist.

B. Storage of material shall provide protective cover from damage and stored at temperatures and moisture conditions in accordance with manufacturer's and supplier recommendations. Materials shall be stacked or stored in accordance with manufacturer's and supplier recommendations.

C. Harvesting Sod:
1. Do not harvest if sod is excessively dry or wet.
2. Harvest and deliver sod only after laying bed is prepared for sodding.
3. Roll or stack to prevent yellowing.
4. Deliver and lay all sod within 24 hours of harvesting.
5. Keep moist and covered from time of harvesting until laid.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Top soil: The top soil shall be of a quality at least equal to that which exists in areas adjacent to the area to be repaired. Top soil shall be free from weed seeds, tree roots, clumps of clay, stones and other objectionable materials that hinder grading, planting and maintenance operations. See Section 02200 – Earthwork for additional requirements on topsoil.

B. Sod:

1. The sod to be used as source material shall be a thick stand of Kentucky Blue grass, Turf Type Tall Fescue, Bermuda grass, Zoysia grass or other grasses as shown on the plans. For established yards, the sod shall match the species removed.
2. The sod shall contain a growth of not more than 1 percent of other grasses and clovers shall be free from all prohibited and noxious weeds.
3. The Turf Type Tall Fescue sod shall be composed of an equal mix of three or four compatible species of 100 percent Turf Type Tall Fescue. The mixture shall not include any varieties of the slower growing Turf Type Tall Fescue "Dwarf". The species shall be one of the following:

Apache	Arid	Austin
Bonanza	Carefree	Chieftan
Cimmaron	Cochise	Falcon
Guardian	Houndog	Jaguar II
Maverick II	Mustang	Olympic
Phoenix	Rebel II	Rebel 3D
Safari	Shenandoah	Thoroughbred
Titan	Tribute	Vegas

4. Kentucky Blue grass and Turf Type Tall Fescue sod shall be cut in strips of uniform thickness, the range of acceptable thickness shall be 1 1/2 to 2 inches; each strip containing at least one square yard. Sod shall be cut in strips not less than 12 inches wide.
5. Bermuda grass or Zoysia grass sods shall be cut into strips of uniform thickness, the range of acceptable thickness shall be 1 1/2 to 2 inches; each strip shall not be less than 12 inches wide and 24 inches long. Strips that crumble will not be acceptable.
6. Broken pads and torn or uneven ends will not be acceptable. Standard size sections shall be strong enough to support their own weight and should retain their size and shape when suspended vertically from a firm grasp on the upper 10 percent of the section. Sod shall not be harvested or transplanted with moisture content (excessively dry or wet) that will adversely affect its survival.
7. Sod shall be relatively free of thatch, up to 1/2 inch allowable (uncompressed). Sod shall be reasonably free of diseases, nematodes and soil-borne insects. State nursery and/or plant materials laws require that all sod entering inter-state commerce be inspected and approved for sale. The same applies to sod being shipped intra-state. The inspections and approval must be made by the state agricultural department, office of the state entomologist.

C. Fertilizer shall be inorganic 12.12.12 or 13.13.13 grade, uniform in composition, free flowing and suitable for application with approved equipment, delivered to the site in convenient containers, each fully labeled, conforming to applicable state fertilizer laws, bearing the name, trade name, or trade mark and warranty of the producer.

PART 3 - EXECUTION

3.1 SAFETY

A. Perform all work in accordance with applicable Occupational Safety and Health Administration (OSHA) standards.

3.2 PREPARATION

A. All sodding work shall be performed by a contractor having demonstrated experience in sodding on projects of similar size. The work shall be prepared by experienced personnel who are familiar with the required work and who are under the supervision of a qualified foreman at all times when the work is in progress.

B. Preparation of areas to be sodded shall include filling, reshaping or eroded areas, cleaning ditches and refinishing slopes to the established grade section. The area shall be cleared of stumps, stones larger than 1 inch, roots, cable, wire, trash and other materials that might hinder the work or subsequent maintenance.

C. Application of Fertilizer: Before tilling operations, fertilizer shall be spread uniformly at the rate of 300 pounds per acre. Fertilizing rate is equivalent to 3.5 pounds per 500 square feet.

D. Preparation of Sod Bed:

1. After fertilizer has been applied, the areas to be sodded shall be tilled to a depth of at least 2 inches by disking, plowing, harrowing, or other accepted methods until the soil is well pulverized and smoothed with a weighted spiketooth harrow, railroad chains, or bridge timber float drag. When a chisel plow is used, the chisels shall be set not more than 10 inches apart and the areas shall be cross or double-tilled. All areas shall be left smooth for ease of mowing. All operations shall be done in a direction parallel to the contour lines on the slope and not uphill or downhill.
2. Grade areas to smooth, even surface with loose, uniformly fine texture.
    a. Roll and rake, remove ridges, fill depressions to meet finish grades.
    b. Limit such Work to areas to be planted within immediate future.
    c. Remove debris, stones larger than 1 inch diameter and other objects that may interfere with planting and maintenance operations.

3.3 INSTALLATION

A. Time and Conditions. The sodding work shall not be started until all earthwork has been substantially completed. Backfills and fills shall be allowed to settle and the topsoil spread and finish-grading completed before the work is started. Failure to account for settlement prior to placement of topsoil and sod may result in rework of the area.

B. Application of Sod: Kentucky Blue grass and Turf Type Fescue sod shall not be placed during a drought or during the period from June 1 to September 1, unless authorized by the

City/Design Professional and shall not be placed on frozen ground. Bermuda and Zoysia sods shall only be placed during the period from May 1 to October 15. The City/Design Professional reserves the right to delay the sodding of all types of sod or to vary the permissible sodding seasons, due to weather, soil conditions, or for other causes.

C. Sod Placement: Sod shall be moist when it is placed. Sod strips shall be laid along contour lines, commencing at the lowest point of the area and working upward. The transverse joints of sod strips shall be staggered and the sod carefully placed to produce tight joints. If necessary to walk excessively on newly laid sod, walking boards should be laid for this purpose. The sod shall be firm and watered immediately after it is placed. The "firming" shall be accomplished by application of a roller weighing not less than 60 nor more than 90 pounds per linear foot of roller or other approved method.

D. Anchoring Sod: On slopes 2:1 or steeper, the sod shall be anchored using garden staples.

E. Watering: Promptly after sodding, wet the sod thoroughly. Watering shall continue so as to keep all areas moist until acceptance by the City/Design Professional.

F. Water Usage:
   1. All watering equipment required for the work shall be furnished by the Contractor.
   2. All water obtained from fire hydrants shall be metered. See Section 01000 – General Project Requirements.

G. Cleanup Operations within forty-eight (48) hours after completion of the construction operations:
   1. The entire area shall be cleared of excess soil and waste material, including, but not limited to, stones, stumps, roots, brush, wire, grade stakes, trash and all objects that might be a hindrance to maintenance operations or affect the visual appearance of the site.
   2. All roads, over which hauling operations have been conducted, regardless of the type of surfacing, shall be clean and all debris left on the surface shall be removed.
   3. The wheels of vehicles shall be cleaned to avoid leaving soil upon roads, walks and other surfaced areas.

3.4 MAINTENANCE, PROTECTION AND REPAIR

A. Maintenance of Area. The Contractor shall be responsible for maintaining all sodded areas until acceptance by the City/Design Professional. Maintenance of the sodded areas shall include the following:
   1. All newly sodded grassed areas shall be kept in a healthy growing condition by watering, weeding, mowing, trimming, edging, etc., until completion and acceptance by the City/Design Professional. The sodded areas shall be mowed with approved mowing equipment to a height of 3 inches whenever the average height of vegetation becomes 6 inches.
   2. Turf grass of one-square foot or more that does not show definite growth and establishment shall be re-sodded by the Contractor at no additional cost to the Owner. The Contractor shall continue the care and maintenance of all sodded areas as specified above until all work of this project has been satisfactorily completed and all deficiencies have been corrected at which time final inspection shall be made.

B. Protection and Repair:
   1. The sodded area shall be kept free of traffic until accepted.

2. If at any time before acceptance of the completed contract, any portion of the seeded surface becomes gullied, damaged - intentionally or otherwise, or the seeding has been damaged or destroyed, the affected portion shall be repaired to re-establish the specified condition prior to the acceptance of the work.

3.5 WARRANTY

A. Sodding shall have taken root and have established satisfactory coverage before acceptance by the City/Design Professional. The Contractor shall maintain as described in paragraph 3.4 and shall guarantee sodding for one (1) year after acceptance. The Contractor shall scarify, re-sod, fertilize and water any dead or barren area greater than 1 square foot. See Section 02575 – Surface Restoration for requirements on early acceptance.

END OF SECTION

SECTION 02937

GREEN STORMWATER INFRASTRUCTURE SITE ACTIVITY PLAN

PART 1 GENERAL

1.01 PURPOSE

A. The purpose of Section 02937 Green Stormwater Infrastructure Site Activity Plan is to thoroughly plan construction sequencing, prepare, control and protect the green stormwater infrastructure sites, install the green stormwater infrastructure components (GSI Components) as defined in Section 00800 Supplementary Conditions, stabilize disturbed area, and establish the green stormwater infrastructure facilities.

1.02 MEASUREMENT AND PAYMENT

A. The cost for development and implementation of the Site Activity Plan shall be subsidiary to other project administrative costs.

1.03 RELATED SECTIONS

A. The sections listed below form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

00700	General Conditions
00800	Supplementary Conditions
02750	Exposed Aggregate Concrete Pavement
02938	Green Stormwater Infrastructure Control and Protection
02939	Green Stormwater Infrastructure Earthwork
02940	Green Stormwater Infrastructure Inlets
02941	Green Stormwater Infrastructure Energy Dissipation and Pollutant Removal
02946	Green Stormwater Infrastructure Aggregate Media
02947	Green Stormwater Infrastructure Growing Media and Soil Amendments
02948	Green Stormwater Infrastructure Media Liners
02949	Green Stormwater Infrastructure Existing Tree Protection
02950	Green Stormwater Infrastructure Selective Vegetation Removal

02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding

02954 Green Stormwater Infrastructure Piping

02955 Green Stormwater Infrastructure Outlets

02956 Green Stormwater Infrastructure In-Situ Infiltration Testing

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design ProfessionalOwner.

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

APWA 2150	Division II Construction and Material Specification, Erosion and Sediment Control

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

SITE ACTIVITY PLAN

GREEN STORMWATER INFRASTRUCTURE CONSTRUCTION SCHEDULE

STORMWATER RUNOFF MANAGEMENT PLAN

SITE ACCESS AND UTILIZATION PLAN

GREEN STORMWATER INFRASTRUCTURE MAINTENANCE PLAN

QUALITY ASSURANCE QUALIFICATIONS

SD-10 Operation and Maintenance Data

SITE ACTIVITY PLAN UPDATES

1.06 QUALITY ASSURANCE

A. Qualifications

1. The Contractor shall develop and control the Site Activity Plan. The Contractor is responsible for installation and

establishment of all green stormwater infrastructure components.

2. QUALITY ASSURANCE QUALIFICATIONS; use the attached Green Stormwater Infrastructure Quality Assurance form to submit qualifications with a minimum of three (3) references for related project work meeting the experience requirements and documentation of required certifications described in Part 1.06 of the following Sections:02939 Green Stormwater Infrastructure Earthwork, 02946 Green Stormwater Infrastructure Aggregate Media, 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments, 02949 Green Stormwater Infrastructure Existing Tree Protection, 02950 Green Stormwater Infrastructure Selective Vegetation Removal, 02952 Green Stormwater Infrastructure Native Grass and Wildflower Seeding, 02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding, 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing. Qualifications shall include project location, name of firm executing work, owner name and contact number, completion date, and dollar value of work.

B. Erosion and Sediment Control

1. The Contractor shall assume that implementation measures specified in the Site Activity Plan are independent of erosion and sediment control as required under the Owner's General Operating Permit with the Missouri Department of Natural Resources (Permit No: MOR100006).

2. The Contractor shall utilize APWA 2150 in conjunction with Section 02938 Green Stormwater Infrastructure Control and Protection as part of this Site Activity Plan, and to the extent necessary to control and protect green stormwater infrastructure.

1.07 QUALITY CONTROL

A. The Contractor shall be responsible for updating the Site Activity Plan during the project at an interval at least as frequent as every 30 days.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Not applicable.

PART 2 PRODUCTS

2.01 MATERIALS AND METHODS

A. Materials and methods identified by Contractor in the Site Activity Plan are subject to approval by Design ProfessionalOwner prior to Part 3.

2.02 ALTERNATE SITE ACTIVITY PLAN MATERIALS OR METHODS

A. The Contractor may propose alternative methods or materials for implementation of the Site Activity Plan during the project, provided that such methods provide equal or improved measures, as determined by the Design ProfessionalOwner. The Contractor shall submit documentation as requested by the Design ProfessionalOwner to evaluate the alternative.

PART 3 EXECUTION

3.01 PREPARATION

A. A Site Activity Plan is a collection of illustrative plans which identify a detailed green stormwater infrastructure construction schedule, address stormwater runoff during construction, summarize means of access to the Site, identify the anticipated Site utilization and identify maintenance activities to be performed.

B. All preconstruction submittals per Part 1.05, shall be submitted and accepted prior to commencement of Work.

3.02 INSTALLATION

A. The Contractor shall develop and submit a SITE ACTIVITY PLAN within 30 days of Notice to Proceed which shall include but not be limited to the information defined per the following:

B. GREEN STORMWATER INFRASTRUCTURE CONSTRUCTION SCHEDULE: Shall be included and maintained as part of the Project Schedule requirements per Section 00700, following the attached Green Stormwater Infrastructure Construction Schedule form. The Green Stormwater Infrastructure Construction Schedule shall include additional detail on specific phasing of construction activities for all GSI Components. The Green Stormwater Infrastructure Construction Schedule shall include but not be limited to timelines for all green stormwater infrastructure materials:

1. Procurement of Material including lead times for all green stormwater infrastructure materials to be used onsite;

2. Installation of GSI Components;

3. Bypass/Diversion of Stormwater Runoff;

4. Site Stabilization Activities

C. STORMWATER RUNOFF MANAGEMENT PLAN: Shall include a markup to a Drawing(s) with appropriate existing and proposed topographic information with notes to fully illustrate drainage patterns on the Site, and the impact of drainage patterns on the green stormwater infrastructure installation and establishment. Stormwater Runoff Management Plan shall be integrated with control and protection requirements as specified by Section 02938 Green Stormwater Infrastructure Control and Protection to manage stormwater runoff within the Site. Stormwater runoff shall not be

allowed to discharge into a green stormwater infrastructure facility until authorized by the Design ProfessionalOwner. Unless approved by the Owner, green stormwater infrastructure shall not be used for collection or conveyance of stormwater during construction. Contractor shall provide means and methods to control stormwater and protect green stormwater infrastructure through the Establishment Period, including installation, inspection, and maintenance. Stormwater Runoff Management Plan shall include but not be limited to the following:

1. Delineation of Green Stormwater Infrastructure Boundaries including all green stormwater infrastructure components;

2. Site Drainage Patterns of stormwater runoff within the Site extents including means and methods to divert stormwater runoff away from green stormwater infrastructure extents;

3. Control of Stormwater Runoff as defined in Section 02938 Green Stormwater Infrastructure Control and Protection;

4. Protection of Green Stormwater Infrastructure as defined in Section 02938 Green Stormwater Infrastructure Control and Protection.

D. SITE ACCESS AND UTILIZATION PLAN: Shall include a markup to a Drawing(s) with appropriate existing and proposed topographic information to fully illustrate access routes and storage locations to limit Site compaction and sedimentation to retain the integrity of the green stormwater infrastructure facility. The Contractor shall coordinate with all trades to prevent vehicle travel across green stormwater infrastructure footprint, as defined in the Drawing(s) and/or within green stormwater infrastructure components. Site Access and Utilization Plan shall include but not be limited to the following:

1. Project Phasing identified graphically with the intent of protecting the green stormwater infrastructure;

2. Delineation of Green Stormwater Infrastructure Protection Boundaries per Section 02938 Green Stormwater Infrastructure Control and Protection;

3. Delineation of Tree Protection Zones including tree protection methods, addressing construction access within tree protection zones per Section 02949 Green Stormwater Infrastructure Existing Tree Protection;

4. Anticipated Site Traffic Patterns including Site access, haul roads, delivery of materials and any temporary facilities;

5. Anticipated Compaction Areas and Contractor's plans for decompaction and/or removal and replacement of any soils not planned for excavation;

6. Maintenance of Utilities on Site during Work, including but not limited to, flow in sewers and water courses;

7. Identification of Storage Areas for material and fuel storage, laydown/equipment staging, material stockpiling, and temporary facility areas;

8. Material Schedule of how stored materials will be protected, including maximum permissible storage durations, and a description of how materials will be disposed of, if applicable;

9. Description of the Equipment and Methods used to for excavation and placement with respective materials within the limits of the green stormwater infrastructure, in a manner that does not put the function of the green stormwater infrastructure facility at risk per Section 02939 Green Stormwater Infrastructure Earthwork.

E. GREEN STORMWATER INFRASTRUCTURE MAINTENANCE PLAN: Shall include specific maintenance activities by green stormwater infrastructure component to be performed by the Contractor. Maintenance Plan shall include Contractor proposed frequency of activities identified on the attached Green Stormwater Infrastructure Maintenance Form. Frequencies may include weekly, bi-weekly, monthly, quarterly, semi-annual, and annual maintenance activities, subject to approval by the Owner. The Contractor shall use a standard template provided by Owner for Green Stormwater Infrastructure Maintenance Plan including but not limited to the following items:

1. Maintenance Activities proposed and associated frequency for each activity;

2. Inspection Log will be recorded at the time of the activity and shall include the following:

    a. Project identification including project name, contract number, inspector name and contact, date and time of inspection, and weather conditions at the time of inspection;

    b. Description of Tasks completed including objective of tasks, completion status, and related notes;

    c. Cumulative rainfall during the previous 24 hours and the current week and observed water level in the green stormwater infrastructure footprint;

    d. General inspection notes including but not limited to observed presence of mosquito larvae, animal burrowing, soil loss, sedimentation, invasive species, dying/dead

plants, or general damage to the green stormwater infrastructure facility.

3. Material Log including quantities of materials used during inspection and maintenance activities. Material utilization documentation shall be recorded at the time of the activity.

3.03 TOLERANCES

A. Not applicable.

3.04 DISPOSAL OF MATERIAL

A. All debris and excess material shall be disposed of off Site by the Contractor in a manner complying with local ordinances and antipollution laws. Waste shall not be buried on the Site or disposed of into storm drains, sanitary sewers, streams or waterways.

B. Materials may be temporarily stockpiled in an area within the limits of construction that do not disrupt construction activities, create any nuisances or safety hazards, or otherwise restrict access to the Site.

C. Waste materials shall not be stored in areas designated for green stormwater infrastructure.

D. Burning of waste materials shall not be allowed within the Site.

3.05 PROTECTION

A. Protection of green stormwater infrastructure facility per Section 02938 Green Stormwater Infrastructure Control and Protection shall be included by Contractor in the Site Activity Plan, through all phases of construction.

B. Areas serviced and/or maintained shall be promptly cleaned up on the same working day as Work is performed to a suitable condition. All equipment or tools used in the performance of this Work shall be removed from the location and any spillage swept and removed from the area the same working day as Work is performed.

C. Protect landscape from damage. Landscaping damaged during construction shall be treated, repaired, or replaced within 48 hours by Contractor, weather and planting season permitting and as approved by Owner.

3.06 MAINTENANCE

A. SITE ACTIVITY PLAN UPDATES shall be submitted with each Application for Payment at not more than 30-day intervals through Establishment Period. Updates to the Site Activity Plan should

reflect any changes to the schedule, stormwater runoff management plan, Site access and utilization plan, or maintenance plans provided in previous Site Activity Plan submittals.

B. Maintenance of Site Activity Plan shall be the responsibility of the Contractor until Achievement of Full Operation, as defined in Section 00800 Supplementary Conditions.

C. Green stormwater infrastructure facility shall be maintained per Part 3.02, E.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

A. The Contractor shall be responsible for maintaining record copies of all material verification forms such as load tickets, invoices, sales receipts, and/or similar items to verify type and quantity of material delivered to the Site. The Owner reserves the right to request verification of any material delivered to the Site throughout the duration of the project.

-- End of Section --

GREEN STORMWATER INFRASTRUCTURE
SITE COMPONENTS

Project Title: Mill Creek Park - Phase 2 Retention Pond

Project Number: 81000955

Contractor:

Date:

See Designer Tabs | Filter Blank Rows

See Contractor Tabs | Clear Filter

GSI SITES	
GSI Site Name	GSI Practice
Bioretention Ponds	Bioretention
Basin 1 Underground Storage	Subsurface Storage
44th Street	Pretreatment

GSI COMPONENTS	
☑	GSI-1 Inlets
☑	GSI-2 Energy Dissipation & Pollutant Rem
☑	GSI-3 Above Grade Barriers
☐	GSI-4 Permeable Pavements
☑	GSI-5 Soil & Aggregate Media
☑	GSI-6 Media Liners
☐	GSI-7 Landscaping
☑	GSI-8 Piping
☑	GSI-9 Outlets
☑	GSI-10 Storage Chambers
☐	*(Insert Additional Component)*

GREEN STORMWATER INFRASTRUCTURE
CONSTRUCTION SCHEDULE

Project Title: Mill Creek Park – Phase 2 Retention Pond

Project Number: 81000955

Contractor:

Date:

Filter Blank Component Rows | Clear Filter

GSI Site Name	GSI Component Category	GSI Component Product/Description	Material Procurement Lead Time	Begin Installation Date	Complete Installation Date	Notes
Bioretention Ponds	GSI-1 Inlets	Nyloplast				
	GSI-2 Energy Dissipation & Pollutant Removal	Energy Dissipation Stones				
	GSI-3 Above Grade Barriers	Basin Perimeter Walls				
	GSI-3 Above Grade Barriers	Basin Perimeter Curbs				
	GSI-3 Above Grade Barriers	Bollards				
	GSI-5 Soil & Aggregate Media	Bioretention Soil Media				
	GSI-5 Soil & Aggregate Media	Sand				
	GSI-5 Soil & Aggregate Media	#9 Choker Course				
	GSI-5 Soil & Aggregate Media	#57 Aggregate Storage Media				
	GSI-6 Media Liners	Permable Media Liner				
	GSI-7 Landscaping	Existing Tree Protection				
	GSI-8 Piping	Underdrain				
	GSI-8 Piping	Cleanouts				
	GSI-9 Outlets	Agridrain				
	GSI-9 Outlets	Weir Walkways & Cutoff Walls				
	GSI-9 Outlets	Opti Controls				
	GSI-9 Outlets	Precast Concrete Outlet				

GREEN STORMWATER INFRASTRUCTURE
CONSTRUCTION SCHEDULE

GSI Site Name	GSI Component Category	GSI Component Product/Description	Material Procurement Lead Time	Begin Installation Date	Complete Installation Date	Notes
Basin 1 Underground Storage	GSI-10 Storage Chambers	StormTrap				
	GSI-6 Media Liners	Manifold Piping				
	GSI-7 Landscaping	Existing Tree Protection				
	GSI-8 Piping	Underdrain				
	GSI-8 Piping	Observation Well				
	GSI-9 Outlets	Precast Concrete Outlet				
	GSI-10 Storage Chambers	ADS Stormtech Chambers				
44th Street	GSI-1 Inlets	Diversion Structure				
	GSI-2 Energy Dissipation & Pollutant Removal	SiteSaver				
	GSI-7 Landscaping	Existing Tree Protection				

GREEN STORMWATER INFRASTRUCURE
MAINTENANCE SCHEDULE

Project Title: Mill Creek Park – Phase 2 Retention Pond

Project Number: 81000955

Contractor:

Date:

Filter Applicable Components | See All Components | Sample Frequency | Filter Required Tasks Only | See All Tasks | Reset Tasks

GSI Component	Required Tasks	Frequency	Time of Year	Responsible Party	GSI Sites Included	Required
GSI-1 Inlets	Inspect for standing water, sediment, debris, trash, blockages, and structural integrity				Bioretention Ponds, 44th Street	x
	Remove sediment, debris, trash, blockages					x
	Repair damage					x
GSI-2 Energy Dissipation & Pollutant Removal	Inspect integrity and record debris depth				Bioretention Ponds, 44th Street	x
	Remove sediment, debris, and trash					x
	Repair erosion or other damage					x
GSI-3 Above Grade Barriers	Inspect structural integrity				Bioretention Ponds	x
	Repair structural, erosion or other damage					x
GSI-5 Soil & Aggregate Media	Inspect 48-hours after 3-inches of rainfall in 24 hour period and record standing water depth	Annually			Bioretention Ponds	x
	Inspect during or immediately following rain event for trash, debris, flow blockages, erosion paths, and	Seasonally				x
	Remove sediment, debris, and trash	Bi-weekly				x
	Replace settled or excavated materials, repair erosion/damage	Quarterly				x
GSI-8 Piping	Inspect for standing water, structural integrity, secure access points, record debris depth				Bioretention Ponds, Basin 1 Underground Storage	x
	Remove sediment, debris, trash, blockages					x
	Repair damage					x
	Inspect for sediment, trash, debris, blockages, structural integrity, and outlet control mechanism				Bioretention	x

GREEN STORMWATER INFRASTRUCURE
MAINTENANCE SCHEDULE

GSI Component	Required Tasks	Frequency	Time of Year	Responsible Party	GSI Sites Included	Required
GSI-9 Outlets	Clear flow paths and remove sediment, trash, debris, and blockages				Ponds, Basin 1 Underground Storage	x
	Repair damage					x
GSI-10 Storage Chambers	Inspect for standing water, sediment, debris, trash, blockages, secure access points, structural				Basin 1 Underground Storage	x
	Remove sediment, debris, trash and blockages					x
	Deep clean with jet wash and vacuum combination					x
	Repair damage					x

GREEN STORMWATER INFRASTRUCTURE
QUALITY ASSURANCE QUALIFICATIONS

Project Title: Mill Creek Park – Phase 2 Retention Pond

Project Number: 81000955

Contractor:

Date:

Specification Number	Specification Name	Experience Requirement	Responsible Prime/ Subcontractor	Reference Number	Project Location	Owner Name	Contact Number	Completion Date	Dollar Value
02939	GSI Earthwork	*Landscaping/ GSI experience, within previous 3 years*		1					
				2					
				3					
02944	GSI Porous Asphalt	*3 years recent porous asphalt experience*		1					
				2					
				3					
02945	GSI Permeable Pavers	*3 years recent permeable paver experience*		1					
				2					
				3					
02946	GSI Aggregate Media	*3 years GSI installation experience*		1					
				2					
				3					
02947	GSI Growing Media & Soil Amendments	*5 years landscaping/GSI installation experience*		1					
				2					
				3					
02949	GSI Existing Tree Protection	*Experienced tree service firm; certified Arborist*		1					
				2					
				Attach list of certified arborist personnel dedicated to project.					
02950	GSI Selective Vegetation Removal	*Horticulturist; landscape removal experience; Experienced tree service firm*		1					
				2					
				Attach list of certified horticulturist personnel dedicated to project.					

GREEN STORMWATER INFRASTRUCTURE
QUALITY ASSURANCE QUALIFICATIONS

Specification Number	Specification Name	Experience Requirement	Responsible Prime/ Subcontractor	Reference Number	Project Location	Owner Name	Contact Number	Completion Date	Dollar Value
02951	GSI Plants	*5 years landscaping/GSI experience*		1					
				2					
				3					
02953	GSI Non-Native Seeding and Sodding	*Seeding/sodding experience*		1					
				2					
				3					
02956	GSI In-Situ Infiltration Testing	*Infiltration testing experience*		1					
				2					
				3					

SECTION 02938

GREEN STORMWATER INFRASTRUCTURE CONTROL AND PROTECTION

PART 1 GENERAL

1.01 PURPOSE

A. The purpose of Section 02938 Green Stormwater Infrastructure Control and Protection is to provide control of stormwater collection, conveyance, and runoff to green stormwater infrastructure installations within the Site, and to protect the green stormwater infrastructure during construction and through the Establishment Period, as defined in Section 02957 Green Stormwater Infrastructure Establishment.

B. This section shall work in conjunction with the Stormwater Runoff Management Plan, as described in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

C. This section does not replace Owner or Contractor erosion and sediment control regulatory responsibilities. Green stormwater infrastructure for protection shall be identified graphically in the Drawings.

D. Definitions

1. Control of Stormwater Runoff: Measures, means, and methods of collection and conveyance of stormwater.

2. Protection of Green Stormwater Infrastructure: Measures, means, and methods of preserving the condition, stormwater management capabilities, and general landscape health of green stormwater infrastructure.

1.02 MEASUREMENT AND PAYMENT

A. The cost for development and implementation of green stormwater infrastructure control and protection shall be subsidiary to Work being performed.

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937 Green Stormwater Infrastructure Site Activity Plan

02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the

text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by the Design Professional.

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

APWA 2150	Division II Construction and Material Specification, Erosion and Sediment Control

1.05 SUBMITTALS

A. Not applicable.

1.06 QUALITY ASSURANCE

A. Not applicable.

1.07 QUALITY CONTROL

A. Temporary Control of Stormwater Runoff measures and temporary Protection of Green Stormwater Infrastructure means and methods shall be evaluated by the Contractor with Site Activity Plan updates, as defined in Section 02937 Green Stormwater Infrastructure Site Activity Plan, through the duration of the Establishment Period.

B. Control and Protection measures evaluation and updates shall be recorded as follows for the specified periods:

1. Stormwater Runoff Management Plan from the Notice to Proceed until Certificate of Achievement of Full Operation is issued.

2. Green Stormwater Infrastructure Maintenance Plan from Certificate of Achievement of Full Operation through the Establishment Period.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Delivery, storage, and handling of materials associated with temporary Control of Stormwater Runoff and temporary Protection of Green Stormwater Infrastructure shall meet the requirements of APWA 2150, or as identified in the Drawings.

B. Manufactured products shall be delivered, stored and handled per the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials used for temporary Control of Stormwater Runoff and temporary Protection of Green Stormwater Infrastructure shall meet the requirements of APWA 2150, or as identified in the Drawings. The Contractor may propose alternative materials, provided that

such methods provide equal or improved measures of Control as determined by Design Professional.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to Work, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area.

B. Contractor shall submit a description of measures for Control of Stormwater Runoff and Protection of Green Stormwater Infrastructure proposed for all green stormwater infrastructure components, as identified in the Runoff Management Plan as defined in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.02 INSTALLATION

A. Contractor shall provide all specific temporary Control of Stormwater Runoff measures and temporary Protection of Green Stormwater Infrastructure, means and methods as defined by the Site Activity Plan.

B. Control and protection shall be installed prior to Work performed upstream of any green stormwater infrastructure component per the schedule and sequencing identified in the Site Activity Plan.

C. Control of Stormwater Runoff and Protection of Green Stormwater Infrastructure shall include the following minimum methods for applicable green stormwater infrastructure components:

1. Flow control at green stormwater infrastructure inlets including protection of entire boundary for facilities accepting overland flow;

2. Flow control at green stormwater infrastructure outlets;

3. Sediment, debris and dust control within the green stormwater infrastructure.

3.03 TOLERANCES

A. Not applicable.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. Not applicable.

3.06 MAINTENANCE

A. The Contractor shall maintain temporary Control of Stormwater Runoff and Protection of Green Stormwater Infrastructure until the entire upstream area is fully stabilized.

B. The Contractor shall be responsible for removing, replacing, and cleaning of control and protection measures throughout the duration of Work to maintain control and protection of the green stormwater infrastructure facility. Contractor shall inspect and repair control and protection measures and remove sediment after each storm event. Removed sediment shall not be deposited to an area that will contribute sediment to the GSI. Removed sediment shall be disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

C. Excessive damage or lack of Control of Stormwater Runoff and/or Protection of Green Stormwater Infrastructure will result in not meeting required service level of performance per Section 02957 Green Stormwater Infrastructure Establishment.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

A. Not applicable.

-- End of Section --

SECTION 02939

GREEN STORMWATER INFRASTRUCTURE EARTHWORK

PART 1 GENERAL

1.01 PURPOSE

A. The purpose of Section 02939 Green Stormwater Infrastructure Earthwork is to provide Site preparation, excavation and grading requirements for green stormwater infrastructure infiltration practices that require limited compaction of subgrade.

B. Earthwork for green stormwater infrastructure requiring compaction and areas outside of designated green stormwater infrastructure shall be in accordance with the APWA 2100, or as specified in the Drawings.

C. Definitions

1. Backfill: Placing of approved material in the green stormwater infrastructure facility area(s) to the lines and grades as shown in the Drawings.

2. Clearing: Cutting and disposal of trees, brush, and all other vegetation or combustible material found on or above the existing ground surface inside the limits of disturbance of the green stormwater infrastructure.

3. Excavation: Removal of materials from the construction area to the lines and grades shown in the Drawings. Excavation shall include all materials regardless of nature unless otherwise specified in the Drawings.

4. Finished Grade: Elevation of finished surface of soil media per Sections 02946 Green Stormwater Infrastructure Aggregate Media and/or 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments.

5. Grubbing: Removal and disposal of all tree stumps and roots within the limits of disturbance of the green stormwater infrastructure.

6. Subgrade: Surface or elevation of subsoil remaining after completing excavation.

1.02 MEASUREMENT AND PAYMENT

A. The Contractor shall provide all labor, material and equipment required for green stormwater infrastructure earthwork, depicted in the Drawings and specified herein. Earthwork shall be measured in the units of Cubic Yards and shall be paid for by Lump Sum Price.

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937 Green Stormwater Infrastructure Site Activity Plan

02938 Green Stormwater Infrastructure Control and Protection

02946 Green Stormwater Infrastructure Aggregate Media

02947 Green Stormwater Infrastructure Growing Media and Soil Amendments

02949 Green Stormwater Infrastructure Existing Tree Protection

02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding

02956 Green Stormwater Infrastructure In-Situ Infiltration Testing

02957 Green Stormwater Infrastructure Establishment Period

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design Professional.

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

APWA 2100	Division II Construction and Material Specifications, Grading and Site Preparation

FEDERAL HIGHWAY ADMINISTRATION (FHWA)

FHWA MUTCD	Manual on Uniform Traffic Control Devices for Streets and Highways

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

EXISTING GRADE SURVEY VERIFICATION

SITE INSPECTION

SD-06 Test Reports

PRE-CONSTRUCTION INFILTRATION TEST RESULTS

SD-07 Certificates

COMPLETION OF EXCAVATION

FINISHED GRADE SURVEY VERIFICATION

1.06 QUALITY ASSURANCE

A. Installer Qualifications

1. Work shall be performed by a qualified installer whose work has resulted in the successful installation of green stormwater infrastructure facilities and establishment of plant life within the last three (3) years, with employees skilled in the landscape trade, and specifically skilled in green stormwater infrastructure.

1.07 QUALITY CONTROL

A. The Contractor shall notify the Owner within 48 hours of completion of excavation and prior to placement of all media, as specified in Sections 02946 Green Stormwater Infrastructure Aggregate Media and 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments.

B. Prior to procurement of material and delivery to the Site, the Contractor shall submit all required material to the testing agency and submit required testing results showing material is in conformance with the Contract Documents, as specified in Sections 02946 Green Stormwater Infrastructure Aggregate Media and 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. All materials shall be handled and stored in accordance with the respective specification sections.

B. Construction equipment and materials shall not be stored within the footprint of the green stormwater infrastructure facility at any time.

C. The Contractor shall field mark all excavation areas designated for green stormwater infrastructure prior to commencement of Work.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. The Contractor shall submit a description of equipment/methods used for excavation and placement of green stormwater infrastructure materials prior to the commencement of Work per Section 02937 Green Stormwater Infrastructure Site Activity Plan. The Contractor shall be solely responsible for determining the

means and methods for meeting the requirements of excavation and placement of materials with the following conditions:

1. The Contractor shall use equipment and methods that minimize compaction of both the base of the green stormwater infrastructure facility as well as the installed materials unless otherwise specified in the Drawings.

2. Low ground-contact pressure equipment shall be used on green stormwater infrastructure facilities to minimize disturbance to established areas adjacent to perimeter of green stormwater infrastructure facility. No heavy equipment shall be used within the perimeter of the green stormwater infrastructure facility before, during, or after excavation and installation of materials, unless otherwise specified by Design Professional.

3. Contractor shall abide by all compaction requirements as specified in the Drawings. Contractor shall not use equipment with narrow tracks or narrow tires, rubber tires with large lugs, or high-pressure tires within the limits of the green stormwater infrastructure, unless otherwise specified by the Design Professional.

4. Decompaction of the base of the green stormwater infrastructure facility can be completed by using a primary tilling operation of chisel plow, ripper, or sub-spoiler. Additional refracture methods may be substituted at the discretion of the Design Professional.

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking

1. All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of the Contractor. The Contractor shall set construction stakes, establishing all green stormwater infrastructure locations and elevations. The contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.

2. EXISTING GRADE SURVEY VERIFICATION; Notify the Design Professional if surveyed stake elevations vary from existing grade identified in the Drawings where proposed grade of green stormwater infrastructure facility ties into the existing grade. Surveyed stake elevations shall be taken at specific point locations identified in the Drawings.

B. Existing Utilities

1. The Contractor shall be responsible for protecting all existing items, utilities and/or structures above and below ground.
2. The Contractor shall contact utility owners and/or make exploratory excavations as necessary to determine the exact location of underground utilities and structures and the limits and character of soil and/or rock prior to construction.
3. If any items require relocation or replacement, the Contractor shall notify the utility or property owner in advance of the Work. The Contractor shall be responsible for all arrangements with the utility and/or property owner for relocation or replacement of the item.

C. Project Conditions

1. Green stormwater infrastructure fill, embarkement, or backfill shall not be conducted when the ambient temperature and/or ground temperature is less than or equal to 32 degrees Fahrenheit or in the presence of standing water for a minimum of three (3) days prior to installation, except by permission of the Design Professional. No material shall be installed on frozen surfaces, nor shall frozen material be placed in green stormwater infrastructure facilities.

2. Excavation permits shall be secured prior to any Work. In all instances, the Contractor agrees to perform all Work in accordance with the permit and to indemnify and hold harmless the Owner and Design Professional from all liability, judgments, costs, expenses and claims growing out of damages or alleged damages, of any nature to any person or property arising out of performance or non-performance of said Work or the existence of facilities and/or appurtenances thereof.

3. SITE INSPECTION: Prior to commencement of Work and delivery of materials, the Contractor and Design Professional shall conduct an inspection of the Site to verify the following is in accordance with Section 02937 Green Stormwater Infrastructure Site Activity Plan:

   a. Delineation of boundaries of green stormwater infrastructure excavation extents.

   b. Delineation for protection of existing trees and other vegetation per Section 02949 Green Stormwater Infrastructure Existing Tree Protection.

   c. Location for stockpiling all soil and aggregated materials and equipment and methods of protection.

   d. Location of erosion control measures.

4. The Contractor shall submit for acceptance on all fill materials and/or media per Sections 02946 Green Stormwater Infrastructure Aggregate Media and 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments to be used in the green stormwater infrastructure prior to commencement of excavation.

D. Control and Protection: Prior to earthwork activities, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified in the Runoff Management Plan, per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.

3.02 INSTALLATION

A. Clearing and Grubbing

1. Contractor shall perform all clearing and grubbing within the limits of construction as required to complete the Work.
2. Clear and grub to a minimum depth of 18 inches within the footprint of green stormwater infrastructure facility.
3. Trees not specifically marked for removal shall be protected per Section 02949 Green Stormwater Infrastructure Existing Tree Protection.

B. Excavation

1. Excavation of green stormwater infrastructure facility shall be protected from heavy equipment that would result in compaction of soils within the footprint.

C. Excavation shall be to the dimensions, side slopes, elevations, and cross sections specified in the Drawings, as follows:

1. Contractor shall furnish, install and maintain such sheeting, bracing and other components as may be required to support any excavation per APWA 2100, Part 2102.3.
2. Excavation within one (1) foot of finished grade shall not be permitted if the soil is frozen or has been subjected to greater than 0.25 inches of precipitation in the previous 48 hours.
3. The Contractor shall provide dewatering equipment to remove and dispose of all surface water and groundwater entering excavations. Surface water shall be diverted or otherwise prevented from entering excavations, without causing damage to adjacent property.

4. The bottom of the excavation shall be mechanically scarified to a minimum depth of six (6) inches to alleviate any compaction of the facility bottom. Any ponded water shall be removed from the bottom of the facility and the soil shall be friable before mechanical scarification. Mechanical scarification shall not be done along piping alignment(s) and/or in locations where the soil supports the pipe aggregate material.
5. Any sediment deposited within the excavation extents shall be fully removed from the green stormwater infrastructure facility prior to placement of soil and/or aggregate media, per Sections 02946 Green Stormwater Infrastructure Aggregate Media and 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments.
6. Contractor shall conduct pre-construction infiltration testing per Section 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing after excavation is complete and prior to placement of soil and/or aggregate materials. Submit PRE-CONSTRUCTION INFILTRATION TEST RESULTS.

D. Excavation Protection
1. Excavations shall be restored to the level of the adjacent surfaces as soon as practicable. Contractor shall provide effective protection to the public from any open excavation.
2. Excavations in roadways shall be protected and secured in accordance with existing federal, state and local codes and standards, including, but not limited to, the most current edition of the FHWA MUTCD.
3. A protective cover over an excavation shall be installed so that it can sustain the weight of any persons and/or objects placed upon it. The cover shall be fixed to the ground, so it cannot be moved. Protective covers shall have no opening(s) or protuberance(s) of sufficient size to cause a fall and/or injury. Advance warning devices shall be installed as necessary.
4. Any excavation that is not covered shall be fenced in so that it surrounds the entire excavation area and prevents entry. The fencing shall be a minimum of 42 inches in height. The fence shall be secured and upright at all times.
5. Protective excavation coverings and fences shall be inspected by the Contractor at least daily to assure integrity. Protective excavation coverings and fencesin heavy traffic areas shall be inspected more often as necessary.

6. COMPLETION OF EXCAVATION; Notify the Design Professionalwithin 48 hours of completion of excavation and prior to placement of all media as defined in Sections 02946 Green Stormwater Infrastructure Aggregate Media and

02947 Green Stormwater Infrastructure Growing Media and Soil Amendments.

E. Subgrade Preparation

1. Clean subgrade and dispose of all debris prior to placement of aggregate or soil media. Remove all large clods, lumps, brush, roots, stumps, litter, trash, and other foreign material three (3) inches in diameter or larger.

2. Verify finished depth of facility and grade of surrounding area with Drawings and are within tolerances specified in Part 3.03.

3. Do not compact subgrade under green stormwater infrastructure facility unless specifically required per the Drawings.

F. Filling and Backfilling

1. Backfill material shall not be placed until PRE-CONSTRUCTION INFILTRATION TEST RESULTS have been accepted.

2. Green stormwater infrastructure facility shall be filled to the dimensions, side slopes, elevations, and cross sections specified in the Drawings.

3. Soil and Aggregate Backfill: Fill and backfill materials shall be placed in lifts to suit the lines and grades required, making allowances for settlement and placement of cover materials as specified in Sections 02946 Green Stormwater Infrastructure Aggregate Media and 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments.

G. Pipe and Structure Aggregate

1. Aggregate shall be placed to the depth and extents shown in the Drawings.
2. Place aggregate using methods that will not disturb or damage the piping material or the surrounding green stormwater infrastructure facility.
3. Spread aggregate to provide uniform and continuous support beneath pipe or structures. Backfill around the pipe or structure uniformly in maximum six (6) inch lifts.
4. Where required for stability, compaction shall be achieved using small, hand-held or walk behind compactors.

H. Fine Grading

1. Fine grading shall be performed immediately prior to planting operations.

2. Grading shall provide positive drainage to the green stormwater infrastructure facility and/or outlet

structure within the facility, unless otherwise specified in the Drawings.

3.03 TOLERANCES

A. The Contractor shall place materials based on the lines and grades specified in the Drawings within the following tolerances:

1. Horizontal Tolerance: 0.1 feet

2. Vertical Tolerance: 0.1 feet

B. FINISHED GRADE SURVEY VERIFICATION; Submit survey of finished grade elevation to the Design Professional for review. Survey elevation shall be taken at specific point locations identified in the Drawings.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. The Contractor shall implement temporary control and protection measures per Section 02938 Green Stormwater Infrastructure Control and Protection to protect the green stormwater infrastructure facility until the entire upstream tributary area is fully stabilized.

B. Vegetation shall be installed immediately following installation of soil media per Section 02951 Green Stormwater Infrastructure Plants or, or 02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding. If Site conditions limit vegetation of facility immediately following installation of soil media, Contractor shall implement additional measures to cover and protect the green stormwater infrastructure facility for duration of exposure.

C. All protection measures shall be submitted to the Design Professional for acceptance.

3.06 MAINTENANCE

A. The Contractor shall maintain green stormwater infrastructure facility through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment, and per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

B. The Contractor shall be responsible for maintaining finished grade of materials within the tolerances defined in Part 3.03 for the duration of the Establishment Period. The Contractor shall make all repairs or replacements necessary to correct changes in finished grade within 30 days of notice from the Owner.

3.07 POST-CONSTRUCTION TESTING

A. Contractor shall verify that finished grade elevations of the

facility surface, side slopes, and surrounding area are within tolerances defined in Part 3.03.

3.08 WARRANTY

A. Not applicable.

-- End of Section --

SECTION 02940

GREEN STORMWATER INFRASTRUCTURE INLETS

PART 1 GENERAL

1.01 PURPOSE

A. An inlet is the collection point of stormwater. An inlet typically collects stormwater runoff and discharges this runoff either to the surface or below the surface of the green stormwater infrastructure facility. An inlet can range from simple openings in the curb line, to manufactured stormwater structures, to traditional inlet boxes.

1.02 MEASUREMENT AND PAYMENT

A. Contractor shall provide all labor, material, and equipment required to install the green stormwater infrastructure inlets as shown in the Drawings and as specified herein. Green Stormwater Infrastructure Inlets shall be measured in the units of Each and shall be paid for by Lump Sum Price.

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937	Green Stormwater Infrastructure Site Activity Plan
02938	Green Stormwater Infrastructure Control and Protection
02939	Green Stormwater Infrastructure Earthwork
02946	Green Stormwater Infrastructure Aggregate Media
02957	Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design Professional.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO LRFD	AAHSHTO Load-Resistance-Factor Design Bridge Design Standards

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 301	Specifications for Structural Concrete
ACI 305R	Guide to Hot Weather Concreting
ACI 306R	Guide to Cold Weather Concreting

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

ASTM A615/A615M	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A775/A775M	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM C94/C94M	Standard Specification for Ready-Mixed Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

APWA 2208	Division II Construction and Material Specifications, Paving - Portland Cement Concrete Pavement
APWA 2604	Division II Construction and Material Specifications, Storm Sewers - Structures

KANSAS CITY METRO MATERIALS BOARD SPECIFICATIONS (KCMMB)

KCMMB	Kansas City Metro Materials Board Specifications

MID-WEST CONCRETE INDUSTRY BOARD CONCRETE SPECIFICATIONS - CONCRETE PAVEMENT (MCIB)

MCIB	Mid-West Concrete Industry Board Concrete Specifications - Concrete Pavement

1.05 SUBMITTALS

SD-03 Product Data

MANUFACTURER INFORMATION

SHOP DRAWINGS

SD-06 Test Reports

GRADATION TEST RESULTS

SD-07 Certificates

CONCRETE MIX DESIGN

1.06 QUALITY ASSURANCE

A. Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment. Manufacturer certified according to the National Ready Mixed Concrete Association (NRMCA) "Certificate of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications

1. An independent agency, acceptable to the authorities having jurisdiction, qualified according to ASTM C1077 for testing indicated.

2. Personnel performing tests shall be ACI Concrete Strength Testing Technician and ACI Concrete Laboratory Testing Technician - Level 1. Testing Agency laboratory supervisor shall be an ACI Concrete Laboratory Testing Technician - Level 2.

3. Concrete Field Testing: Personnel conducting concrete field tests shall be qualified as ACI Concrete Field Testing Technician - Grade I.

1.07 QUALITY CONTROL

A. Inspection and testing shall be performed by the Contractor/manufacturer in conformance with applicable standards. All material delivered to the Site shall have quality control certificates certifying the materials conform to specifications.

B. Field testing of concrete shall be performed by the Contractor once for every 50 cubic yards of concrete placed and shall conform to the requirements of APWA 2208.

C. The quality of all materials, the process of manufacture, and the finished products shall be subject to inspection and acceptance by the Design Professional. Such inspection may be made at the place of manufacture or on the Site after delivery.

D. All materials shall be subject to rejection at any time due to failure to meet any requirements specified herein. Material rejected after delivery to the Site shall be marked for identification and shall be removed from the Site immediately.

E. All materials which have been damaged after delivery will be rejected and corrected at the Contractor's expense. If materials are rejected after installation, they shall be repaired as accepted by the Design Professional, or removed and replaced at the Contractor's expense.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Materials shall be stored away from active grading or earthwork to avoid contamination with soil, sediment or debris.

B. Manufactured products shall be delivered, stored and handled per manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MANUFACTURED INLET

A. Manufactured Inlet shall be of the product type and manufacturer specified in the Drawings or approved equal.

B. MANUFACTURER INFORMATION; Submit manufacturer information for product data and instruction for each product, including but not limited to structure type, size, material, effective open area, fabrication, delivery and handling, placement, installation, and protection.

C. SHOP DRAWINGS; Submit shop drawings with a minimum of the following information, if applicable:

1. Suppler name, address and phone;

2. Structure dimensions (exterior and interior) including open area for inlet capacity;

3. Pipe connections and sizes;

4. Flow lines/flow directions.

D. Concrete Base: Concrete mix shall be 4,000 psi with 2-4 inches of slump or approved equal. Contractor shall submit CONCRETE MIX DESIGN prior to procurement of material including certification that mix design meets the requirements of the specified mix. Concrete base shall have an underlying aggregate base.

E. Aggregate Base: Aggregate base shall be the type specified in the Drawings and meet the requirements specified in Section 02946 Green Stormwater Infrastructure Aggregate Media. Contractor shall submit GRADATION TEST RESULTS of aggregate base prior to procurement of material.

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking: All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of

the Contractor. The Contractor shall set construction stakes, establishing all structure locations and elevations. The Contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.

B. Project Conditions

1. The Conditions for concrete placement shall comply with ACI 301. Hot weather placement shall comply with ACI 305R, and cold weather placement shall comply with ACI 306R.

C. Control and Protection

1. Prior to installation of in green stormwater infrastructure inlets, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.

2. Prior to connecting inlets to downstream drainage systems, temporary erosion control measures shall be in place.

3. Stormwater bypass and/or dewatering measures shall be in place to keep the Site clean and dry for the duration of installation.

3.02 INSTALLATION

A. Excavation

1. Excavation methods used shall conform to the requirements of Section 02939 Green Stormwater Infrastructure Earthwork.

2. Excavation shall extend to a depth such that the specified invert elevation and top of structure elevation, once fully installed, is located at the elevation shown in the Drawings. If an invert elevation or top of structure elevation is not specified, the Contractor is to consult the Design Professional to verify control elevations for the structure prior to installation.

3. Subgrade shall be prepared to provide uniform and continuous support of the structure at the grades shown.

B. Manufactured Inlet

1. Concrete Base, Aggregate Base and Anchoring

a. Unless otherwise specified by the manufacturer/Design Professional, all manufactured inlets require a concrete base and aggregate base for stability.

b. Aggregate base shall be placed to the depth and extents shown in the Drawings/recommended by the manufacturer.

Place aggregate using methods that will not disturb or damage the structure itself or the surrounding piping/green stormwater infrastructure facility.

c. Compaction shall be achieved using small, hand-held or walk behind compactors to prevent damage to the structure or over-compaction of the surrounding areas intended for infiltration.

d. Concrete base size and thickness shall be as specified in the Drawings/by manufacturer. Concrete base shall be constructed per APWA 2208, Part 2208.4. Concrete must be cured seven (7) days prior to placement of inlet.

2. Manufactured Inlet Structure Placement

a. Place manufactured inlet on concrete base and level vertically. Verify critical elevations, including but not limited to top of structure and inverts in/out weir elevations.

C. Backfill

1. Prior to backfilling, cover inlet opening(s) to protect from material deposition inside the structure during placement. Provide protection of inlet per Section 02938 Green Stormwater Infrastructure Control and Protection.

2. Backfill around inlet and compact uniformly in maximum six (6) inch lifts by hand using small, hand-held or walk behind compactors to prevent damage to the inlet or over-compaction of surrounding areas intended for infiltration.

3. Install soil and/or aggregate media around structure to finished grade per Sections 02946 Green Stormwater Infrastructure Aggregate Media and 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments as shown in the Drawings. All green stormwater infrastructure media shall be in place including mulch per Section 02951 Green Stormwater Infrastructure Plants prior to removal of protective covering and installation of grated cover.

3.03 TOLERANCES

A. Inlet structure installed elevation shall not deviate from design elevation by more than 0.1 feet. Verify all elevations specified in the Drawings, including but not limited to invert elevations and top of structure elevations.

B. Horizontal placements shall be within 0.1 feet of the alignment depicted in Drawings.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. The Contractor shall implement temporary control and protection measures per Section 02938 Green Stormwater Infrastructure Control and Protection to protect the inlet structure until the entire upstream tributary area is fully stabilized.

B. All protection measures shall be submitted to the Design Professional for acceptance.

3.06 MAINTENANCE

A. The Contractor shall maintain green stormwater infrastructure inlets through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment, and per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

A. The Contractor shall furnish the Owner with a written warranty from the manufacturer/supplier (Warrantor) that shall warrant the material against manufacturing defects and material degradation.

B. Should a defect occur, which is covered under warranty, the Warrantor shall bear all costs for the repair, relocation and replacement of the inlet. The Contractor shall be responsible for coordination with the Warrantor for replacement of any defective products or material.

-- End of Section --

SECTION 02941

GREEN STORMWATER INFRASTRUCTURE ENERGY DISSIPATION AND POLLUTANT REMOVAL

PART 1 GENERAL

1.01 PURPOSE

A. Energy dissipation is used to decrease the velocity of stormwater to prevent erosion and scouring of green stormwater infrastructure facility surface materials. Pretreatment captures sediment, trash, and debris prior to entering the green stormwater infrastructure facility.

1.02 MEASUREMENT AND PAYMENT

A. Contractor shall provide all labor, material, and equipment required to install the energy dissipation and manufactured pretreatment device as shown in the Drawings and as specified herein. Energy dissipation and manufactured pretreatment device shall be paid for by Lump Sum Price.

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937 Green Stormwater Infrastructure Site Activity Plan

02938 Green Stormwater Infrastructure Control and Protection

02939 Green Stormwater Infrastructure Earthwork

02946 Green Stormwater Infrastructure Soil and Aggregate Media

02948 Green Stormwater Infrastructure Media Liners

02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design Professional.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 301	Specifications for Structural Concrete
ACI 305R	Guide to Hot Weather Concreting

ACI 306R	Guide to Cold Weather Concreting

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

ASTM A615/A615M	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A775/A775M	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM C33/C33M	Standard Specification for Concrete Aggregates
ASTM C270	Standard Specification for Mortar for Unit Masonry
ASTM C902	Standard Specification for Pedestrian and Light Traffic Paving Brick
ASTM D5519	Standard Test Methods for Particle Size Analysis of Natural and Man-Made Riprap Materials

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

APWA 2208	(2017) Division II Construction and Material Specifications, Paving - Portland Cement Concrete Pavement

KANSAS CITY METRO MATERIALS BOARD SPECIFICATIONS (KCMMB)

KCMMB	Kansas City Metro Materials Board Specifications

MID-WEST CONCRETE INDUSTRY BOARD CONCRETE SPECIFICATIONS - CONCRETE PAVEMENT (MCIB)

MCIB	Mid-West Concrete Industry Board Concrete Specifications - Concrete Pavement

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

PLACEMENT NOTIFICATION

SD-03 Product Data

MANUFACTURER INFORMATION

SURFACE MATERIAL LAYOUT

SHOP DRAWINGS

SD-04 Samples

SURFACE MATERIAL

SD-07 Certificates

AGGREGATE BASE MEDIA CERTIFICATION

SURFACE STONE MEDIA CERTIFICATION

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. A qualified manufacturer or supplier of specified stone units similar to those specified in the Drawings with adequate production capacity to manufacture required units.

2. A qualified manufacturer or supplier of specified manufactured pretreatment device similar to those specified in the Drawings with adequate production capacity to manufacture required units.

B. Installer Qualifications

1. Manufactured pretreatment device installation shall be completed by the manufacturer or an installer certified by the manufacturer to install the product.

C. Testing Agency Qualifications: Personnel conducting concrete field tests shall be qualified as ACI Concrete Field Testing Technician - Grade I.

1.07 QUALITY CONTROL

A. Inspection and testing shall be performed by the Contractor/manufacturer in conformance with applicable standards. All material delivered to the Site shall have quality control certificates certifying the materials conform to specifications.

B. Field testing of concrete shall be performed by the Contractor once for every 50 cubic yards of concrete placed and shall conform to the requirements of APWA 2208, Part 2208.3.

C. The quality of all materials, the process of manufacture, and the finished products shall be subject to inspection and acceptance by the Design Professional. Such inspection may be made at the place of manufacture or on the Site after delivery.

D. All materials shall be subject to rejection at any time due to failure to meet any requirements specified herein. Material rejected after delivery to the Site shall be marked for identification and shall be removed from the Site immediately.

E. All materials which have been damaged after delivery will be rejected and corrected at the Contractor's expense. If materials

are rejected after installation, they shall be repaired as accepted by the Design Professional, or removed and replaced at the Contractor's expense.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Material shall be stored away from active grading or earthwork to avoid contamination with soil, sediment or debris.

B. Manufactured pretreatment devices shall be delivered, stored and handled per manufacturer's recommendations.

PART 2 PRODUCTS

2.01 ENERGY DISSIPATION

A. Permeable Liner: Permeable liner shall be per Section 02948 Green Stormwater Infrastructure Media Liners.

B. Aggregate Bedding

1. Aggregate bedding material shall be double-washed, of proper size and gradation, and shall be free from sand, silt, clay, excess fines, and other deleterious material.

2. Aggregate bedding shall be meet the quality requirements of ASTM C33/C33M and shall be reasonably well graded within the following limits:

Aggregate Bedding Gradation Requirements

Sieve Size	Passing (Percent by Weight)
75 mm (3 inch)	100
37.5 mm (1-1/2 inch)	75-95
12.5 mm (1/2 inch)	40-60
4.75 mm (no. 4)	5-25

3. AGGREGATE BEDDING MEDIA CERTIFICATION; Submit gradation test results of aggregate bedding prior to procurement of material.

C. Surface Material

1. SURFACE MATERIAL; Submit river rock to be used for energy dissipation. Include supplier name, address and phone as well as material color, color range, and texture options for surface stone.

2. SURFACE MATERIAL LAYOUT; Submit proposed surface material layout with a minimum of the following information, if applicable:

a. Approximate dimensions of individual surface stone;

b. Approximate spacing between individual stone;

3. Surface Stone

a. Surface stone material shall be double-washed and shall be free from sand, silt, clay, excess fines, and other deleterious material.

b. Surface stone shall be of the size, material and dimensions specified in the Drawings.

c. Unless otherwise specified, surface stone shall be hard with elongation no greater than 3:1 length to width ratio. Stone shall be uniformly graded with an average stone diameter as specified in the Drawings.

d. SURFACE STONE MEDIA CERTIFICATION; Submit gradation test results of surface stone prior to procurement of material.

4. Mortar shall be Type S per ASTM C270 or approved equal by Design Professional.

2.02 MANUFACTURED PRETREATMENT DEVICES

A. Manufactured Pretreatment Device shall be of the product type and manufacturer specified in the Drawings or approved equal.

B. MANUFACTURER INFORMATION; Submit manufacturer information for product data, and instructions for each product, including, but not limited to supplier name, address and phone as well as product fabrication, delivery and handling, placement, installation, and protection.

C. SHOP DRAWINGS; submit shop drawings with a minimum of the following information, if applicable:

1. Supplier name, address and phone;

2. Structure dimensions (exterior and interior);

3. Pipe connections and sizes;

4. Flow lines and flow directions.

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking: All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of the Contractor. The Contractor shall set construction stakes, establishing all structure locations and elevations. The Contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.

B. Project Conditions

1. Conditions for concrete placement shall comply with ACI 301. Hot weather placement shall comply with ACI 305R, and cold weather placement shall comply with ACI 306R.

C. Control and Protection

1. Prior to installation of energy dissipation and manufactured pretreatment device, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.

2. PLACEMENT NOTIFICATION; Notify the Design Professional at least 48 hours prior to placement of energy dissipation and manufactured pretreatment device.

3.02 INSTALLATION

A. Excavation

1. Excavation methods used shall conform to the requirements of Section 02939 Green Stormwater Infrastructure Earthwork.

2. Excavation shall extend to a depth such that the specified invert elevation and top of structure elevation, once fully installed, is located at the elevation shown in the Drawings. If an invert elevation or top of structure elevation is not specified, the Contractor is to consult the Design Professional to verify control elevations for the structure prior to installation.

3. Subgrade shall be prepared to provide uniform and continuous support of the energy dissipation and manufactured pretreatment device.

B. Surface Stone Splash Pad

1. Permeable liner shall be installed per Section 02948 Green Stormwater Infrastructure Media Liners prior to placement of aggregate bedding and surface stone.

2. Aggregate bedding shall be spread uniformly to depth and extents specified in the Drawings. Aggregate bedding shall be placed using methods which avoid damage to the permeable liner or subgrade.

3. Surface stone shall be placed over aggregate bedding to the depth and extents specified in the Drawings.

C. Manufactured Pretreatment Device

1. All manufactured pretreatment devices shall be installed per manufacturer requirements and recommendations.

3.03 TOLERANCES

A. Energy dissipation and manufactured pretreatment device installed elevation shall not deviate from design elevation by more than 0.1 feet. Verify all elevations specified in the Drawings, including but not limited to invert elevations and top of structure elevation elevations.

B. Horizontal placements shall be within 0.1 feet of the alignment depicted in Drawings.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. The Contractor shall implement temporary control and protection measures per Section 02938 Green Stormwater Infrastructure Control and Protection to protect the energy dissipation and manufactured pretreatment device until the entire upstream tributary area is fully stabilized.

B. All protection measures shall be submitted to the Design Professional for acceptance.

3.06 MAINTENANCE

A. The Contractor shall maintain energy dissipation and manufactured pretreatment device through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment, and per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

A. The Contractor shall furnish the Owner with a written warranty from the manufacturer/supplier (Warrantor) that shall warrant the material against manufacturing defects and material degradation.

B. Should a defect occur, which is covered under warranty, the Warrantor shall bear all costs for the repair, relocation and replacement of the energy dissipation and manufactured pretreatment device. The Contractor shall be responsible for coordination with the Warrantor for replacement of any defective products or material.

C. The Contractor shall warrant the green stormwater infrastructure energy dissipation materials through the duration of the Establishment Period.

D. If at any time during the Establishment Period the material becomes damaged due to improper erosion control, maintenance activities or frequencies, the Contractor shall replace the material and fully restore the green stormwater infrastructure facility and any damaged components as determined by the Design Professional, at no additional cost to the Owner.

-- End of Section --

SECTION 02946

GREEN STORMWATER INFRASTRUCTURE AGGREGATE MEDIA

PART 1 GENERAL

1.01 PURPOSE

A. Aggregate media serves as one of the primary storage and filtration media in a green stormwater infrastructure facility. Voids in the media allow for stormwater to move through it, providing filtration, infiltration and storage functions. Aggregate media may also provide separation between coarser and finer media or provide structural stability for other components.

B. Definitions

1. Sand: A fine aggregate with particles finer than 3/8-inch sieve.

2. Storage Aggregate Media: Layer of double-washed aggregate, designed for stormwater storage. (In permeable pavement applications, storage aggregate media may also need to be designed for traffic load.)

3. Choker Course: Layer of double-washed aggregate, placed above the storage aggregate media, that filters out sediment particles prior to the storage aggregate media. (In permeable pavement applications, the choker course fills some of the surface voids of the larger sized storage aggregate media and stabilizes the surface prior to paving.)

4. Aggregate Base: Double-washed aggregate that provides structural support.

1.02 MEASUREMENT AND PAYMENT

A. The Contractor shall provide all labor, material, and equipment required for aggregate media installation and testing, dictated in the Drawings and specified herein. Aggregate media shall be paid for by Lump Sum Price.

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937 Green Stormwater Infrastructure Site Activity Plan

02938 Green Stormwater Infrastructure Control and Protection

02939 Green Stormwater Infrastructure Earthwork

02948 Green Stormwater Infrastructure Media Liners

02949 Green Stormwater Infrastructure Existing Tree Protection

02950 Green Stormwater Infrastructure Selective Vegetation Removal

02954 Green Stormwater Infrastructure Piping

02956 Green Stormwater Infrastructure In-Situ Infiltration Testing

02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of Contract Documents, unless otherwise indicated by the Design Professional.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

ASTM C33/C33M	Standard Specification for Concrete Aggregates

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

COMPLETION OF EXCAVATION NOTIFICATION

COMPLETION OF MEDIA INSTALLATION NOTIFICATION

SD-06 Test Reports

TESTING AGENCY CONTACT

SD-07 Certificates

SAND CERTIFICATION

STORAGE AGGREGATE MEDIA CERTIFICATION

CHOKER COURSE CERTIFICATION

FINISHED GRADE SURVEY VERIFICATION

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Work shall be performed by a qualified installer whose work has resulted in the successful installation

of green stormwater infrastructure facilities with a minimum of three (3) years recent experience.

B. Testing Agency Qualifications

1. An independent agency, acceptable to the authorities having jurisdiction, qualified for testing indicated.

2. TESTING AGENCY CONTACT; All testing and analysis shall be at the expense of the Contractor. Submit all material testing results specified including the following contact information for the testing agency used:

a. Testing Agency Name;

b. Testing Agency Address;

c. Testing Agency Phone;

d. Material Tested.

1.07 QUALITY CONTROL

A. Prior to procurement of material and delivery to the Site, the Contractor shall submit required testing results showing material is in conformance with this Specification.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Upon delivery to the Site, the Contractor shall submit material delivery receipts to the Owner for record. Delivery receipts must include sufficient information to verify the material delivered is consistent with the approved submittals. If delivery receipts do not provide sufficient detail, the Contractor is responsible for verifying with the supplier that the correct material was delivered providing the Owner with appropriate documentation.

B. Contractor shall prevent mixing of dissimilar materials during unloading, stockpiling, and placement activities.

C. All stockpiled material shall be covered and protected from contaminants, wind and water erosion. Stockpiles shall be located away from stormwater drainage paths and low-lying areas that collect water or are susceptible to erosion.

D. Any graded aggregate that has been stored shall be remixed prior to delivery to Site to provide sufficient retention of gradation requirements.

E. After delivery and prior to placement, the Owner reserves the right to collect samples of the aggregate media. If the media is found to be outside the parameters specified in Part 2, or outside the accepted testing submittals, the Contractor shall replace the media at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 SAND

A. Sand shall be clean, double washed fine aggregate meeting the following gradation requirements:

Sand Gradation Requirements Based on ASTM C33/C33M

Sieve Size	Passing (Percent by Weight)
9.5 mm (3/8 inch)	100
4.75 mm (No. 4)	95 – 100
2.36 mm (No. 8)	80 – 100
1.18 mm (No. 16)	50 – 85
600 um (No. 30)	25 – 60
300 um (No. 50)	5 – 30
150 um (No. 100)	0 – 10
75 um (No. 200)	0 – 3

B. SAND CERTIFICATION; Submit certification that sand is clean, double washed and meeting the specified gradation requirements Submittal shall include material supplier name, address and phone.

2.02 STORAGE AGGREGATE MEDIA

A. Storage aggregate media shall be No. 2, No. 3, No. 56, No. 57, or No. 67 stone as specified in the Drawings.

B. Storage aggregate media shall be double-washed, hard, durable, rounded, or sub-angular particles of proper size and gradation, and shall be free from sand, silt, clay, excess fines, and other deleterious materials.

C. Storage aggregate media shall meet ASTM C33/C33M grading requirements for coarse aggregates as follows:

Storage Aggregate Gradation Requirements Based on ASTM C33/C33M

Sieve Size	Passing (Percent by Mass)				
	No. 2	No. 3	No. 56	No. 57	No. 67
75 mm (3 inch)	100	–	–	–	–
63 mm (2-1/2 inch)	90 – 100	100	–	–	–
50 mm (2 inch)	35 – 70	90 – 100	–	–	–

37.5 mm (1-1/2 inch)	0 – 15	65 – 70	100	100	–
25 mm (1 inch)	–	0 – 15	90 – 100	95 – 100	100
19 mm (3/4 inch)	0 – 5	–	40 – 85	–	90 – 100
12.5 mm (1/2 inch)	–	0 – 5	10 – 40	25 – 60	–
9.5 mm (3/8 inch)	–	–	0 – 15	–	20 – 55
4.75 mm (No. 4)	–	–	0 – 5	0 – 10	0 – 10
2.36 mm (No. 8)	–	–	–	0 – 5	0 – 5
1.18 mm (No. 16)	–	–	–	–	–
300 um (No. 50)	–	–	–	–	–
75 um (No. 200)	0 – 2	0 – 2	0 – 2	0 – 2	0 – 2

D. STORAGE AGGREGATE MEDIA CERTIFICATION; Submit certification that aggregate is clean, double washed and meeting the specified gradation. Submittal shall include supplier name, address and phone. Gradation reports shall include the following aggregates:

1. No. 57

2.03 CHOKER COURSE

A. Choker course shall be No. 57, No. 7, No. 8, No. 89 or No. 9 stone, or sand, as specified in the Drawings.

B. Choker course material shall be double-washed, hard, durable, particles of proper size and gradation, and shall be free from sand, silt, clay, excess fines, and other deleterious material.

C. Stone Choker course shall meet ASTM C33/C33M gradation requirements as follows:

Choker Course Gradation Requirements Based on ASTM C33/C33M

Sieve Size	Passing (Percent by Mass)				
	No. 57	No. 7	No. 8	No. 89	No. 9
37.5 mm (1-1/2 inch)	100	–	–	–	–
25 mm (1 inch)	95 – 100	–	–	–	–
19 mm (3/4 inch)	–	100	–	–	–
12.5 mm (1/2 inch)	25 – 60	90 – 100	100	100	–

9.5 mm (3/8 inch)	–	40 – 70	85 – 100	90 – 100	100
4.75 mm (No. 4)	0 – 10	0 – 15	10 – 30	20 – 55	85 – 100
2.36 mm (No. 8)	0 – 5	0 – 5	0 – 10	5 – 30	10 – 40
1.18 mm (No. 16)	–	–	0 – 5	0 – 10	0 – 10
300 um (No. 50)	–	–	–	0 – 5	0 – 5
75 um (No. 200)	0 – 2	0 – 2	0 – 2	0 – 2	0 – 2

D. Sand shall be per Part 2.01

E. CHOKER COURSE CERTIFICATION; Submit certification that aggregate is clean, double washed and meeting the specified gradation. Submittal shall include supplier name, address and phone. Gradation reports shall include the following aggregates:

1. No. 9

2. Sand

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking

1. All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of the Contractor. The Contractor shall set construction stakes, establishing lines, slopes, elevations, and continuous profile grades. The Contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.

2. Contractor shall submit survey verification per Section 02939 Green Stormwater Infrastructure Earthwork.

B. Project Conditions: Project conditions shall be in accordance with Section 02939 Green Stormwater Infrastructure Earthwork.

C. Control and Protection

1. The footprint of the facility shall be kept reasonably dry and stormwater runoff to the facility shall be limited throughout the duration of Work to the maximum extent practicable. Prior to aggregate media placement activities, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified in the Runoff Management Plan, per Sections 02937 Green Stormwater Infrastructure Site Activity Plan

and 02938 Green Stormwater Infrastructure Control and Protection.

2. Blocking of curbs, curb cuts, inlets, and other temporary protection and control measures may be necessary to divert stormwater away from the green stormwater infrastructure facility during construction.

3. Unless designated for removal in the Drawings, protect all trees and vegetation per Sections 02949 Green Stormwater Infrastructure Existing Tree Protection and 02950 Green Stormwater Infrastructure Selective Vegetation Removal, respectively.

3.02 INSTALLATION

A. Excavation

1. Excavation methods used shall conform to Section 02939 Green Stormwater Infrastructure Earthwork.

2. Contractor shall conduct pre-construction infiltration testing per Section 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing after excavation is complete and prior to placement of soil and/or aggregate materials.

3. COMPLETION OF EXCAVATION NOTIFICATION; Notify the Design Professional within 48 hours of completion of excavation and prior to placement of all media layers.

B. Storage Aggregate Media and Choker Course Placement

1. Contractor shall place aggregate media in loose six (6) inch lifts, hand-raked to the lines and grades specified in the Drawings.

2. COMPLETION OF MEDIA INSTALLATION NOTIFICATION; Notify the Design Professional within 48 hours of completion of installation of each media layer and prior to placement of any additional aggregate media layers.

3.03 TOLERANCES

A. The Contractor must place materials based on the line and grade specified in the Drawings within the following tolerances:

1. Horizontal Tolerance: 0.1 feet

2. Vertical Tolerance: 0.1 feet

B. FINISHED GRADE SURVEY VERIFICATION; Submit survey of finished grade elevation to the Design Professional for review. Survey elevation shall be taken at specific point locations identified in the Drawings.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. Immediately protect the aggregate media from contamination by undesired materials, trash, debris, water containing cement, clay, silt or materials that will alter the composition of the material by covering with plastic or plywood.

B. The Contractor shall implement temporary control and protection measures per Section 02938 Green Stormwater Infrastructure Control and Protection to protect the green stormwater infrastructure facility until vegetation is fully established.

C. All protection measures shall be submitted to the Design Professional for acceptance.

3.06 MAINTENANCE

A. The Contractor shall maintain the green stormwater infrastructure facility and adjacent areas disturbed during construction through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment, and per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

A. Owner reserves the right to collect a sample of the material for independent testing at any time during the Establishment Period.

3.08 WARRANTY

A. The Contractor shall warrant the green stormwater infrastructure aggregate media through the duration of the Establishment Period.

B. If at any time during the Establishment Period the media fails to infiltrate due to improper erosion control, maintenance activities or frequencies, the Contractor shall replace the media and fully restore the green stormwater infrastructure facility and any damaged components as determined by the Design Professional, at no additional cost to the Owner.

-- End of Section --

SECTION 02947

GREEN STORMWATER INFRASTRUCTURE GROWING MEDIA AND SOIL AMENDMENTS

PART 1 GENERAL

1.01 PURPOSE

A. Growing media serves as one of the primary storage and filtration media in a green stormwater infrastructure facility that includes a well-mixed blend of soil to support vegetation. Voids in the media allow for stormwater to move through it, providing filtration, infiltration and storage function.

B. This section also includes topsoil material and testing requirements and provisions for stripping of existing topsoil, removal of soil horizons, materials, substitutions and supplements, storage, redistribution, and fine grading. Approved topsoil shall be placed in all landscape areas to be planted unless otherwise specified in the Drawings.

C. Definitions

1. Growing Media: Soil that has been designed to meet specific engineering properties including, but not limited to infiltration, strength, and nutrient levels.

2. Bioretention Soil Media: An engineered soil media with specific proportions of topsoil and compost designed to encourage infiltration and promote plant growth.

3. Topsoil: The uppermost layer of soil that contains a majority of the soil's organic matter and microorganisms, making the soil more amenable to sustaining vegetation. Topsoil can be used independently as a native site soil or imported material, or as a component of the bioretention soil media.

4. Soil Amendment: A material added to a soil to improve its physical properties. Soil amendments included in this specification are compost, lime, and sulfur.

5. Compost: A product resulting from the controlled biological decomposition of organic matter that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth. Compost can be used as a soil amendment, or as a component of bioretention soil media and/or amended native soil media.

1.02 MEASUREMENT AND PAYMENT

A. The Contractor shall provide all labor, material, and equipment required for growing media installation and testing, dictated in

the Drawings and specified herein. Growing media shall be paid by Lump Sum Price.

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937 Green Stormwater Infrastructure Site Activity Plan

02938 Green Stormwater Infrastructure Control and Protection

02939 Green Stormwater Infrastructure Earthwork

02946 Green Stormwater Infrastructure Aggregate Media

02949 Green Stormwater Infrastructure Existing Tree Protection

02950 Green Stormwater Infrastructure Selective Vegetation Removal

02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding

02956 Green Stormwater Infrastructure In-Situ Infiltration Testing

02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of Contract Documents, unless otherwise indicated by the Design Professional.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))

ASTM D4972	Standard Test Method for pH of Soils
ASTM D5084	Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
ASTM D5268	Standard Specification for Topsoil Used for Landscaping and Construction Purposes
ASTM D6913	Standard Specification for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
ASTM D7503	Standard Test Method for Measuring the Exchange Complex and Cation Exchange Capacity of Inorganic Fine-Grained Soils
ASTM F1632	Standard Test Method for Particle Size Analysis and Shape Grading of Golf Course Putting Green and Sports Field Rootzone Mixes
ASTM F1647	Standard Test Methods for Organic Matter Content of Athletic Field Rootzone Mixes

TESTING METHODS FOR THE EXAMINATION OF COMPOSTING AND COMPOST (TMECC)

TMECC 2.02	Laboratory Sample Preparation
TMECC 3.09	Total Solids and Moisture
TMECC 4.02	Nitrogen
TMECC 4.03	Phosphorus
TMECC 4.04	Potassium
TMECC 4.05	Secondary and Micro-Nutrient Content
TMECC 4.06	Heavy Metals and Hazardous Elements
TMECC 4.07	Other Elements
TMECC 4.10	Electrical Conductivity for Compost

TMECC 4.11	Electrometric pH Determinations for Compost
TMECC 5.02	Indicator Ratios
TMECC 5.07	Loss on Ignition Organic Matter Method
TMECC 5.08	Respirometry
TMECC 7.01	Coliform Bacteria

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)

USDA NRCS	Natural Resources Conservation Service, United States Department of Agriculture, Soil Classification System

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR	Title 40: Protection of Environment

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

COMPLETION OF EXCAVATION NOTIFICATION

SD-04 Samples

BIORETENTION SOIL MEDIA SAMPLE

TOPSOIL MEDIA SAMPLE

SD-06 Test Reports

TESTING AGENCY CONTACT

POST-CONSTRUCTION INFILTRATION TEST RESULTS

SD-07 Certificates

IMPORTED TOPSOIL CERTIFICATION

NATIVE TOPSOIL CERTIFICATION

COMPOST CERTIFICATION

BIORETENTION SOIL MEDIA CERTIFICATION

FINISHED GRADE SURVEY VERIFICATION

SD-11 Closeout Submittals

MATERIAL VERIFICATION FORMS

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Work shall be performed by a qualified installer with a minimum five (5) years of recent experience whose work has resulted in the successful installation of green stormwater infrastructure facilities, establishment of plant life, grading and shaping of landscape features, planting beds, lakes and wetlands or other comparable amenities. Installer shall be skilled in the landscape trade and specifically skilled in green stormwater infrastructure. Contractor shall maintain a qualified field supervisor on site at all times.

B. Testing Agency Qualifications

1. An independent agency, acceptable to the authorities having jurisdiction, qualified for testing indicated. The testing agency shall be accredited by the American Association for Laboratory Accreditation and on the United States Golf Association (USGA) preferred labs list.

2. TESTING AGENCY CONTACT; All testing and analysis shall be at the expense of the Contractor. Submit all material testing results specified including the following contact information for the testing agency used:

a. Testing Agency Name;

b. Testing Agency Address;

c. Testing Agency Phone;

d. Material Tested.

1.07 QUALITY CONTROL

A. Prior to procurement of material and delivery to the Site, the Contractor shall submit required testing results showing material is in conformance with this Specification.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Contractor shall prevent mixing of dissimilar materials during unloading, stockpiling, and placement activities.

B. Materials shall not be delivered to the site and work cannot proceed until the submittals have been accepted by the Design Professional.

C. All stockpiled material shall be covered and protected from contaminants, wind and water erosion. Stockpiles shall be located away from stormwater drainage paths and low-lying areas that collect water or are susceptible to erosion. Soil material shall not be stockpiled to a height exceeding four (4) feet, or for greater than 14 days. Where soil is stockpiled for greater than 14

days, the Contractor shall re-sample material and submit for testing per Part 1.05.

D. The Contractor shall not handle, move, or work growing media when saturated or frozen.

E. After delivery and prior to placement, the Design Professional reserves the right to collect samples of the growing media. If the media is found to be outside the parameters specified in Part 2, or outside the submitted test reports and/or certificates, the Contractor shall replace the media at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 BIORETENTION SOIL MEDIA

A. Bioretention soil media shall be a mixture of topsoil and compost. Material tests are required for each individual component of the bioretention soil media prior to mixing as specified in Parts 2.03 and 2.04.

B. Bioretention soil media shall be certified to meet the following mixing composition of each component:

Bioretention Soil Media Components

Component	Composition (Percent by Volume)
Topsoil	85 - 90
Compost	10 - 15

1. Topsoil component of the bioretention soil media shall be per Part 2.03. Contractor shall provide topsoil certification submittal for topsoil component prior to mixing of bioretention soil media.

2. Compost component of the bioretention soil media shall be per Part 2.04. Contractor shall provide compost certification submittal for compost component prior to mixing of bioretention soil media.

C. The bioretention soil media shall meet the following requirements after thorough mixing of all components:

Bioretention Soil Media Testing Requirements

Item	Criteria	Test Method (or Approved Equal)
Very Fine Sand	</= 15% by weight passing 0.10 millimeter (No. 140) sieve and retained on the 0.05 millimeter (No. 270) sieve	AST F1632 M
Silt (0.05 - 0.002 mm)+ Very Fine Sand	</ = 40% by weight	AST F1632 M
Saturated Hydraulic Conductivity	>/= 4.0 in/hr. inches/hour	ASTM D5084 compacted to 85 percent density per ASTM D698
pH	6. - 8.0 0	ASTM D4972
Total Phosphorus (P2O5)	</ = 60 ppm	TMECC 4.03-A
Total Potassium (K2O)	>/ = 78 ppm	TMECC 4.04-A
Magnesium	>/ = 32 ppm	TMECC 4.05-Mg
Conductivity (Soluable Salts)	</ = 1.5 mmhos/cm (dS/m)	TMECC 4.10-A
Cation Exchange Capacity	>/ = 15	ASTM D7503

D. BIORETENTION SOIL MEDIA CERTIFICATION; Submit testing agency certification that the bioretention soil media is within the parameters specified after thorough mixing of all components. Test reports shall be specific to bioretention soil media designated for project use and shall be dated within three (3) months of submittal date. At a minimum, test report shall include the following:

1. Material supplier name, address and phone;

2. Percent by volume mix ratio of topsoil and compost components;

3. Percent by volume composition of sand, silt, clay and organic matter;

4. Percent by weight of very fine sand passing 0.10 millimeter (No. 140) sieve and retained on 0.05 millimeter (No. 270) sieve;

5. Saturated Hydraulic Conductivity;

6. pH;

7. Total Phosphorus;

8. Total Potassium;

9. Magnesium;

10. Conductivity (Soluble Salts);

11. Cation Exchange Capacity.

E. BIORETENTION SOIL MEDIA SAMPLE; One (1) gallon sample of soil mixture.

2.02 TOPSOIL

A. Imported Topsoil

1. Topsoil shall be fertile, friable and free of weeds, weed propagules, roots, rock, clay lumps, cinders, concrete, brick, plastics, metals, litter, debris, herbicides, and other deleterious material.

2. Topsoil requirements shall be consistent with loam, sandy clay loam, or clay loam soil properties.

3. Topsoil pH shall be between 6 and 8 per ASTM D4972

4. Topsoil shall be between 10 percent and 20 percent organic matter by dry weight per ASTM F1647.

5. Topsoil gradation shall be determined per ASTM D6913 or approved equal meeting the following gradation requirements:

Topsoil Gradation Requirements

Sieve Size	Passing (Percent by Weight)
19.0 mm (3/4 inch)	100
75 micrometers (No. 200)	0 - 25

6. Topsoil composition shall be determined per ASTM F1632 or approved equal meeting the following requirements:

Topsoil Composition Requirements

Component (Particle Size)	Composition (Percent by Weight)
Sand (2.0 - 0.05 mm)	35 - 60
Silt (0.05 - 0.002 mm)	20 - 30
Clay (<0.002 mm)	20 - 35

7. IMPORTED TOPSOIL CERTIFICATION; At least 30 days prior to starting Work, submit testing agency certification that topsoil is within the parameters specified prior to mixing with other growing media components. Test reports shall be specific to topsoil media designated for project use and shall be dated within six (6) months of submittal date. At a minimum certification shall include the following:

    a. Material supplier name, address and phone;

    b. Gradation;

        c. Percent by volumePercent by volume composition of sand, silt, clay and organic matter;

    d. pH.

8. TOPSOIL MEDIA SAMPLE; One (1) gallon sample of soil mixture.

B. Native Topsoil

1. Native site topsoil may be used in lieu of imported topsoil if material meets the requirements of Part 2.03, A., and/or is deemed acceptable by the Design Professional.

2. Native topsoil may only be obtained from well-draining sites with onsite topsoil depths of four (4) inches or greater.

3. If native topsoil does not meet requirements of Part 2.03, A., native topsoil shall be amended at the Contractor's expense by amendments identified herein per testing agency recommendations.

4. If native topsoil is amended, resubmit test results after the topsoil mixture has been thoroughly blended. If the material is deemed unsuitable by the Design Professional, the material shall be reconditioned as recommended by the testing agency.

5. NATIVE TOPSOIL CERTIFICATION; At least 30 days prior to starting Work, submit testing agency certification that topsoil is within the parameters specified prior to mixing with other growing media components. At a minimum test report shall include the following:

    a. Gradation;

    b. Percent by volume composition of sand, silt, clay and organic matter;

    c. pH;

    d. Amendment product data and mix ratios.

2.03 SOIL AMENDMENTS

A. Compost

1. Compost shall be a locally sourced homogeneous and friable mixture of partially decomposed organic matter, resulting from composting.

2. Compost supplier shall participate in the US Composting Council's Seal of Testing Assurance (STA) Program, which requires testing through specific approved labs using test methods from the TMECC manual to characterize compost.

3. The Compost shall meet the following requirements:

Compost Testing Requirements

Characteristic	Acceptable Range	Test Method (or Approved Equal)
Stability (Carbon Dioxide Evolution Rate)	< 4 mg CO2-C/g OM per day	TMECC 5.08-B
Oxygen Uptake	< 150 mg O2/kg volatile solids per hour	TMECC 5.08-A
pH	6.0 - 8.5	TMECC 4.11-A
Conductivity (Soluable Salts)	< 4.0 mmhos/cm (dS/m)	TMECC 4.10-A
Particle Size	98 percent passing 3/8" (10 mm) sieve (by dry weight)	TMECC 2.02-B
Organic Matter	30 percent - 60 percent (by mass)	TMECC 5.07-A
Foreign Matter*	< 1 percent (by mass)	*Foreign matter is defined a any matter over 2 mm in any dimension that results from human intervention and havir organic or inorganic constituents such as metal, glass, clay and synthetic polymers (i.e. plastic and rubber).
Trace Metals	< Ceiling Concentrations	40 CFR 503.13 or TMECC 4.06
Moisture Content (percent dry weight)	40 percent - 60 percent	TMECC 3.09-A

Characteristic	Acceptable Range	Test Method (or Approved Equal)
Salmonella (Pathogen)	< 3 MPN/4 grams (by dry weight)	TMECC 7.01-B
Fecal Coliform Bacteria (Pathogen)	< 1,000 MPN/gram (by dry weight)	TMECC 7.01-B

4. COMPOST CERTIFICATION; Submit testing agency certification that compost is within the parameters specified prior to mixing with other growing media components. Test reports shall be specific to media designated for project use and shall be dated within six (6) months of submittal date. At a minimum test report shall include the following:

   a. Material supplier name, address, phone, and verification of participation in the STA Certified Compost program;

   b. Stability (Carbon Dioxide Evolution Rate);

   c. Oxygen Uptake;

   d. pH;

   e. Conductivity (Soluble Salts);

   f. Particle Size;

   g. Organic Matter;

   h. Foreign Matter;

   i. Trace metals;

   j. Moisture Content;

   k. Salmonella;

   l. Fecal Coliform Bacteria.

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking

1. All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of the Contractor. The Contractor shall set construction stakes, establishing lines, slopes, elevations, and continuous profile grades. The Contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.

2. Contractor shall submit survey verification per Section 02939 Green Stormwater Infrastructure Earthwork.

B. Project Conditions

1. Project conditions shall be in accordance with Section 02939 Green Stormwater Infrastructure Earthwork.

2. When conditions detrimental to the proper growth of plant material are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Design Professional prior to installation.

C. Control and Protection

1. The footprint of the facility shall be kept reasonably dry and stormwater runoff the facility shall be limited throughout the duration of Work to the maximum extent practicable. Prior to growing media placement activities, the perimeter of the Site shall be protected against runoff and sedimentation from contributing drainage area with measures identified in the Runoff Management Plan, per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.

2. Blocking of curbs, curb cuts, inlets, and other temporary protection and control measures may be necessary to divert stormwater away from the Site during construction.

3. Unless designated for removal in the Drawings, protect all trees and vegetation per Sections 02949 Green Stormwater Infrastructure Existing Tree Protection and 02950 Green Stormwater Infrastructure Selective Vegetation Removal.

3.02 INSTALLATION

A. Excavation

1. Excavation methods used shall conform to Section 02939 Green Stormwater Infrastructure Earthwork.

2. Contractor shall conduct pre-construction infiltration testing per Section 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing after excavation is complete and prior to placement of soil and/or aggregate materials.

3. COMPLETION OF EXCAVATION NOTIFICATION; Notify the Design Professional within 48 hours of completion of excavation and prior to placement of all media layers.

B. Bioretention Soil Media Placement

1. The growing media shall have a moisture content low enough to prevent visible clumping and compaction during placement.

2. Contractor shall place engineered soil media in horizontal lifts not to exceed six (6) inches for the entire green stormwater infrastructure facility. Each lift shall be lightly watered to encourage settling.

3. If the growing media becomes contaminated with undesired materials during construction, the undesired materials shall be removed and replaced with uncontaminated growing media at the Contractor's expense. If the Design Professional deems that any of the material placed is not in conformance with this specification, then the Contractor shall remove the material in question and replace with clean material meeting requirements of part 2.01.

4. To account for settling, Contractor shall install a two (2) to three (3) inch surcharge lift of growing media over the entire green stormwater infrastructure facility. Surcharge lift shall be allowed to settle for a minimum of 48 hours prior to bringing green stormwater infrastructure to finished grade. The entire surface of the growing media, shall be roto-tilled to a depth of six (6) inches at final grading.

5. Mechanical compaction of the growing media is not permitted. Compaction of the growing media shall not exceed 85 percent density per ASTM D698.

C. Topsoil Placement

1. Topsoil that is a component of the bioretention soil media shall be mixed as specified per part 2.01.

2. Stripping of native topsoil shall be as follows:

a. The full depth of topsoil (1' foot min.) shall be stripped from all grading areas, using a phased approach where appropriate.

b. Topsoil up to a minimum depth of six (6) inches or the entire “A” horizon of the applicable soil series being disturbed as published in the Published County Soil Survey or other detailed soil survey, shall be stripped and stockpiled from all areas to be excavated or filled.

3. Imported or native topsoil to be used independently shall be placed on the as follows:

a. Scarify subgrade to a depth of six (6) inches.
b. Remove and dispose of stones larger than one (1) inch in any dimension, sticks, roots, litter debris, and extraneous matter.

c. Place Topsoil in six (6) inch lifts to a minimum depth of six (6) inches in areas to be planted with sod, and a minimum depth of twelve (12) inches in areas designed as ornamental planting soil. Limit excavation to areas that will be installed within the same day.

d. After Topsoil is installed, spread two (2) inches of

Compost over the areas to be planted with sod and four (4) inches of Compost over ornamental planting soil locations as noted in the Planting Plan. Install additional soil amendments per soil test recommendations and roto till into the top 4-6 inches of topsoil.

e. Contractor shall not leave pits open and will be required to clearly mark or warn the public of their locations.

f. Backfill topsoil with amendments thoroughly mixed to a minimum depth to meet grades as shown in the Drawings. Do not backfill or excavate if fill or sub-grade is frozen.

g. Achieve an approximately uniform stable thickness, finished grading, and surface-water drainage systems. Lightly water topsoil after placement to encourage settling.

h. The amended topsoil shall be spread to have a maximum dry density standard proctor between 75% and 85%. Protect from over compaction.

i. Protect the materials from wind and water erosion.

j. Maintain positive surface drainage. Fill low spots with topsoil except where depressions are indicated in the Drawings.

k. Manually spread topsoil around trees, permanent structures, and paving to prevent damage to adjacent trees and structures.

3.03 TOLERANCES

A. The Contractor must place materials based on the line and grade specified in the Drawings within the following tolerances:

1. Horizontal Tolerance: 0.1 feet

2. Vertical Tolerance: 0.1 feet

B. FINISHED GRADE SURVEY VERIFICATION; Submit survey of finished grade elevation to the Design Professional for review. Survey elevation shall be taken at specific point locations identified in the Drawings.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. Immediately protect the growing media from contamination by undesired materials, trash, debris, water containing cement, clay, silt or materials that will alter the composition of the material by covering with media liner, plastic or plywood.

B. The Contractor shall implement temporary control and protection measures per Section 02938 Green Stormwater Infrastructure Control and Protection to protect the Site until vegetation is fully established.

C. Vegetation shall be installed immediately following installation of topsoil per Section 02951 Green Stormwater Infrastructure Plants and 02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding. If Site conditions limit vegetation of facility immediately following installation of soil, Contractor shall implement additional measures to cover and protect the growing media for duration of exposure.

D. All protection measures shall be submitted to the Design Professional for acceptance.

E. Fully clean all non-vegetated areas where growing media has deposited, including but not limited to pavement.

3.06 MAINTENANCE

A. The Contractor shall maintain the green stormwater infrastructure facility and adjacent areas disturbed during construction through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment, and per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

A. The Contractor shall conduct post-construction infiltration testing per Section 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing at up to three (3) testing locations once all soil and aggregate media has been installed and prior to installation of vegetation. Contractor shall conduct testing within ten (10) days of installation of surface media and submit POST-CONSTRUCTION INFILTRATION TEST RESULTS.

B. Average post-construction infiltration rate shall meet or exceed pre-construction infiltration rates and shall be no less than 0.25 inches per hour with no single test less than 0.15 inches per hour.

C. Owner reserves the right to collect a sample of the material for independent testing at any time during the Establishment Period.

D. Growing media that fails to meet post-construction infiltration requirements shall be remediated as recommended by the Design Professional. Amended media shall then be retested per Section 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing. This procedure shall be repeated by the Contractor until the media meets post-construction infiltration requirements at the discretion of the Design Professional.

3.08 WARRANTY

A. MATERIAL VERIFICATION FORMS; At least 10 working days prior to the Final Inspection, the Contractor shall submit copies of material verification forms, such as load tickets, invoices, sales receipts, and/or similar items to verify quantity of material delivered to the site.

B. The Contractor shall warrant the green stormwater infrastructure growing media through the duration of the Establishment Period. A random five (5) gallon sample of growing media may be collected by the Design Professional anytime during the first year after placement for testing and verification.

C. If at any time during the Establishment Period soil loss occurs or media fails to infiltrate due to improper erosion control, maintenance activities or frequencies, the Contractor shall replace the media and fully restore the green stormwater infrastructure facility and any damaged components as determined by the Design Professional, at no additional cost to the Owner.

-- End of Section --

SECTION 02948

GREEN STORMWATER INFRASTRUCTURE MEDIA LINERS

PART 1 GENERAL

1.01 PURPOSE

A. Media liners are synthetic or clay liners used to provide stabilization and/or separation of soil and aggregate media within a green stormwater infrastructure facility, and to limit mixing of media layers. Media liners can be permeable or impermeable, allow or prevent stormwater infiltration, stabilize media layers, and protect adjacent infrastructure.

1.02 MEASUREMENT AND PAYMENT

A. The Contractor shall provide all labor, material, and equipment required to install media liners as depicted in the Drawings and as specified herein. Media liners shall be measured in the units of Square Yards and shall be paid for by Lump Sum Price.

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937 Green Stormwater Infrastructure Site Activity Plan

02938 Green Stormwater Infrastructure Control and Protection

02939 Green Stormwater Infrastructure Earthwork

02946 Green Stormwater Infrastructure Aggregate Media

02947 Green Stormwater Infrastructure Growing Media and Soil Amendments

02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design Professional.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using

	Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))
ASTM D751	Standard Test Methods for Coated Fabrics
ASTM D1238	Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
ASTM D3786/D3786M	Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
ASTM D4491/D4491M	Standard Test Method for Water Permeability of Geotextiles by Permittivity
ASTM D4533/D4533M	Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D4632/D4632M	Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
ASTM D5084	Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
ASTM D5884/D5884M	Standard Test Method for Determining Tearing Strength of Internally Reinforced Geomembranes
ASTM D5885/D5885M	Standard Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry
ASTM D6241	Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

ASTM D7003/D7003M	Standard Test Method for Strip Tensile Properties of Reinforced Geomembranes
ASTM D7004/D7004M	Standard Test Method for Grab Tensile Properties of Reinforced Geomembranes
ASTM D7238	Standard Test Method for Effect of Exposure of Unreinforced Polyolefin Geomembrane Using Fluorescent UV Condensation Apparatus
ASTM E96/E96M	Standard Test Method for Water Vapor Transmission of Materials

GEOSYNTHETIC RESEARCH INSTITUTE (GRI)

GRI GM 22	Standard Specification for Test Methods, Required Properties and Testing Frequencies for Scrim Reinforced Polyethylene Barriers Used in Exposed Temporary Applications
GRI GT 13(a)	Standard Specification for Test Methods and Properties for Geotextiles Used as Separation between Subgrade Soil and Aggregate

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

MEDIA LINER PLACEMENT NOTIFICATION

SD-03 Product Data

MANUFACTURER INFORMATION

SD-06 Test Reports

IMPERMEABLE CLAY LINER FIELD VERIFICATION

SD-07 Certificates

MANUFACTURER QUANTITY CERTIFICATION

MANUFACTURER QUALITY CERTIFICATION

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. The manufacturer shall have previously demonstrated ability to produce the media liner by having at least two (2) years continuous experience in the manufacturing of the media liner and successfully manufactured a minimum of ten (10) million square feet of the media liner.

2. MANUFACTURER QUANTITY CERTIFICATION; Submit manufacturer certification verifying a minimum of 10 million square feet of the media liner being manufactured as of the date of the submittal.

3. MANUFACTURER QUALITY CERTIFICATION; Submit manufacturer certification, verifying that the quality of the resin used to manufacture the media liner meets the requirements specified in Part 2.

1.07 QUALITY CONTROL

A. Quality control certificates, signed by the manufacturer's quality assurance manager, shall be documented for each roll delivered to the Site and shall include the following:

1. Manufacturer Name;

2. Product Identification;

3. Thickness;

4. Roll Dimension;

5. Roll Number;

6. Lot Number;

7. Sampling Procedures;

8. Sampling Frequency;

9. Test Results of conformance sampling.

B. Conformance sampling shall be completed at a minimum frequency of one (1) sample every 50,000 square feet of media liner delivered. If the results of any test do not conform to the requirements of this specification, retesting to determine conformance or rejection shall be done in accordance with the manufacturing protocol as set forth in the manufacturer's quality assurance at no additional cost to the Owner.

C. MANUFACTURER INFORMATION; Submit manufacturer instructions for each product, including, but not limited to fabrication, delivery and handling, installation and protection. Include the following manufacturer information:

1. Supplier name, address and phone;

2. Documents for material warranty;

3. Documents for media liner workmanship, including, but not limited to batch identifications and associated roll numbers;
4. Origin, identification and production information for the resin used in the media liner, including, but not limited to the supplier's name, brand name and production plant for the resin;
5. Media liner properties including but not limited to weight, grab tensile strength, grab tensile elongation, tongue tear, California Bearing Ratio (CBR) puncture, bursting strength, water vapor transmission, high pressure oxidative induction time, and ultraviolet resistance as specified in Part 2.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Materials shall be wrapped with a protective cover to avoid damage due to handling, water, sunlight, and contaminants. The Contractor shall be responsible for replacement of damaged or unacceptable material as identified by the Design Professional at no additional cost to the Owner.

B. During storage, the media liner shall be elevated off the ground and adequately covered to protect them from dirt, grease, moisture, mud, mechanical abrasions, and excessive heat that may damage the media liner material. The Contractor shall avoid dragging the media liner on rough soil subbase. Media liner shall be stored on a prepared surface (not wooden pallets) and shall not be stacked more than two (2) rolls high.

PART 2 PRODUCTS

2.01 PERMEABLE GEOTEXTILE LINER

A. Permeable geotextile liner shall be of the product type and manufacturer specified in the drawings.

2.02 IMPERMABLE CLAY LINER

A. Impermeable clay liner shall have a hydraulic conductivity less than or equal to 1x10^7 cm/s, as measured per ASTM D5084, when compacted at 95% Standard proctor.

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking: All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of the Contractor. The Contractor shall set construction stakes, establishing lines, slopes, elevations, and continuous profile grades. The Contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.

B. Soil Preparation: Remove and dispose of stones larger than one (1) inch in any dimension, sticks, roots, litter, debris, extraneous matter per Part 3.04.

C. Project Conditions

1. Media liner placement shall not proceed at an ambient temperature below 32 degrees Fahrenheit or above 100 degrees Fahrenheit. Media liner placement shall not be performed during precipitation, in an area of ponded water, or excessive winds that adversely affect the media liner placement.

2. MEDIA LINER PLACEMENT NOTIFICATION; Notify the Design Professional at least 48 hours prior to placement of media liner.

D. Control and Protection: Prior to installation, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.

3.02 INSTALLATION

A. Excavation: Facility shall be excavated per Section 02939 Green Stormwater Infrastructure Earthwork to the dimensions, side slopes, and elevations specified in the Drawings.

B. Anchor Trench: Anchor trench shall be constructed as shown in the Drawings or as recommended by the manufacturer.

C. Liner Placement

1. Permeable Geotextile Liner

a. Permeable geotextile liner shall be placed loosely with no wrinkles or folds, and with no void space between the permeable geotextile liner and adjacent surface.

b. Successive sheets of permeable geotextile liner shall overlap per manufacturer's recommendations, with the upstream (higher in elevation) sheet overlapping the downstream (lower in elevation) sheet.

c. All seams and overlaps shall be subject to the approval of the Design Professional.

d. Prior to covering the permeable geotextile liner with materials, the permeable geotextile liner shall be inspected for any damage (e.g. holes, tears, rips etc.) incurred during placement. The inspection shall be performed by the Design Professional.

e. Damaged permeable geotextile liner, as identified by the Design Professional, shall be repaired or replaced immediately by the Contractor per manufacturer's recommendations at no additional cost to the Owner.

2. Impermeable Clay Liner

a. Install impermeable clay liner in up to 12-inch lifts and compact each lift.

b. Compact each lift to attain a hydraulic conductivity less than or equal to 1x10^7 cm/s, as measured per ASTM D5084, when compacted at 95% Standard proctor.

c. IMPERMEABLE CLAY LINER FIELD VERIFICATION; Conduct at least two (2) nuclear density test per ASTM D6938 for every clay dike location at the time of the installation. Submit report demonstrating that the installed impermeable clay liner meets requirements specified. At a minimum test report shall include the following:

1) Material supplier name, address and phone

2) Operator name, organization, address, and phone

3) Test location transcribed on Drawing with Test Number or Test Identification

4) Dry density for each test conducted

5) Water content for each test conducted

6) Percent compacted for each test conducted

d. Impermeable clay liner that is damaged or does not meet requirements shall be repaired or replaced immediately by the Contractor at no additional cost to the Owner.

D. Backfill: Backfill shall be in accordance with Section 02939 Green Stormwater Infrastructure Earthwork. Install soil and aggregate media over media liner to finished grade per Section 02946 Green Stormwater Infrastructure Aggregate Media and 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments, as shown in the Drawings.

3.03 TOLERANCES

A. The Contractor shall place product(s) based on the line and grade specified in the Drawings within the following tolerances:

1. Horizontal Tolerance: 0.1 feet

2. Vertical Tolerance: 0.1 feet

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. The Contractor shall implement temporary control and protection

measures per Section 02938 Green Stormwater Infrastructure Control and Protection to protect the green stormwater infrastructure facility until the entire upstream tributary area is fully stabilized.

B. All protection measures shall be submitted to the Design Professional for acceptance.

3.06 MAINTENANCE

A. The Contractor shall maintain the green stormwater infrastructure facility per Section 02957 Green Stormwater Infrastructure Establishment, and per the schedule identified Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

A. The Contractor shall furnish the Owner with a written warranty from the manufacturer/supplier (Warrantor) that shall warrant the material against manufacturing defects and material degradation.

B. Should a defect occur, which is covered under warranty, the Warrantor shall bear all costs for the repair, relocation and replacement of the media liner. The Contractor shall be responsible for coordination with the Warrantor for replacement of any defective products or material.

-- End of Section --

SECTION 02949

GREEN STORMWATER INFRASTRUCTURE EXISTING TREE PROTECTION

PART 1 GENERAL

1.01 PURPOSE

A. This Section includes the protection and trimming of existing trees that interfere with, or are affected by, execution of the Work, whether temporary or permanent construction.

B. Definitions

1. Tree Protection Zone: Area surrounding individual trees or groups of trees to remain during Work, and defined by the Drip Line of individual trees or the perimeter Drip Line of groups of trees, unless otherwise indicated.

2. Drip Line: Area defined by the outermost circumference of the tree canopy.

3. Diameter Breast Height (DBH): The outside bark diameter of an existing tree measured 4.5 feet above the ground, on the uphill side of the tree.

4. Caliper: Diameter of the stem or trunk of a tree measured above existing grade. For trees up to 4.5 inches in diameter, Caliper shall be measured six (6) inches above existing grade. If the Caliper measured at six (6) inches is greater than 4.5 inches, the Caliper shall be measured at 12 inches above existing grade.

5. Tree Removal: Demolition of existing tree, including cutting down the tree, grubbing the stump, and removing and disposing of the demolished tree material from the Site.

1.02 MEASUREMENT AND PAYMENT

A. The Contractor shall provide all labor, material, and equipment required for protection of existing trees, dictated in the Drawings and specified herein. Existing tree protection shall be paid for by Lump Sum Price and measured as follows:

Existing Tree Protection Measurement and Payment Units

Item	Unit
Tree Protection Fencing	Linear Feet
Tree Removal	Each
Tree Replacement	Each 2-inch caliper replacement tree

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937 Green Stormwater Infrastructure Site Activity Plan

02946 Green Stormwater Infrastructure Aggregate Media

02947 Green Stormwater Infrastructure Growing Media and Soil Amendments

02948 Green Stormwater Infrastructure Media Liners

02951 Green Stormwater Infrastructure Plants

02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding

02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design Professional.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z60.1	The American Standard for Nursery Stock
ANSI A300	Tree Care Operations: Standard Practices for Tree, Shrub and Other Woody Plant Maintenance

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

TREE REPLACEMENT PLAN

TREE REMOVAL IDENTIFICATION

TREE PROTECTION PRE-CONSTRUCTION CONFERENCE

1.06 QUALITY ASSURANCE

A. Tree Service Qualifications: Work shall be performed by an experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Work and that will assign an experienced, qualified Arborist to

the Work. The Arborist shall be certified by the International Society of Arboriculture.

B. Tree Pruning Standards: Comply with ANSI A300 Part 1, "Trees, Shrubs and other Woody Plant Maintenance-Standard Practices (Pruning)."

1.07 QUALITY CONTROL

A. A qualified Arborist as identified in Part 1.06, A. shall be on the Site on a full-time basis during execution of tasks related to tree protection.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Do not store construction materials, debris, or excavated material inside Tree Protection Zone(s).

B. Site utilization shall protect root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials, and, protecting root systems from ponding, eroding, compaction or excessive wetting caused by dewatering operations.

C. Do not permit vehicles or foot traffic within Tree Protection Zone(s).

PART 2 PRODUCTS

2.01 TREE PROTECTION FENCING

A. Tree protection fencing shall be orange in color and minimum 48 inches in height Mesh Construction Fencing by Conweed or approved equal. Fence posts shall be Metal T-Posts.

2.02 TREE REPLACEMENT

A. TREE REMOVAL IDENTIFICATION; Submit any trees to be removed not specifically identified for removal in the Drawings. Tree removal identification submittal shall include the following:

1. Location of tree with northing/easting points;

2. Species of tree;

3. And purpose for removal.

B. TREE REPLACEMENT PLAN; Contractor shall submit a tree replacement plan for all trees removed not specifically identified for removal in the Drawings. Tree replacement plan shall include the following:

1. Location of replacement tree(s) with northing/easting points;

2. Species of replacement tree(s);

3. And Caliper of replacement tree(s).

C. Replacement trees shall be in accordance with Section 02951 Green Stormwater Infrastructure Plants.

PART 3 EXECUTION

3.01 PREPARATION

A. Trees, tree roots and limbs within the construction limits shall be protected against injury or damage through the duration of the Work. All trees and vegetation shall remain and be protected unless designated otherwise by the Design Professional.

B. Any trees damaged or destroyed during construction due to construction activities shall be treated or removed at the Contractor's expense per Part 3.02, E. and/or F.

C. Construction Access

1. Submit construction access location and duration of temporary access within Tree Protection Zone(s) per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

2. There shall be no construction traffic within the Tree Protection Zone(s). If no other access is obtainable, place four (4) foot by eight (8) foot sheets of three-quarter (3/4) inch plywood atop nine (9) inches of shredded wood pulp or mulch over entire area proposed for vehicular traffic.

3. After removal of mulch and plywood, Contractor shall aerate the surface soil, per Part 3.02, E.

4. All disturbed areas shall be re-sodded per Section 02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding or pavement restored in-kind.

D. Project Conditions

1. Tree protection fencing shall be installed prior to construction operations.

2. Proceed with Work only when existing and forecasted weather conditions are suitable for Work.

E. TREE PROTECTION PRE-CONSTRUCTION CONFERENCE: Before tree protection and trimming operations begin, the Contractor shall conduct a meeting with the Design Professional at the Site to review tree protection and trimming procedures and responsibilities. Contractor shall submit tree protection methods to be used during construction.

3.02 INSTALLATION

A. Tree Protection

1. Install tree protection fencing around Tree Protection Zone(s) to protect remaining trees and vegetation from damage due to Work. Maintain tree protection fencing and remove when Work is complete.

2. Preferred Fencing Installation Method: Where trees are located in open areas not constricted by existing pavement, utilities or proposed grading, the tree protection fencing shall be installed a minimum of one (1) foot outside the Drip Line of the tree.

3. Alternative Fencing Installation Method 1: Where trees are located in areas constricted by utilities or proposed grading, the tree protection fencing shall be installed as close to the Drip Line as possible OR as follows:

Alternative Fencing Installation Method 1 by Tree Size

Tree Size (DBH)	Fence Placement Requirement
Small Trees (<9 inches)	Minimum of 5 feet from face of tree along the side of constriction. All other sides shall be 1 foot outside the dripline of the tree.
Medium (10 inches to 15 inches)	Minimum of 10 feet from the face of the tree along the side of constriction. All other sides shall 1 foot outside the Drip Line of the tree.
Large (>15 inches)	Minimum of 15 feet from the face of the tree along the side of constriction. All other sides shall 1 foot outside the Drip Line of the tree.

4. Alternative Fencing Installation Method 2: Where trees are located adjacent to existing pavement, install tree protection fencing adjacent to pavement. All other sides shall be a minimum of one (1) foot outside the Drip Line of the tree.

5. Alternative fencing installation method shall be submitted to the Design Professional.

B. Excavation

1. Do not excavate within Tree Protection Zone(s), unless otherwise indicated in the Drawings or approved by the Design Professional.

2. Install shoring or other protective support systems to minimize sloping excavations within the vicinity of the Tree Protection Zone(s). Do not allow soil loss from Tree Protection Zone(s) in instances where the Drip Line is a

point of beginning for excavation or grading operations. If soil loss occurs, Contractor shall correct the problem within 24 hours of occurrence.

3. Where excavation is required within the Drip Line of the tree, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

4. Where utility trenches are required within Tree Protection Zone(s), tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.

5. Roots damaged during excavation or trenching activities shall be pruned per Part 3.02, D.

C. Regrading

1. Regrading in the vicinity of an existing tree shall be based on lowering, minor and moderate fill conditions, as defined in the following subsections. Roots damaged by regrading activities shall be pruned per Part 3.02, D.

2. Grade Lowering: Where new finished grade is indicated below existing grade around trees, slope grade away from trees as recommended by Arborist, unless otherwise indicated in the Drawings.

3. Minor Fill: Where existing grade is six (6) inches or less below finished grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations. Do not operate equipment within Tree Protection Zone(s) when fine grading topsoil is placed above existing grade.

4. Moderate Fill: Where existing grade is more than six (6) inches but less than 12 inches below finished grade, place storage aggregate media No. 57 stone per Section 02946 Green Stormwater Infrastructure Aggregate Media, permeable liner per Section 02948 Green Stormwater Infrastructure Media Liners, and topsoil per Section 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments on existing grade as follows:

    a. Carefully place storage aggregate media No. 57 stone against tree trunk approximately two (2) inches above finished grade and extend not less than 18 inches from tree trunk on all sides. For balance of area within Drip Line, place storage aggregate media No. 57 stone up to six (6) inches below finished grade.

b. Place permeable liner with edges overlapping 6 inches minimum.

c. Place remaining fill layer of topsoil to finished grade. Do not compact storage aggregate media No. 57 stone or topsoil. Hand grade to required finish elevations.

D. Root Pruning

1. Root Pruning shall take place only where the roots of existing trees have been damaged by regrading or trenching operations and as directed by the Arborist.
2. If construction is to occur within the root zone of existing plant material, root pruning and special plant care, including fertilizing and watering, will be required.
3. Do not cut main lateral roots or taproots. Cut only smaller roots that interfere with installation of Work. Do not break or chop.
4. Prior to root pruning, remove all weeds.
5. Root prune using an approved mechanical root pruning saw prior to regrading operations, as directed by the Arborist. Air Spading excavation consisting of hand and/or pneumatic excavation may be required as directed by Arborist.
6. For plant material that is to remain in place, if the roots of that plant material are exposed during construction, the damaged root ends are to be removed by cutting them off cleanly.
7. Initial watering shall be performed on all trees, which are designated for root pruning. Water trees immediately after pruning by thoroughly saturating root balls and continue to keep root balls thoroughly saturated during first three (3) weeks following root pruning. After the first three (3) weeks, water as required, according to weather conditions, to keep root balls in a moist condition during growing seasons, through the duration of the Work. Test root balls for optimal moisture once per week using a soil auger.
8. All pruning shall be overseen by an Arborist. All pruning shall be done according to the National Arborist Association's Pruning Standards.
9. Any damage to the root zone, as determined by the Arborist, will be compensated by pruning an equivalent amount of the top vegetative growth of the material within one (1) week following root damage, fertilization and supplemental watering.

E. Tree Repair

1. Promptly repair trees damaged by construction operations within 24 hours of occurrence. Treat damaged trunks, limbs, and roots according to Arborist's written instructions.

2. If soil within the Tree Protection Zone(s) becomes compacted during construction, aerate the surface soil a minimum of ten (10) feet outside of the Drip Line and no closer than three (3) feet from the tree trunk. Drill holes two (2) inches in diameter a minimum of 12 inches deep at 24 inches on center or use a turf aerator that is approved by the Design Professional. Backfill holes with an equal mix of augered soil and sand.

F. Tree Replacement

1. Contractor shall obtain written approval from the Design Professional prior to removal of trees not specifically indicated for removal in the Drawings.

2. Trees not indicated for removal in the Drawings that die or are damaged during construction operations shall be removed and replaced at the Contractor's expense if the Design Professional determines that the trees are incapable of restoring to normal growth pattern.

3. Trees removed shall be replaced with two (2) inch Caliper tree(s) at a rate based on the DBH of the existing tree, as follows:

Tree Replacement Requirements

Size of Tree Removed (DBH)	Rate of Replacement (2-inch Caliper)
1 inch - 5 inches	2:1
6 inches - 10 inches	3:1
11 inches - 16 inches	4:1
17 inches - 23 inches	5:1
24 inches - 31 inches	6:1
32+ inches	8:1

4. Replacement trees shall be planted per Section 02951 Green Stormwater Infrastructure Plants and maintained per Section 02957 Green Stormwater Infrastructure Establishment.

3.03 TOLERANCES

A. Trees shall be measured according to ANSI Z60.1 with branches and trunks or canes in their normal position.

B. Do not prune to obtain required sizes.

C. Replacement tree Calipers shall measure equal to or greater than size specified in Part 3.02, F.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. The Contractor shall maintain tree protection through the duration of Work in the vicinity of the Tree Protection Zone(s) per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.06 MAINTENANCE

A. Remove tall grass or weeds by mowing and pickup all trash within the Tree Protection Zone(s) for the duration of Work.

B. Contractor shall be responsible for the health of the tree(s) identified for protection through the duration of the Establishment Period, as defined in Section 02957 Green Stormwater Infrastructure Establishment.

C. Vegetative maintenance shall be per Section 02957 Green Stormwater Infrastructure Establishment.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

A. Trees, tree roots and limbs within the extents of Work shall be protected against injury or damage through the duration of the Establishment Period. Any trees located in the Tree Protection Zone(s) that die or show more than 25 percent canopy dieback shall be removed and replaced at Contractor's expense per Part 3.02, F.

B. Contractor is responsible for installed plant material warranty per Section 02951 Green Stormwater Infrastructure Plants.

-- End of Section --

SECTION 02950

GREEN STORMWATER INFRASTRUCTURE SELECTIVE VEGETATION REMOVAL

PART 1 GENERAL

1.01 PURPOSE

A. The purpose of Section 02950 Green Stormwater Infrastructure Selective Vegetation Removal is to manage areas noted in the Drawings as Tree Protection Zones in which no clearing and grubbing activities, construction, or staging areas are to occur. Areas shall be maintained free from invasive species and structural and/or maintenance concerns of existing tree stands. Within these areas, desirable vegetation, including grasses, wildflowers, shrubs, or trees are to be protected from construction activities.

B. Definitions

1. Selective Vegetation Removal: Areas within Tree Protection Zone designated in the Drawings outside of normal clearing and grubbing, where the Contractor shall remove selected trees less than 2-inch diameter breast height and invasive plant undergrowth.

2. Diameter Breast Height (DBH): The outside bark diameter of an existing tree measured 4.5 feet above the ground, on the uphill side of the tree.

3. Glyphosate: A non-selective herbicide that absorbs into the plant tissue and is carried to the roots. Caution must be taken to minimize off-target impacts when applying non-selective herbicides.

4. Triclopyr: A selective herbicide for broadleaf plants (forbs, shrubs, and trees).

5. Invasive Species: Shall be determined by the Missouri Department of Conservation Invasive Plant Species List.

6. Wooded Area Cleanup: Work within the Tree Protection Zone where the Contractor shall remove debris, partially dead or broken vegetation, stumps, loose roots, trash and leaf litter.

1.02 MEASUREMENT AND PAYMENT

A. The cost for development and implementation of Selective Vegetation Removal shall be subsidiary to Work being performed.

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937	Green Stormwater Infrastructure Site Activity Plan
02938	Green Stormwater Infrastructure Control and Protection
02949	Green Stormwater Infrastructure Existing Tree Protection
02953	Green Stormwater Infrastructure Non-Native Seeding and Sodding
02957	Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design Professional.

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

APWA 2150	Division II Construction and Material Specification, Erosion and Sediment Control

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z60.1	The American Standard for Nursery Stock

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

MEANS/METHODS OF SELECTIVE VEGETATION REMOVAL

SELECTIVE VEGETATION FIELD ASSESSMENT

FIELD HABITAT ASSESSMENT

SD-07 Certificates

MANUFACTURER CERTIFICATIONS

SD-10 Operation and Maintenance Data

SELECTIVE VEGETATION REMOVAL MAINTENANCE REPORT

1.06 QUALITY ASSURANCE

A. Contractor Qualifications: A qualified horticulturist who has completed work similar in material, design, and extent to that indicated for this Work and with a record of successful landscape removal.

B. Tree Service Qualifications: Work shall be performed by an experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Work and that will assign an experienced, qualified Arborist to the Work. The Arborist shall be certified by the International Society of Arboriculture.

1.07 QUALITY CONTROL

A. MEANS/METHODS OF SELECTIVE VEGETATION REMOVAL; Submit means and methods to be used for Selective Vegetation Removal and Wooded Area Cleanup.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Deliver herbicides in manufacturer's original unopened and undamaged containers. They shall be clearly marked to identify brand name, concentration, contents, and order number on each package. Store all materials in a protected, dry location at temperatures in accordance with manufacturer's recommendation. Materials shall be stacked and stored in accordance with manufacturer's recommendation.

B. Additional manufactured products shall be delivered, stored and handled per the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 HERBICIDES

A. Use of chemical treatment for removal or cause of death for Selective Vegetation Removal must be approved by the Design Professional prior to use.

B. Do not use herbicides that could harm existing plant material intended to remain when applied per Contractor's means and methods per Part 1.07. Contractor shall be responsible for removal and replacement of any and all prematurely defoliated trees within six (6) months of observed damage intended.

1. Woody Plants and Cut Stumps: Contractor shall submit suitable herbicide for approval.

2. Groundcovers and Broadleaf Plants (non-woody): Contractor shall submit suitable herbicide for approval.

C. MANUFACTURER CERTIFICATIONS: Contractor shall submit for approval all products being used and/or stored on the Site prior to delivery or use. Submit product certificates signed by manufacturer, certifying that product complies with these

Selective Vegetation Removal requirements. Include manufacturer certified analysis for standard products.

2.02 SEED

A. Seed operations shall follow Section 02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding as documented per Drawings.

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking

1. SELECTIVE VEGETATION FIELD ASSESSMENT; Contractor shall be responsible for performing a Selective Vegetation Field Assessment of the Site with the Design Professional and qualified Arborist to assess the existing vegetation. The Selective Vegetation Field Assessment submittal shall include, but is not limited to, the following:

a. Contractor shall survey and tag trees, as necessary, for selective removal with final approval given by the Design Professional.

b. Provide figure(s), identifying existing vegetation to remain, invasive species for removal, detailing the species, size, condition, and location of vegetation.

c. Coordinate with utility(s) and Design Professional for Work that impacts the existing Tree Protection Zone.

d. Opportunities for vegetation preservation, or selective removal of vegetation as an alternative to standard clearing and grubbing;

e. Construction limits and the anticipated impacts on surrounding vegetation. Tree protection fencing per Section 02949 Green Stormwater Existing Tree Protection shall be installed around all Selective Vegetation Removal areas.

2. SELECTIVE VEGETATION REMOVAL MAINTENANCE REPORT: Submit a written or graphic report for the care and maintenance of the Tree Protection Zone and Selective Vegetation Removal. This Selective Vegetation Removal Maintenance Report shall convey the activities required for the selective removal and preservation of vegetation. Contractor shall be responsible for coordination with a qualified Arborist for the care of the vegetation during construction and during pruning and vegetation removal activities. All removal and maintenance activities must have approval prior to execution of Work.

3. FIELD HABITAT ASSESSMENT; Submit report for Migratory Bird Nests and State Identified Endangered Bat Habitat. Perform 'Field Habitat Assessment for Active Migratory Bird Nests and Northern Long-eared Bat Habitat' prior to proceeding with any

site clearing or plant species removal. The Endangered Species Act (ESA) (16 U.S.C. 1531) provides protection to species that are listed as threatened or endangered or have critical habitat designated for the persistence of the species. The Northern Long-eared Bat (NLEB) is protected as a threatened species under the ESA within Final 4(d) Rule for the Northern Long eared Bat (4(d) rule). The NLEB hibernates in caves or abandoned mines during the winter. During the summer, the NLEB may roost beneath loose bark of live, dead, or dying trees. Roosting or foraging habitat include forests, wooded fence rows, and riparian areas.

4. Delineate areas for herbicide application and obtain Design Professional acceptance of delineated areas prior to herbicide applications. Adjust areas for herbicide application as requested.

5. All trees not designated for removal shall remain in place. The Contractor shall protect and preserve all vegetation designated to remain.

B. Project Conditions

1. Selective Vegetation Removal shall be limited to September 1st through February 15th to discourage migratory birds from nesting within area of construction.

2. Vegetation must be cleared to a height less than 12 inches. Cleared material should be removed by the Contractor prior to February 15th. If Selective Vegetation Removal is performed between February 16th and August 31st, the Contractor shall employ a qualified wildlife biologist or ecologist to conduct survey for migratory bird activity prior to commencing Selective Vegetation Removal operations.

3. Where migratory bird activity is identified, the Contractor shall obtain the required permits under the Federal Migratory Bird Treaty Act prior to commencing activities. If no migratory bird activity is identified, the contractor may commence activities. Selective Vegetation Removal must be completed within seven (7) calendar days after inspection, including removal of all downed vegetation material from the site. If Selective Vegetation Removal is not completed within seven (7) calendar days of inspection, the contractor's qualified wildlife biologist or ecologist must resurvey the site as required above.

4. Selective Vegetation Removal activities in the Tree Protection Zones shall be completed three (3) months prior to Site clearing, grubbing and earthwork activities. After Selective Vegetation Removal activities have been completed, Contractor shall protect the entire area as specified in Sections 02949 Green Stormwater Infrastructure Existing Tree Protection. Contractor shall take care to limit activities that would conflict with the restoration of Tree Protection Zones.

C. Control and Protection

1. This section shall work in conjunction with the Stormwater Runoff Management Plan, as described in Section 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.

2. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by operations.

3. Provide erosion control measures in accordance with APWA 2150, to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. This section does not replace erosion and sediment control regulatory responsibilities.

4. Examine areas for compliance with requirements and conditions affecting performance of Work. Proceed with Selective Vegetation Removal only after unsatisfactory conditions have been corrected.

5. Temporary roadways shall be located to minimize damage to shrub and tree stands per the requirements of 02937 Green Stormwater Infrastructure Site Activity Plan.

6. Soil stabilization measures shall be located at the limits of clearing to prevent sediment deposition within the Tree Protection Zone per 02938 Green Stormwater Infrastructure Control and Protection.

7. Equipment must be kept away from trees to be preserved to avoid trunk damage caused by equipment nicking or scarring the trunk.

3.02 INSTALLATION

A. Vegetation Removal Methods

1. Preservation of Existing Trees: Work within the Tree Protection Zone shall be by hand clearing and power raking only. Do not use heavy equipment. Do not mechanically scarify the surface.

2. Mechanical Vegetation Removal: Mechanical removal involves use of loppers, hand saws and other hand tools to cut down plants and hand pulling. Caution needs to be taken when manually removing plants so that soil is not highly disturbed leading to erosion. Many invasive plants can spread via rhizomes and thus taking out the entirety of the root is imperative.

3. Chemical Vegetation Removal: Contractor shall use common systemic herbicides (active ingredients either glyphosate or triclopyr) for chemical vegetation removal, or approved equal. Contractor shall use basal bark treatment and/or foliar treatment or other approved control method. Contractor shall apply systemic herbicide during times and/or seasons that minimize risk for translocation in the plant.

B. Selective Vegetation Removal

1. All trees less than 2-inch caliper and species deemed as invasive shall be cleared and removed. Stumps shall be cut to two (2) inches above the ground and treated with approved herbicide to discourage regrowth. Do not excavate root mass or disturb adjacent tree roots.

2. All woody shrubs, including both invasive and non-invasive, shall be cleared and removed. Hand dig roots or treat with herbicide to discourage regrowth. Contractor shall take caution not to disturb adjacent tree roots.

3. All groundcovers deemed invasive shall be cleared and removed. All non-invasive groundcovers shall remain.

C. Tree Preservation Understory Restoration

1. Contractor shall, by broadcasting, seed all areas that have been cleared during Selective Vegetation Removal within the Tree Protection Zone with seed mixes as denoted in the Drawings.

2. Contractor shall install seed, following applicable Section 02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding, except that it shall be applied by broadcasting.

D. Trees that lose more than fifty percent of their leaves within Establishment Period shall be replaced per Tree Replacement Requirements, described in 02949 Green Stormwater Infrastructure Existing Tree Protection.

3.03 TOLERANCES

A. Trees shall be measured according to ANSI Z60.1 with branches and trunks or canes in their normal position.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. Not applicable.

3.06 MAINTENANCE

A. The Contractor shall maintain temporary Tree Protection Zone through the Establishment Period as defined in Section 02957 Green Stormwater Infrastructure Establishment.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

A. Not applicable.

-- End of Section --

SECTION 02953

GREEN STORMWATER INFRASTRUCTURE NON-NATIVE SEEDING AND SODDING

PART 1 GENERAL

1.01 PURPOSE

A. The purpose of Section 02953 Green Stormwater Infrastructure Non-Native Seeding and Sodding is to provide requirements for furnishing and applying limited soil amendments, seeding, sodding, reconditioning existing lawn areas, and replanting unsatisfactory or damaged lawns affected by execution of the Work.

B. Definitions

1. Certified Seed: Progeny of breeder, foundation or registered seed, handled under procedures acceptable to the Department of Agriculture and Forestry to maintain satisfactory genetic purity and identity. Certification color is Blue Tag or Gold Tag.

2. Cover Crop: Temporary vegetation to help suppress weeds and manage soil erosion when project conditions are outside of the non-native seeding and sodding planting seasons.

3. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath topsoil.

1.02 MEASUREMENT AND PAYMENT

The Contractor shall provide all labor, material, and equipment required for seeding and sodding, depicted in the Drawings and specified herein. Seed and sod shall be paid for by Lump Sum Price measured as follows:

Non-Native Seeding and Sodding Measurement and Payment Units

Item	Unit
Temporary Seed	Acre
Turfgrass Sod	Square Feet

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937 Green Stormwater Infrastructure Site Activity Plan

02938 Green Stormwater Infrastructure Control and Protection

02946 Green Stormwater Infrastructure Aggregate Media

02947 Green Stormwater Infrastructure Growing Media and Soil Amendments

02957 Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design Professional.

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

APWA 2150	(2017) Division II Construction and Material Specification, Erosion and Sediment Control

TURFGRASS PRODUCERS INTERNATIONAL (TPI)

TPI	Guideline Specifications to Turfgrass Sodding

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)

USDA FSA	United States Department of Agriculture, Federal Seed Act

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

TEMPORARY SEEDING NOTIFICATION

SD-03 Product Data

SOIL AMENDMENTS

SD-07 Certificates

TURFGRASS SOD SEED CERTIFICATION

TEMPORARY SEED CERTIFICATION

1.06 QUALITY ASSURANCE

A. Installer Qualifications

1. Work shall be performed by a qualified installer per Section 02937 Green Stormwater Infrastructure Site Activity Plan,whose work has resulted in the successful installation of seeding and sodding, similar in material, design, and extent.

1.07 QUALITY CONTROL

A. Prior to procurement of material and delivery to the Site, the Contractor shall submit quality control certificates, certifying the materials conform to specifications. The quality of all materials, the process of manufacture, and the finished products shall be subject to inspection and acceptance by the Design Professional. Such inspection may be made at the place of manufacture or the Site after delivery.

B. All materials shall be subject to rejection at any time due to failure to meet any requirements specified herein. Material rejected after delivery to the Site shall be marked for identification and shall be removed from the Site immediately. All materials which have been damaged after delivery or installation will be rejected, removed and replaced at the Contractor's expense.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Upon delivery to the Site, the Contractor shall submit material delivery receipts to the Owner for record. Delivery receipts must include sufficient information to verify the material delivered is consistent with the approved submittals. If delivery receipts do not provide sufficient detail, the Contractor is responsible for verifying with the supplier that the correct material was delivered and providing the Owner with appropriate documentation.

B. Temporary Seed: Deliver seed in original sealed, labeled, and undamaged containers.

C. Turf Sod: Harvest, deliver, store, and handle turf sod according to requirements of the TPI.

D. Seed used for sod shall have Gold Tag certification.

E. Sod shall have uniform density, color, and texture of the turfgrass species, strongly rooted, and capable of vigorous growth and development when planted.

F. Sodded areas shall be a blend of 90 percent Turf-Type Tall Fescue and ten (10) percent Kentucky Bluegrass:

1. Blend shall be at least three (3) improved Turf Type Tall Fescues combined with at least two (2) Kentucky Bluegrass species.

2. Turf-Type Tall Fescues shall have a 70 percent average endophyte level minimum.

PART 2 PRODUCTS

2.01 TURFGRASS SOD

A. Sod shall be certified turfgrass sod complying with TPI specifications for machine-cut thickness, size, strength, moisture content, and mowed height, free of weeds.

B. TURFGRASS SOD SEED CERTIFICATION; Provide certificates and supplier seed label for turfgrass sod seed including:

1. The botanical and common name, origin and percentage by weight of each species and variety;
2. Percentage germination, purity, and weed seed;
3. Identity of noxious weeds;
4. Date of seed test.

C. Seed used for sod shall meet the following requirements for germination, purity, and weed seed:
1. Germination: 85 percent (min)
2. Purity: 98 percent (min)
3. Weed seed: 0.0% noxious weed seed
4. Weed seed ≤ 0.5% by weight

D. Seed used for sod shall have Gold Tag certification

E. Sod shall have uniform density, color, and texture of the turfgrass species, strongly rooted, free of weeds, and capable of vigorous growth and development when planted.

F. Sodded areas shall be a blend of 90 percent Turf-Type Tall Fescue and ten (10) percent Kentucky Bluegrass:

1. Blend shall be at least three (3) improved Turf Type Tall Fescues combined with at least two (2) Kentucky Bluegrass species.
2. Turf-Type Tall Fescues shall have a 70 percent average endophyte level minimum.

2.02 TEMPORARY SEED

A. Temporary seeding shall be installed when site and/or seasonal conditions do not allow for seeding or sodding of the type specified.

B. TEMPORARY SEEDING NOTIFICATION; Notify Design Professional when temporary seeding is warranted.

C. Temporary seed shall be per APWA 2150, Part 2153.5, A.

D. TEMPORARY SEED CERTIFICATION; Submit certificates and supplier seed label for temporary seed including:

1. The botanical and common name, origin and percentage by weight of each species and variety;

2. Percentage germination, purity, and weed seed;

3. Identity of noxious weeds;

4. Date of seed test.

2.03 TOPSOIL

A. Topsoil shall be per Section 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments.

B. SOIL AMENDMENTS; Per Section 02947 Green Infrastructure Growing Media and Soil Amendments; Submit product data of the following soil amendments, including but not limited to product name, product instructions, and supplier name, address, and phone.

2.04 HERBICIDE

A. Herbicides shall be per Section 02951 Green Stormwater Infrastructure Plants.

2.05 SEED COAT

A. Seed Coat shall be cross-linked, modified acrylic polymer (CAS# 71042-87-0) with graphite (CAS#7782-42-5).

2.06 FERTILIZER

A. Fertilizer shall be slow-release, granular or pelleted fertilizer.

B. Fertilizer shall be commercial fertilizer of neutral character with some elements derived from organic sources, containing elements at rates per soil testing recommendations.

C. Do not use fertilizer between May 1st and September 15th.

2.07 MULCH

A. Straw mulch shall be air-dry, clean, mildew and seed free salt hay or threshed straw of wheat, rye, oats or barely.

2.08 WATER

A. Water used in this Work shall be furnished by the Contractor and will be suitable for irrigation and free from ingredients harmful to plant life.

B. All watering equipment shall be furnished by the Contractor.

C. Water from adjacent fire hydrants, public or private water lines shall be metered. Written approval from the property owner shall be obtained prior to the use of suitable water from ponds, creeks or private owners.

PART 3 EXECUTION

3.01 PREPARATION

A. Project Conditions

1. Sod: Sod as temperatures allow and when irrigation for establishment is available. Do not sod when ground is frozen

or ambient air temperatures are greater than 90 degrees Fahrenheit or less than 50 degrees Fahrenheit.

2. Seeding or sodding dates outside of the specified planting seasons shall be approved by the Design Professional. Contractor shall notify the Design Professional in the event of seeding discrepancies and if seasonal conditions become abnormal. Proceed with seeding only when existing and forecasted weather conditions permit.

3. Contractor shall examine areas to be seeded or sodded for compliance with requirements and conditions affecting installation and performance. When unsatisfactory conditions for seed or sod growth are encountered, including, but not limited to rubble fill, adverse drainage conditions, or obstructions, notify the Design Professional before seeding or sodding. Proceed with installation only after unsatisfactory conditions have been corrected to the satisfaction of the Design Professional.

B. Control and Protection

1. Prior to installation, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.

2. Contractor shall protect structures, utilities, sidewalks, pavements, and other facilities, lawns and existing vegetation from damage caused by seeding and sodding operations.

3.02 INSTALLATION

A. Soil Preparation

1. Prepare soil per Section 02947 Green Infrastructure Growing Media and Soil Amendments.

2. Newly Graded Subgrades: Limit subgrade preparation to areas that will be planted in the immediate future.

B. Fine Grading: Grade seeding and sodding areas to a smooth, uniform surface plane with a loose, uniformly fine texture.

1. Perform grading to finished grade elevations identified in the Drawings. Roll and rake, remove ridges, and fill depressions to meet finished grade.

2. Limit fine grading to areas that can be planted in the immediate future.

3. Wet surface thoroughly and allow to dry before planting. Do not create muddy soil.

4. Restore areas if eroded or otherwise disturbed after finished grading, before seeding or sodding.

C. Temporary Seeding: Temporary seeding shall be installed per APWA 2150, Part 2153.5, B. to produce a cover crop until the permanent seed per Part 2.01 or sod per Part 2.02 can be installed per Part 3.01.

D. Sodding

1. Lay sod within 24 hours of harvesting. Do not lay sod if sod is dormant or if subgrade is frozen or muddy.

a. Remove plastic netting from sod rolls during placement.

b. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap.

c. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation.

d. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface.

e. Work sifted topsoil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

2. Lay sod across angle of slopes exceeding 3:1 (horizontal:vertical). Anchor sod on slopes exceeding 4:1 (horizontal:vertical) with steel staples spaced per manufacturer recommendations but not less than two (2) anchors per sod strip to prevent slippage.

3. Saturate sod with fine water spray within one (1) hour of planting. For first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1.5 inches below sod.

E. Mulching: Mulching shall be done within 24 hours following the seeding operation except in the case of wood cellulose type mulch.

1. Straw mulch shall be spread uniformly in a continuous blanket at a depth of not less than 1.5 inches and not more than two (2) inches loose measurement (approximately 1.5 to 2 tons per acre).

2. Mulch shall be spread by hand or by a blower type mulch spreader.

3. Blower type mulch spreaders shall be adjusted and operated in such a manner as to prevent excessive breakage of the mulch material. If this cannot be accomplished, the mulch shall be spread by hand.

4. Care shall be exercised to ensure that all wire from baled hay is collected as it is removed from the bale.

5. Mulching shall be started at the windward side of relatively flat areas, or at the upper part of a steep slope, and continued uniformly until the area is covered.

6. The mulch shall not be bunched.

3.03 TOLERANCES

A. Finished Grade: The Contractor shall place materials based on the line and grade specified in the Drawings within 0.1 feet vertical tolerance.

B. Satisfactory Seed and Sod Areas

1. Area shall be uniform and free of weeds, bare spots exceeding five (5) by five (5) inches, and surface irregularities.

2. Reestablish areas that do not comply with requirements and continue maintenance until areas are satisfactory as determined by the Design Professional.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

B. Clean wheels of vehicles prior to leaving Site to avoid tracking soil onto roads, sidewalks, or other areas.

3.05 PROTECTION

A. Contractor is responsible for protection of seed or sod from damage due to landscape operations, operations by other contractors and trades, and others.

B. The Contractor shall implement control and protection measures per Section 02938 Green Stormwater Infrastructure Control and Protection, including temporary seeding, to protect the green stormwater infrastructure facility until vegetation is fully established and the entire upstream drainage area is stabilized.

C. All protection measures shall be submitted to the Design Professionalfor acceptance.

D. Erect visible barricades and warning signs to protect newly seeded or sodded areas from traffic. Maintain barricades throughout Establishment Period, as defined in Section 02957 Green Stormwater Infrastructure Establishment, and until substantial and healthy stand of specified plants is established.

3.06 MAINTENANCE

A. The Contractor shall maintain the green stormwater infrastructure facility and adjacent areas disturbed during construction through the Establishment Period and per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

A. The Contractor shall warrant the green stormwater infrastructure seeding and sodding through the duration of the Establishment Period.

B. If at any time during the Establishment Period the facility becomes damaged due to improper erosion control, maintenance activities, or frequency of maintenance activities, the Contractor shall restore the green stormwater infrastructure facility and any damaged components as determined by the Design Professional, at no additional cost to the Owner.

-- End of Section --

SECTION 02954

GREEN STORMWATER INFRASTRUCTURE PIPING

PART 1 GENERAL

1.01 PURPOSE

A. Piping consists of all piping and appurtenances within a green stormwater infrastructure facility. Piping is primarily intended to convey stormwater to or away from the green stormwater infrastructure facility and to provide access or observation to the subsurface. Piping is also used to protect utilities from water damage, as well as to protect the green stormwater infrastructure facility from contamination from the utility.

1.02 MEASUREMENT AND PAYMENT

A. The Contractor shall provide all labor, material, and equipment required for piping installation and testing, dictated in the Drawings and specified herein. Piping shall be paid for by Lump Sum Price.

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937	Green Stormwater Infrastructure Site Activity Plan
02938	Green Stormwater Infrastructure Control and Protection
02939	Green Stormwater Infrastructure Earthwork
02946	Green Stormwater Infrastructure Aggregate Media
02948	Green Stormwater Infrastructure Media Liners
02957	Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design Professional.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M252	Standard Specification for Corrugated Polyethylene Drainage Pipe

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

APWA 2208	(2017) Division II Construction and Material Specifications, Paving - Portland Cement Concrete Pavement
APWA 2500	(2017, Revised 2019) Division II Construction and Material Specifications, Sanitary Sewers
APWA 2602	(2017, Revised 2020) Division II Construction and Material Specifications, Storm Sewers - Pipe Sewer Construction

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

ASTM A615/A615M	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A775/A775M	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM D3034	Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM F679	Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
ASTM F758	Standard Specification for Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
ASTM F1760	Standard Specification for Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content

KANSAS CITY METRO MATERIALS BOARD SPECIFICATIONS (KCMMB)

KCMMB	Kansas City Metro Materials Board Specifications

MID-WEST CONCRETE INDUSTRY BOARD CONCRETE SPECIFICATIONS - CONCRETE PAVEMENT (MCIB)

MCIB	Mid-West Concrete Industry Board Concrete Specifications - Concrete Pavement

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

PLACEMENT NOTIFICATION

BACKFILL NOTIFICATION

SD-02 Shop Drawings

SHOP DRAWINGS

SD-03 Product Data

MANUFACTURER INFORMATION

SD-07 Certificates

CONCRETE MIX DESIGN

FINISHED GRADE SURVEY VERIFICATION

1.06 QUALITY ASSURANCE

A. Not applicable.

1.07 QUALITY CONTROL

A. Prior to procurement of material and delivery to the Site, the Contractor shall submit quality control certificates, certifying the materials conform to specifications. The quality of all materials, the process of manufacture, and the finished products shall be subject to inspection and acceptance by the Design Professional. Such inspection may be made at the place of manufacture or the Site after delivery.

B. All materials shall be subject to rejection at any time due to failure to meet any requirements specified herein. Material rejected after delivery to the Site shall be marked for identification and shall be removed from the Site immediately. All materials which have been damaged after delivery or installation will be rejected, removed and replaced at the Contractor's expense.

C. MANUFACTURER INFORMATION; Submit manufacturer information for each product, including, but not limited to supplier name, address and phone as well as product fabrication, delivery and handling, placement, installation, and protection information.

D. SHOP DRAWINGS; Submit shop drawings with a minimum of the following information, if applicable:

1. Structure dimensions (exterior and interior);

2. Pipe connections and sizes;

3. Flow lines and flow directions.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Piping and appurtenances shall be delivered, stored, and handled such that the material is installed in sound, undamaged condition.

B. Plastic piping and appurtenances shall be protected from direct sunlight and other heat sources to prevent curvature and/or deformation.

C. Manufactured products shall be delivered, stored and handled per manufacturer's recommendations.

PART 2 PRODUCTS

2.01 UNDERDRAIN AND DISTRIBUTION PIPE MATERIAL

A. Reinforced Concrete Pipe (RCP): RCP, fittings and joints shall conform to APWA 2602, Part 2602.2, A.

B. High Density Polyethylene (HDPE)

1. All HDPE pipe, fitting and joints shall be provided by manufacturers certified through the Plastic Pipe Institute (PPI) and/or the National Transportation Product Evaluation Program (NTPEP) third party certification program.

2. Solid Wall HDPE Pipe

a. Solid wall HDPE pipe, fittings and joints shall conform to APWA 2602 Part 2602.2, D.

3. Perforated HDPE Pipe

a. Perforated HDPE pipe, fittings and joints shall conform APWA 2602 Part 2602.2, D. for 12 inch to 60 inch diameter pipe and AASHTO M252 for three (3) inch to ten (10) inch diameter pipe and shall have AASHTO Class II perforations.

C. Polyvinyl Chloride (PVC) Pipe

1. Plastic pipe, fittings and joints shall contain an ultraviolet inhibitor to provide protection from exposure to direct sunlight per ASTM D3034, ASTM F758, ASTM R679, or ASTM F1760.

a. Solid Wall PVC Pipe: PVC solid wall gravity pipe shall be type PSM, PVC minimum SFR (35) with full diameter

dimensions and shall conform to ASTM D3034. Straight pipe shall be furnished in lengths per ASTM D3034.

b. Perforated PVC Pipe

1) Perforated PVC pipe shall be Type PS-46 PVC and shall conform to ASTM F758 or ASTM F679. Straight pipe shall be furnished in lengths per ASTM D3034.

2) Solid PVC pipe per ASTM D3034 or ASTM F1760 with drilled perforations may be used in lieu of perforated PVC pipe as approved by the Design Professional. Perforations shall be adequately sized to maintain the design flow and to prevent migration of soil and aggregate material into the pipe.

3) Perforations shall be two (2) rows of one-half (1/2) inch diameter holes spread longitudinally, maximum six (6) inch spacing and shall be oriented 120 degrees apart (60 degrees either side of the pipe bottom). The top of pipe shall be marked for ease of installation.

2. PVC Fittings and Joints

a. Fittings for perforated PVC pipe shall be bell and spigot push-on joints meeting applicable requirements of ASTM D3212 (Exception: Internal pressure test and vacuum test are not required). The bell-end and spigot-end may be unperforated for a length equal to the depth of the socket and/or shoulder.

b. Gasket-type joints shall conform to ASTM D3212. Solvent-cement-type joints shall conform to ASTM F758 or ASTM F679.

2.02 CLEANOUT

A. Cleanout shall be constructed of HDPE or PVC material.

B. Cleanout cap shall be threaded.

C. For cleanout in pavement, cleanout frame and cover shall be Neenah R-1976 or approved equal. Cleanout shall be anchored to a minimum four (4) inch thick concrete collar atop minimum six (6) inch aggregate base per the respective requirements specified here-in.

2.03 HDPE ANTI-SEEP COLLAR

A. Anti-seep collar shall be constructed of HDPE material with a minimum thickness of one-fourth (1/4) inch.

B. Bolt shall be stainless steel.

C. Manufacturer shall be Scheib Drainage Products or approved equal.

2.04 AGGREGATE BASE

A. Aggregate base shall be of the material specified in the Drawings, and shall meet the requirements of Section 02946 Green Stormwater Infrastructure Aggregate Media.

2.05 CONCRETE COLLAR

A. Concrete mix shall be minimum 3,500 psi with 4-6 inches of slump or approved equal for concrete collar unless otherwise specified in the Drawings. Submit CONCRETE MIX DESIGN certifying that concrete mix design for concrete collar meets the requirements of the specified mix.

B. Reinforcement: Shall be No. 4 rebar. Non-epoxy coated bars shall conform to ASTM A615/A615M. Epoxy coated bars shall conform to ASTM A775/A775M. Dowels shall be five-eighths (5/8) inch diameter by two (2) feet smooth dowels.

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking: All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of the Contractor. The Contractor shall set construction stakes, establishing all structure locations and elevations. The Contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.

B. Project Conditions

1. Piping shall be installed only when weather and/or trench conditions are suitable. Water may be removed from pipe trench via sump pumping or other methods as approved by Design Professional.

C. Control and Protection

1. Prior to installation, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.

2. Prior to installing the underdrain system, temporary erosion control shall be in place to protect any existing downstream drainage system to which the underdrain system connects.

3. Stormwater bypass and/or dewatering measures shall be in place to keep the Site clean and dry for the duration of installation.

3.02 INSTALLATION

A. Excavation

1. Excavation methods used shall conform to Section 02939 Green Stormwater Infrastructure Earthwork.

2. Excavation shall extend to a depth such that the specified invert elevations, once fully installed, are located at the elevation shown in the Drawings. If an invert elevation is not specified, the Contractor shall consult the Design Professional to verify control elevations for the structure prior to installation.

3. Subgrade shall be prepared to provide uniform and continuous support of the piping to the lines and grades shown in the Drawings.

B. Permeable Liner: Permeable liner shall be installed per Section 02948 Green Stormwater Infrastructure Media Liners to the lines and grades specified in the Drawings.

C. Aggregate Base

1. Aggregate base shall be installed per Section 02946 Green Stormwater Infrastructure Aggregate Media to the lines, grades and depths specified in the Drawings.

2. Place aggregate base using methods that will not disturb or damage the piping material or the surrounding green stormwater infrastructure facility.

3. Compaction shall be achieved using small, hand-held or walk behind compactors to prevent damage to the structure or over-compaction of the surrounding areas intended for infiltration.

D. Piping

1. Piping materials shall be inspected prior to placement, rejecting any damaged or defective pipe.

2. PLACEMENT NOTIFICATION; Notify the Design Professional at least 48 hours prior to placement of piping materials.

3. Piping shall be installed to the lines, grades and depths specified in the Drawings.

    a. Pipe laying shall commence at the lowest point with continuous slope to provide unrestricted flow and eliminate low spots that could retain water.

    b. Pipe shall be laid with ends abutting. Bell-and spigot type pipe shall be installed with the bell end upstream.

4. Cutting shall be performed in a manner to provide smooth, straight, cuts at right angles to the pipe axis, without damage

to the pipe. Cuts shall be performed with mechanical pipe cutters, or as approved by the Design Professional.

5. The interior of all piping and appurtenances shall be clear of all foreign matter and debris.

6. Surfaces shall be wiped clean, dry, and free from oil and grease prior to jointing. Jointing shall be watertight.

7. Perforated pipe shall be laid as to center the perforations on the bottom of the pipe.

8. Piping materials damaged during installation shall be removed from the Site and replaced per Part 3.04 at the Contactor's expense.

9. Contractor shall comply with detailed installation requirements as follows:

   a. RCP shall be installed per APWA 2602 Part 2602.3, B.

   b. HDPE shall be installed per APWA 2602 Part 2602.3, B.

   c. PVC shall be installed per APWA 2500 Part 2505.3, A.

E. Concrete: Shall be constructed per APWA 2208.

F. Cleanout

1. Cleanouts shall be installed to the lines, grades and depths specified in the Drawings.

2. Pipe connection shall be made watertight.

G. HDPE Anti-Seep Collar

1. Install anti-seep collar as specified in the Drawings.

2. Affix HPDE around pipe using bolts or other manufacturer required products.

3. Anti-seep collar shall be made watertight using appropriate non-shrink grout or other manufacturer required products.

H. Backfill

1. BACKFILL NOTIFICATION; Notify the Design Professional at least 48 hours prior to placement of backfill.

2. Contractor shall receive approval of all in-place pipes from the Design Professional prior to backfilling.

3. Backfill shall be placed to the lines, grades and depths specified in the Drawings.

3.03 TOLERANCES

A. The Contractor shall place materials based on the line and grade specified in the Drawings within the following tolerances:

1. Horizontal Tolerance: 0.1 feet

2. Vertical Tolerance: 0.1 feet

B. A maximum tolerance of one-fourth (1/4) inch on hole spacing and size will be allowed.

C. FINISHED GRADE SURVEY VERIFICATION; Survey finished elevation of green stormwater infrastructure piping and submit to the Design Professional for review. Survey elevation shall be taken at specific point locations identified in the Drawings, including but not limited to invert elevations and top of structure elevations.

3.04 DISPOSAL OF MATERIALS

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. The Contractor shall implement temporary protection and control measures per Section 02938 Green Stormwater Infrastructure Control and Protection to protect the green stormwater infrastructure facility until the entire upstream tributary area is fully stabilized.

3.06 MAINTENANCE

A. The Contractor shall maintain the green stormwater infrastructure facility per Section 02957 Green Stormwater Infrastructure Establishment, and per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

A. The Contractor shall furnish the Owner with a written warranty from the manufacturer/supplier (Warrantor) that shall warrant the material against manufacturing defects and material degradation.

B. Should a defect occur, which is covered under warranty, the Warrantor shall bear all costs for the repair, relocation and replacement of the piping. The Contractor shall be responsible for coordination with the Warrantor for replacement of any defective products or material.

C. The Contractor shall warrant the green stormwater infrastructure piping through the duration of the Establishment Period.

D. If at any time during the Establishment Period the piping fails to function due to improper erosion control, maintenance activities or frequencies, the Contractor shall replace the piping and fully restore the green stormwater infrastructure facility and any damaged components as determined by the Design Professional, at no additional cost to the Owner.

-- End of Section --

SECTION 02955

GREEN STORMWATER INFRASTRUCTURE OUTLETS

PART 1 GENERAL

1.01 PURPOSE

A. Outlets allow excess stormwater to exit the green stormwater infrastructure facility when the capacity of the facility is exceeded. The outlet structure can control water levels both at the surface and in the subsurface of the green stormwater infrastructure facility.

1.02 MEASUREMENT AND PAYMENT

A. Contractor shall provide all labor, material and equipment required to install the outlet as shown in the Drawings and as specified herein. Outlet shall be paid for by Lump Sum.

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937	Green Stormwater Infrastructure Site Activity Plan
02938	Green Stormwater Infrastructure Control and Protection
02939	Green Stormwater Infrastructure Earthwork
02946	Green Stormwater Infrastructure Aggregate Media
02954	Green Stormwater Infrastructure Piping
02957	Green Stormwater Infrastructure Establishment

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design Professional.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 301	Specifications for Structural Concrete
ACI 305R	Guide to Hot Weather Concreting

ACI 306R	Guide to Cold Weather Concreting
ACI 318	Building Code Requirements for Structural Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

ASTM C94/C94M	Standard Specification for Ready-Mixed Concrete
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A615/A615M	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

KANSAS CITY METROPOLITAN CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION (APWA)

APWA 2208	Division II Construction and Material Specifications, Paving - Portland Cement Concrete Pavement

KANSAS CITY METRO MATERIALS BOARD SPECIFICATIONS (KCMMB)

KCMMB	Kansas City Metro Materials Board Specifications

MID-WEST CONCRETE INDUSTRY BOARD CONCRETE SPECIFICATIONS - CONCRETE PAVEMENT (MCIB)

MCIB	Mid-West Concrete Industry Board Concrete Specifications - Concrete Pavement

1.05 SUBMITTALS

SD-03 Product Data

MANUFACTURER INFORMATION

SHOP DRAWINGS

SD-07 Certificates

CONCRETE BASE MIX DESIGN

CONCRETE COLLAR MIX DESIGN

FINISHED GRADE SURVEY VERIFICATION

1.06 QUALITY ASSURANCE

A. Concrete Manufacturer: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94Mrequirements for production facilities and equipment. Manufacturer certified according to the National Ready Mixed Concrete Association (NRMCA) "Certificate of Ready Mixed Concrete Production Facilities."

B. Installer Qualifications: Design Professional to insert additional manufacturer/installer qualifications as applicable.

C. Testing Agency Qualifications

1. An independent agency, acceptable to the authorities having jurisdiction, qualified according to ASTM C1077 for testing indicated.

2. Personnel performing tests shall be ACI Concrete Strength Testing Technician and ACI Concrete Laboratory Testing Technician - Level 1. Testing Agency laboratory supervisor shall be an ACI Concrete Laboratory Testing Technician - Level 2.

D. Concrete Field Testing: Personnel conducting concrete field tests shall be qualified as ACI Concrete Field Testing Technician - Grade I.

1.07 QUALITY CONTROL

A. Inspection and testing shall be performed by the Contractor/manufacturer in conformance with applicable standards. All material delivered to the Site shall have quality control certificates certifying the materials conform to specifications.

B. Field testing of concrete shall be performed by the Contractor once for every 50-cubic yard of concrete placed and shall conform to the requirements of APWA 2208.

C. SHOP DRAWINGS: Submit shop drawings with a minimum of the following information, if applicable:

1. Supplier name, address and phone;

2. Structure dimensions (exterior and interior);

3. Pipe connections and sizes;

4. Flow lines/flow directions;

5. Grate and/or screening details including effective open area for outlet capacity. Approved or equal products must provide grate effective open area that is within an acceptable range to

the specified product, as determined by the Design Professional.

D. The quality of all materials, the process of manufacture, and the finished products shall be subject to inspection and acceptance by the Design Professional. Such inspection may be made at the place of manufacture or on the Site after delivery.

E. All materials shall be subject to rejection at any time due to failure to meet any requirements specified herein. Material rejected after delivery to the Site shall be marked for identification and shall be removed from the Site immediately.

F. All materials which have been damaged after delivery will be rejected and replaced at the Contractor's expense. If materials are rejected after installation, they shall be repaired as accepted by the Design Professional, or removed and replaced at the Contractor's expense.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Materials shall be stored away from active grading or earthwork to avoid contamination with soil, sediment or debris.

B. Manufactured products shall be delivered, stored and handled per manufacturer recommendations.

PART 2 PRODUCTS

2.01 MANUFACTURED WATER LEVEL AND JUNCTION STUCTURE

A. Manufactured Outlet Structure shall be of the product type and manufacturer specified in the Drawings or approved equal.

B. MANUFACTURER INFORMATION; Submit manufacturer information, product data and instructions for each product, including but not limited to structure type, size, material, effective open area, fabrication, delivery and handling, placement, installation, and protection.

C. Structure Coating Material: All exposed plastic surfaces of structures shall have a black textured rubberized coating applied to the outer surface. Coating shall extend a minimum of 12 inches below the finished grade.

D. Concrete Base: Concrete mix shall be 4,000 psi conforming to KCMMB or approved equal. Reinforcing bars shall be ASTM A615/A615M Grade 60 or approved equal. Concrete cover requirements shall conform to ACI 318.

1. CONCRETE BASE MIX DESIGN; Submit certification that concrete mix design for concrete base meets the requirements of the specified mix.

E. Aggregate Base: Concrete shall have an underlying aggregate base per Section 02946 Green Stormwater Infrastructure Aggregate Media.

PART 3 EXECUTION

3.01 PREPARATION

A. Surveying and Staking: All construction stakes, lines, and grades for the proper completion of Work shall be the responsibility of the Contractor. The Contractor shall set construction stakes, establishing all structure locations and elevations. The Contractor shall establish all necessary controls, detail dimensions, and measurements required for layout and performance of Work.

B. Project Conditions

1. Conditions for concrete placement shall comply with ACI 301. Hot weather placement shall comply with ACI 305R, and cold weather placement shall comply with ACI 306R.

C. Control and Protection

1. Prior to installation of green stormwater infrastructure structures, the perimeter of the green stormwater infrastructure facility shall be protected against runoff and sedimentation from contributing drainage area with measures identified per Sections 02937 Green Stormwater Infrastructure Site Activity Plan and 02938 Green Stormwater Infrastructure Control and Protection.

2. Prior to connecting the outlet to downstream drainage systems, temporary erosion control measures shall be in place.

3. Stormwater bypass and/or dewatering measures shall be in place to keep the Site clean and dry for the duration of installation.

3.02 INSTALLATION

A. Excavation

1. Excavation methods used shall conform to the requirements of Section 02939 Green Stormwater Infrastructure Earthwork.

2. Excavation shall extend to a depth such that the specified overflow elevation, once fully installed, is located at the elevation shown in the Drawings. If an overflow elevation is not specified, the Contractor is to consult the Design Professional to verify control elevations for the structure prior to installation.

3. Subgrade shall be prepared to provide uniform and continuous support of the outlet to the lines and grades shown in the Drawings.

B. Manufactured Structure

1. Concrete Base and Anchoring

a. Unless otherwise specified by the manufacturer, all manufactured outlet structures require anchoring to prevent floating during periods of inundation.

b. Aggregate base shall be placed to the depth and extents shown in the Drawings. Place aggregate using methods that will not disturb or damage the outlet structures the surrounding piping, or the green stormwater infrastructure facility.

c. Compaction shall be achieved using small, hand-held or walk behind compactors to prevent damage to the structure or over-compaction of the surrounding areas intended for infiltration.

d. Concrete base size and thickness shall be as specified by manufacturer.

e. Anchoring: Outlet structure shall be encased in concrete or otherwise securely attached to the concrete base to resist buoyancy and flotation. Concrete encasement or other attachments shall not inhibit the function of the structure. If manufactured outlet structure includes aluminum accessories, apply bituminous coating to all aluminum surfaces in contact with concrete. Manufactured outlet structures with stainless steel accessories do not require bituminous coating for concrete encasement.

2. Manufactured Outlet Structure Placement

a. Place outlet structure on concrete base and level vertically. Verify critical elevations, including but not limited to top of structure and inverts in/out elevations.

b. Connection of underdrain and/or outlet pipes to outlet structure shall provide watertight connections per manufacturer's instructions.

c. Anchor or encase outlet structure to concrete base.

C. Backfill

1. Prior to backfilling, cover structure openings to protect from material deposition inside the structure during placement. Provide protection of outlet per Section 02938 Green Stormwater Infrastructure Control and Protection.

2. Backfill around structure and compact uniformly in six (6) inch lifts by hand using small, hand-held or walk behind compactors to prevent damage to the structure or over-compaction of surrounding areas intended for infiltration.

3. Install soil and/or aggregate media around structure to finished grade per Section 02946 Green Stormwater Infrastructure Aggregate Media and 02947 Green Stormwater Infrastructure Growing Media and Soil Amendments,as shown in the Drawings. All green stormwater infrastructure media shall

be in place including mulch per Section 02951 Green Stormwater Infrastructure Plants prior to removal of protective covering and installation of grated cover.

3.03 TOLERANCES

A. Manufacture structure installed elevation shall not deviate from design elevation by more than 0.1 feet. Verify all elevations specified in the Drawings including but not limited to invert elevations and top of structure elevations.

B. Horizontal placements shall be within 0.1 feet of the alignment depicted in Drawings.

C. FINISHED GRADE SURVEY VERIFICATION; Survey finished elevation of green stormwater infrastructure outlet and submit to the Design Professional for review. Survey elevation shall be taken at specific point locations identified in the Drawings, including but not limited to invert elevations and top of structure elevations.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. The Contractor shall implement temporary protection and control measures per Section 02938 Green Stormwater Infrastructure Control and Protection to protect the outlet until the entire upstream tributary area is fully stabilized.

B. All protection measures shall be submitted to the Design Professional for acceptance.

3.06 MAINTENANCE

A. The Contractor shall maintain outlet through the Establishment Period, as defined in Section 02957 Green Stormwater Infrastructure Establishment, and per the schedule identified in Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

A. The Contractor shall furnish the Owner with a written warranty from the manufacturer/supplier (Warrantor) that shall warrant the material against manufacturing defects and material degradation.

B. Should a defect occur, which is covered under warranty, the Warrantor shall bear all costs for the repair, relocation and replacement of the outlet. The Contractor shall be responsible for

coordination with the Warrantor for replacement of any defective products or material.

-- End of Section --

SECTION 02956

GREEN STORMWATER INFRASTRUCTURE IN-SITU INFILTRATION TESTING

PART 1 GENERAL

1.01 PURPOSE

A. The purpose of Section 02956 Green Stormwater Infrastructure In-Situ Infiltration Testing is to provide specific testing methods to measure performance of a green stormwater infrastructure facility via Double-ring Infiltrometer Testing and Percolation Testing.

1.02 MEASUREMENT AND PAYMENT

A. Payment will constitute full compensation for all labor, equipment, tools, supplies, and incidentals necessary to complete the Work. Testing shall be subsidiary to Bioretention Soil Media.

1.03 RELATED SECTIONS

A. The following sections form a part of this specification to the extent referenced. The specifications are referred to within the text by the numeric designation only.

02937 Green Stormwater Infrastructure Site Activity Plan

1.04 REFERENCE STANDARDS

A. The following publications form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Comply with reference standards in effect as of date of the Contract Documents, unless otherwise indicated by Design Professional.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

ASTM C1701/C1701M	Standard Test Method for Infiltration Rate of In Place Pervious Concrete
ASTM C1781/C1781M	Standard Test Method for Infiltration Rate of Permeable Unit Pavement Systems
ASTM D3385	Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer
ASTM D8152	Standard Practice for Measuring Field Infiltration Rate and Calculating Field Hydraulic

Conductivity Using the Modified
Philip Dunne Infiltrometer Test

1.05 SUBMITTALS

SD-01 Preconstruction Submittals

TESTING SITE IDENTIFICATION FIGURE(S)

TESTING NOTIFICATION

SD-06 Test Reports

INFILTRATION TEST RESULTS

1.06 QUALITY ASSURANCE

A. Testing shall be completed by a qualified professional per Section 02937 Green Stormwater Infrastructure Site Activity Plan, with experience in infiltration testing.

1.07 QUALITY CONTROL

A. TESTING NOTIFICATION; Notify the Design Professional at least 48 hours prior to scheduled testing.

1.08 DELIVERY, STORAGE, AND HANDLING (EQUIPMENT)

A. Not Applicable.

PART 2 PRODUCTS

2.01 TESTING EQUIPMENT

A. Contractor shall provide testing equipment.

1. Contractor utilize alternative equipment, provided that such equipment provides equal testing results, as determined by the Design Professional.

2. Double-Ring Infiltrometer Testing: Infiltration testing equipment shall meet the requirements of ASTM D3385.

3. Percolation Testing: Percolation testing equipment shall fulfill requirements to complete test per Part 3.02.

PART 3 EXECUTION

3.01 PREPARATION

A. TESTING SITE IDENTIFICATION FIGURE(S); Submit a figure of proposed sites for both pre-construction and post-construction testing, including a unique identifier for each location tested. Post-construction testing sites shall be as close (in proximity) as possible to the pre-construction testing sites.

B. Site Preparation: Mulch, sediment and other debris that inhibit the installation of the testing equipment shall be brushed aside prior to installation.

C. Project Conditions: Testing shall not be performed when the surface being tested is frozen, when ambient air temperature is at or forecasted to be less than or equal to 32 degrees Fahrenheit during the time of testing, during a precipitation event, nor while an irrigation system is activated. Infiltration testing on permeable surfaces shall not be conducted when the pavement surface temperature exceeds 100 degrees Fahrenheit.

3.02 INSTALLATION

A. Double-Ring Infiltrometer Testing

1. Install infiltration rings per ASTM D3385 driven to a depth of approximately four (4) inches.

2. Perform infiltration test per ASTM D3385.

B. Percolation Testing

1. Excavate a round test hole nine (9) inches in diameter and no less than nine (9) inches deep at each percolation testing site.

2. Install a test ring with a minimum diameter of six (6) inches and a height no less than the depth of the excavated hole.

3. Measure and record the depth to the bottom of the test ring.

4. Saturate testing site by completely filling the test ring with water and allowing it to drain completely.

5. When the testing site has completely drained and the bottom of the test hole is still saturated (no more than 24 hours after the testing site has drained), completely refill the test ring; measure and record the initial depth of water. Record the start time of test.

6. Measure and record drawdown at regular intervals until the test ring has completely drained, reporting percolation test results in inches of drawdown per time.

C. INFILTRATION TEST RESULTS; Submit test results within ten (10) days of testing. Results shall include site identification figure(s) showing northing and easting points of test sites, photographs of the testing sites (before, during, and after testing), date of test, test start and end times, data points collected, weather conditions from the beginning to end of testing, and conclusive result.

D. Alternative Testing: Contractor may propose alternative methods for testing, provided that such methods provide equal testing results, as determined by the Design Professional.

3.03 TOLERANCES

A. Double-Ring Infiltrometer Testing

1. Record the volume of liquid infiltrated during a period of up to six (6) hours or until a relatively constant rate of infiltration is obtained. A relatively constant rate of infiltration as it relates to terminating infiltration testing shall be a minimum of four (4) consecutive infiltration rate measurements of the inner ring within ten (10) percent of each other.

2. Volume shall be recorded to the nearest twenty-five (25) milliliters at an approximate interval of ten (10) minutes for green stormwater infrastructure.

3. Elapsed time shall be recorded to the nearest second.

B. Percolation Testing: Drawdown shall be measured and recorded at regular intervals until the test hole has completely drained. Drawdown shall be measured within 0.1 inch of accuracy.

3.04 DISPOSAL OF MATERIAL

A. Materials no longer in use shall be removed and disposed of by Contractor per Section 02937 Green Stormwater Infrastructure Site Activity Plan.

3.05 PROTECTION

A. Contractor shall return the testing site to pre-test conditions.

3.06 MAINTENANCE

A. Not applicable.

3.07 POST-CONSTRUCTION TESTING

A. Not applicable.

3.08 WARRANTY

A. Not applicable.

3.09 FINAL ACCEPTANCE

A. If testing results are inconsistent with defined procedures, re-testing shall occur at the discretion of the Design Professional.

-- End of Section --

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 REFERENCES

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.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117	(2010; Errata 2011) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 121R	(2008) Guide for Concrete Construction Quality Systems in Conformance with ISO 9001
ACI 301	(2016) Specifications for Structural Concrete
ACI 302.1R	(2015) Guide for Concrete Floor and Slab Construction
ACI 304.2R	(2017) Guide to Placing Concrete by Pumping Methods
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305.1	(2014) Specification for Hot Weather Concreting
ACI 305R	(2020) Guide to Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 306R	(2016) Guide to Cold Weather Concreting
ACI 308.1	(2011) Specification for Curing Concrete
ACI 347R	(2014; Errata 1 2017) Guide to Formwork for Concrete
ACI SP-2	(2007; Abstract: 10th Edition) ACI Manual of Concrete Inspection
ACI SP-15	(2011) Field Reference Manual: Standard Specifications for Structural Concrete ACI 301-05 with Selected ACI References

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995; R 2004) Basic Hardboard

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M	(2011) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A184/A184M	(2019) Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615/A615M	(2022) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A706/A706M	(2022a) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A970/A970M	(2018) Standard Specification for Headed Steel Bars for Concrete Reinforcement
ASTM A996/A996M	(2016) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ASTM A1044/A1044M	(2016a) Standard Specification for Steel Stud Assemblies for Shear Reinforcement of Concrete
ASTM A1064/A1064M	(2022) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31/C31M	(2022) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33/C33M	(2018) Standard Specification for Concrete Aggregates
ASTM C39/C39M	(2021) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C42/C42M	(2020) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C78/C78M	(2022) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam

	with Third-Point Loading)
ASTM C94/C94M	(2022a) Standard Specification for Ready-Mixed Concrete
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C138/C138M	(2017a) Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2022) Standard Specification for Portland Cement
ASTM C172/C172M	(2017) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173/C173M	(2016) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C231/C231M	(2022) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C311/C311M	(2022) Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C330/C330M	(2017a) Standard Specification for Lightweight Aggregates for Structural Concrete
ASTM C494/C494M	(2019; E 2022) Standard Specification for Chemical Admixtures for Concrete
ASTM C567/C567M	(2019) Determining Density of Structural Lightweight Concrete
ASTM C595/C595M	(2021) Standard Specification for Blended Hydraulic Cements
ASTM C618	(2023) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C803/C803M	(2018) Standard Test Method for Penetration Resistance of Hardened Concrete
ASTM C845/C845M	(2018) Standard Specification for Expansive Hydraulic Cement

ASTM C873/C873M	(2015) Standard Test Method for Compressive Strength of Concrete Cylinders Cast in Place in Cylindrical Molds
ASTM C900	(2015) Standard Test Method for Pullout Strength of Hardened Concrete
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM C989/C989M	(2022) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1012/C1012M	(2018b) Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution
ASTM C1017/C1017M	(2013; E 2015) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1077	(2017) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1157/C1157M	(2020a) Standard Performance Specification for Hydraulic Cement
ASTM C1218/C1218M	(2020c) Standard Test Method for Water-Soluble Chloride in Mortar and Concrete
ASTM C1240	(2020) Standard Specification for Silica Fume Used in Cementitious Mixtures
ASTM C1260	(2021) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1293	(2008; R 2015) Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
ASTM C1567	(2022) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602/C1602M	(2022) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM C1778	(2016) Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete

ASTM D412	(2016) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D471	(2016a) Standard Test Method for Rubber Property - Effect of Liquids
ASTM D1751	(2018) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2018) Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D2628	(1991; R 2016) Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
ASTM D2835	(1989; R 2017) Standard Specification for Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
ASTM D3042	(2017) Standard Test Method for Insoluble Residue in Carbonate Aggregates
ASTM D5759	(2012; R 2020) Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses
ASTM D6690	(2015) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM E96/E96M	(2022a; E 2023) Standard Test Methods for Gravimetric Determination ofWater Vapor Transmission Rate of Materials
ASTM E329	(2021) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
ASTM E1643	(2018a) Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
ASTM E1745	(2017) Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
ASTM E1993/E1993M	(1998; R 2020) Standard Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2018) Manual of Standard Practice
CRSI RB4.1	(2016) Supports for Reinforcement Used in Concrete

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 1	(2009) DOC Voluntary Product Standard PS 1-07, Structural Plywood

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 513	(1974) Corps of Engineers Specifications for Rubber Waterstops
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstops

1.02 DEFINITIONS

a. "Cementitious material" as used herein must include all portland cement, pozzolan, fly ash, slag cement, and silica fume.

b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.

c. "Chemical admixtures" are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.

d. "Supplementary cementing materials" (SCM) include coal fly ash, silica fume, slag cement, natural or calcined pozzolans, and ultra-fine coal ash when used in such proportions to replace the portland cement that result in improvement to sustainability and durability and reduced cost.

e. "Design strength" (f'c) is the specified compressive strength of concrete at time(s) specified in this section to meet structural design criteria.

f. "Mass Concrete" is any concrete system that approaches a maximum temperature of 158 degrees F within the first 72 hours of placement. In addition, it includes all concrete elements with a section thickness of 3 feet or more regardless of temperature.

g. "Mixture proportioning" is the process of designing concrete mixture proportions to enable it to meet the strength, service

life and constructability requirements of the project while minimizing the initial and life-cycle cost.

h. "Mixture proportions" are the masses or volumes of individual ingredients used to make a unit measure (cubic meter or cubic yard) of concrete.

i. "Pozzolan" is a siliceous or siliceous and aluminous material, which in itself possesses little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

j. "Workability (or consistence)" is the ability of a fresh (plastic) concrete mix to fill the form/mould properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and size distribution), cementitious content and age (level of hydration).

1.03 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Concrete Curing Plan

Quality Control Plan; G

Quality Control Personnel Certifications; G

Quality Control Organizational Chart

Laboratory Accreditation; G

Form Removal Schedule; G

Maturity Method Data

SD-02 Shop Drawings

Formwork

Reinforcing Steel; G

SD-03 Product Data

Joint Sealants;

Joint Filler;

Formwork Materials

Recycled Aggregate Materials;

Cementitious Materials;

Vapor Retarder and Vapor Barrier

Concrete Curing Materials

Reinforcement;

Liquid Chemical Floor Hardeners and Sealers

Admixtures

Reinforcing Fibers

Mechanical Reinforcing Bar Connectors

Waterstops

Local/Regional Materials;

Biodegradable Form Release Agent

Pumping ConcreteFinishing Plan

Nonshrink Grout

SD-04 Samples

Slab Finish Sample

Surface Finish Samples

SD-05 Design Data

Concrete Mix Design; G

Formwork Calculations

SD-06 Test Reports

Concrete Mix Design; G

Fly Ash

Pozzolan

Slag Cement

Aggregates

Fiber-Reinforced Concrete; G

Tolerance Report

Compressive Strength Tests; G

Unit Weight of Structural Concrete

Chloride Ion Concentration

Air Content

Slump Tests

Water

SD-07 Certificates

Reinforcing Bars

Welder Qualifications

Silica Fume Manufacturer's Representative

VOC Content for Form Release Agents, Curing Compounds, and Concrete Penetrating Sealers

Safety Data Sheets

Field Testing Technician and Testing Agency

SD-08 Manufacturer's Instructions

Liquid Chemical Floor Hardeners and Sealers

Joint Sealants;

Curing Compound

1.04 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

1.05 DELIVERY, STORAGE, AND HANDLING

Follow ACI 301, ACI 304R and ASTM A934/A934M requirements and recommendations. Do not deliver concrete until vapor retarder, vapor barrier, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. Do not store concrete curing compounds or sealers with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store concrete curing compounds or sealers in occupied spaces.

A. Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

1.06 QUALITY ASSURANCE

A. Design Data

1. Formwork Calculations

ACI 347R. Include design calculations indicating arrangement of forms, sizes and grades of supports (lumber), panels, and related components. Furnish drawings and calculations of shoring and re-shoring methods proposed for floor and roof slabs, spandrel beams, and other horizontal concrete members. Calculations must indicate concrete pressure with both live and dead loads, along with material types.

2. Concrete Mix Design

Sixty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, supplementary cementitious materials, and admixtures; and applicable reference specifications. Submit mill test and all other test for cement, supplementary cementitious materials, aggregates, and admixtures. Provide documentation of maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Provide mix proportion data using at least three different water-cementitious material ratios for each type of mixture, which produce a range of strength encompassing those required for each type of concrete required. If source material changes, resubmit mix proportion data using revised source material. Provide only materials that have been proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. Indicate clearly in the submittal where each mix design is used when more than one mix design is submitted. Resubmit data on concrete components if the qualities or source of components changes. Required average strength can be documented by field experience if field strength test data are available and represent a single group of at least 10 consecutive strength tests for one mixture, using materials and conditions similar to those expected for work, and encompassing a period of not less than 45 days. The average of field strength tests shall equal or exceed fcr'. Changes in materials, conditions, and proportions within the test record shall not have been more closely restricted than those for the proposed work. Test records shall not be more than 24 months old. Obtain mix design approval from the contracting officer prior to concrete placement.

B. Shop Drawings

1. Formwork

Drawings showing details of formwork including, but not limited to; joints, supports, studding and shoring, and sequence of form and shoring removal. Indicate placement

schedule, construction, location and method of forming control joints. Include locations of inserts, conduit, sleeves and other embedded items. Reproductions of contract drawings are unacceptable. Submit form removal schedule indicating element and minimum length of time for form removal.

Design, fabricate, erect, support, brace, and maintain formwork so that it is able to support, without failure, all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork.

2. Reinforcing Steel

Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars. Reproductions of contract drawings are unacceptable.

C. Control Submittals

1. Concrete Curing Plan

Submit proposed materials, methods and duration for curing concrete elements in accordance with ACI 308.1.

2. Pumping Concrete

Submit proposed materials and methods for pumping concrete. Submittal must include mix designs, pumping equipment including type of pump and size and material for pipe, and maximum length and height concrete is to be pumped.

3. Silica Fume Manufacturer's Representative

The manufacturer's representative must be present at mix plant to ensure proper mix, including high range water reducer, and batching methods during the first 3 days of concrete mix preparation and placement. After which the manufacturer's representative must designate a representative at the concrete producer's plant to ensure the concrete mix procedures meet the silica fume manufacturer's recommendations.

4. Finishing Plan

Submit proposed material and procedures to be used in obtaining the finish for the floors. Include qualification of person to be used for obtaining floor tolerance measurement, description of measuring equipment to be used, and a sketch showing lines and locations the measuring equipment will follow.

5. VOC Content for form release agents, curing compounds, and concrete penetrating sealers

Submit certification for the form release agent, curing

compounds, and concrete penetrating sealers that indicate the VOC content of each product.

6. Safety Data Sheets

Submit Safety Data Sheets (SDS) for all materials that are regulated for hazardous health effects. SDS must be readily accessible during each work shift to employees when they are at the construction site.

D. Test Reports

1. Fly Ash and Pozzolan

Submit test results in accordance with ASTM C618 for fly ash and pozzolan. Submit test results performed within 6 months of submittal date.

2. Slag Cement

Submit test results in accordance with ASTM C989/C989M for slag cement. Submit test results performed within 6 months of submittal date.

3. Aggregates

Submit test results in accordance with ASTM C33/C33M, or ASTM C330/C330M for lightweight aggregate.

E. Quality Control Plan

Develop and submit for approval a concrete quality control program in accordance with the guidelines of ACI 121R and as specified herein. The plan must include approved laboratories. Provide direct oversight for the concrete qualification program inclusive of associated sampling and testing. All quality control reports must be provided to the Contracting Officer, Quality Manager and Concrete Supplier. Maintain a copy of ACI SP-15 and CRSI 10MSP at project site.

F. Quality Control Personnel Certifications

The Contractor must submit for approval the responsibilities of the various quality control personnel, including the names and qualifications of the individuals in those positions and a quality control organizational chart defining the quality control hierarchy and the responsibility of the various positions. Quality control personnel must be employed by the Contractor.

Submit American Concrete Institute certification for the following:

a. CQC personnel responsible for inspection of concrete operations.

b. Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews.

c. Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.

1. Quality Manager Qualifications

The quality manager must hold a current license as a professional engineer in a U.S. state or territory with experience on at least five similar projects. Evidence of extraordinary proven experience may be considered by the Contracting Officer as sufficient to act as the Quality Manager.

2. Field Testing Technician and Testing Agency

Submit data on qualifications of proposed testing agency and technicians for approval by the Contracting Officer prior to performing testing on concrete.

a. Work on concrete under this contract must be performed by an ACI Concrete Field Testing Technician Grade 1 qualified in accordance with ACI SP-2 or equivalent. Equivalent certification programs must include requirements for written and performance examinations as stipulated in ACI SP-2.

b. Testing agencies that perform testing services on reinforcing steel must meet the requirements of ASTM E329.

c. Testing agencies that perform testing services on concrete materials must meet the requirements of ASTM C1077.

G. Laboratory Qualifications for Concrete Qualification Testing

The concrete testing laboratory must have the necessary equipment and experience to accomplish required testing. The laboratory must meet the requirements of ASTM C1077 and be Cement and Concrete Reference Laboratory (CCRL) inspected.

H. Laboratory Accreditation

Laboratory and testing facilities must be provided by and at the expense of the Contractor. The laboratories performing the tests must be accredited in accordance with ASTM C1077, including ASTM C78/C78M and ASTM C1260. The accreditation must be current and must include the required test methods, as specified. Furthermore, the testing must comply with the following requirements:

a. Aggregate Testing and Mix Proportioning: Aggregate testing and mixture proportioning studies must be performed by an accredited laboratory and under the direction of a registered professional engineer in a U.S. state or territory competent in concrete materials who is competent in concrete materials and must sign all reports and designs.

b. Acceptance Testing: Furnish all materials, labor, and

facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Furnish and maintain boxes or other facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by ASTM C31/C31M.

c. Contractor Quality Control: All sampling and testing must be performed by an approved, onsite, independent, accredited laboratory.

1.07 ENVIRONMENTAL REQUIREMENTS

Provide space ventilation according to material manufacturer recommendations, at a minimum, during and following installation of concrete curing compound and sealer. Maintain one of the following ventilation conditions during the curing period or for 72 hours after installation:

a. Supply 100 percent outside air 24 hours a day.

b. Supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 55 degrees F and 84 degrees F and humidity is between 30 percent and 60 percent.

c. Supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated above.

A. Submittals for Environmental Performance

a. Provide data indication the percentage of post-industrial pozzolan (fly ash, slag cement) cement substitution as a percentage of the full product composite by weight.

b. Provide data indicating the percentage of post-industrial and post-consumer recycled content aggregate.

c. Provide product data indicating the percentage of post-consumer recycled steel content in each type of steel reinforcement as a percentage of the full product composite by weight.

d. Provide product data stating the location where all products were manufactured

e. For projects using FSC certified formwork, provide chain-of-custody documentation for all certified wood products.

f. For projects using reusable formwork, provide data showing how formwork is reused.

g. Provide SDS product information data showing that form release agents meet any environmental performance goals such as using vegetable and soy based products.

h. Provide SDS product information data showing that concrete adhesives meet any environmental performance goals including low emitting, low volatile organic compound products.

1.08 SUSTAINABLE DESIGN REQUIREMENTS

A. Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources.See Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING for cumulative total local material requirements. Concrete materials may be locally available. Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

B. Forest Stewardship Council (FSC) Certification

Use FSC-certified wood where specified. Provide letter of certification signed by lumber supplier. Indicate compliance with FSC STD 01 001 and identify certifying organization. Submit FSC certification numbers; identify each certified product on a line-item basis. Submit copies of invoices bearing the FSC certification numbers.

1.09 QUALIFICATIONS FOR WELDING WORK

Welding procedures must be in accordance with AWS D1.4/D1.4M.

Verify that Welder qualifications are in accordance with AWS D1.4/D1.4M for welding of reinforcement or under an equivalent qualification test approved in advance. Welders are permitted to do only the type of welding for which each is specifically qualified.

PART 2 PRODUCTS

2.01 FORMWORK MATERIALS

a. Form-facing material in contact with concrete must be lumber, plywood, or tempered concrete-form-grade hardboard, . Submit product information on proposed form-facing materials if different from that specified herein.

b. Design formwork, shores, reshores, and backshores to support loads transmitted to them and to comply with applicable building code requirements.

c. Design formwork to withstand pressure resulting from placement and vibration of concrete and to maintain specified tolerances.

d. Design formwork to accommodate waterstop materials in joints at locations indicated in Contract Documents.

e. Provide temporary openings in formwork if needed to facilitate cleaning and inspection.

f. Design formwork joints to inhibit leakage of mortar.

g. Limit deflection of facing materials for concrete surfaces exposed to view to 1/240 of center-to-center spacing of facing supports.

h. Do not use earth cuts as forms for vertical or sloping surfaces.

i. Submit product information on proposed form-facing materials if different from that specified herein.

j. Submit shop drawings for formwork, shoring, reshoring, and backshoring. Shop drawings must be signed and sealed by a licensed design engineer.

k. Submit design calculations for formwork, shoring, reshoring, and backshoring. Design calculations must be signed and sealed by a licensed design engineer.

l. Submit procedure for reshoring and backshoring, including drawings signed and sealed by a licensed design engineer. Include on shop drawings the formwork removal procedure and magnitude of construction loads used for design of reshoring or backshoring system. Indicate in procedure the magnitude of live and dead loads assumed for required capacity of the structure at time of reshoring or backshoring.

m. Submit manufacturer's product data on form liner proposed for use with each formed surface.

A. Wood Forms

Use lumber as specified in Section 06 10 00 ROUGH CARPENTRY and as follows. Provide lumber that is square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Provide plywood that complies with NIST PS 1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining. Submit data verifying that composite wood products contain no urea formaldehyde resins. Virgin wood used must be FSC-certified.

1. Concrete Form Plywood (Standard Rough)

Provide plywood that conforms to NIST PS 1, B-B, concrete form, not less than 5/8-inch thick.

2. Overlaid Concrete Form Plywood (Standard Smooth)

Provide plywood that conforms to NIST PS 1, B-B, high density form overlay, not less than 5/8-inch thick.

2.02 FORMWORK ACCESSORIES

a. Use commercially manufactured formwork accessories, including ties and hangers.

b. Form ties and accessories must not reduce the effective cover of the reinforcement.

A. Form Ties

a. Use form ties with ends or end fasteners that can be removed without damage to concrete.

b. Where indicated in Contract Documents, use form ties with integral water barrier plates or other acceptable positive water barriers in walls.

c. The breakback distance for ferrous ties must be at least 3/4 in. for Surface Finish-2.0 or Surface Finish-3.0, as defined in ACI 301.

d. If the breakback distance is less than 3/4 in., use coated or corrosion-resistant ties.

e. Submit manufacturer's data sheet on form ties.

B. Waterstops

Submit manufacturer's data sheet on waterstop materials and splices.

1. PVC Waterstop

Polyvinylchloride waterstops must conform to COE CRD-C 572.

2. Rubber Waterstop

Rubber waterstops must conform to COE CRD-C 513.

3. Thermoplastic Elastomeric Rubber Waterstop

Thermoplastic elastomeric rubber waterstops must conform to ASTM D471.

4. Hydrophilic Waterstop

Swellable strip type compound of polymer modified chloroprene rubber that swells upon contact with water must conform to the following requirements when tested in accordance to ASTM D412: Tensile strength 420 psi minimum; ultimate elongation 600 percent minimum. Hardness must be 50 minimum on the type A durometer and the volumetric expansion ratio in distilled water at 70 degrees F must be 3 to 1 minimum.

C. Biodegradable Form Release Agent

a. Provide form release agent that is colorless, biodegradable, and water-based, with a low (maximum of 55 grams/liter (g/l)) VOC content. A minimum of 85 percent of the total product must be biobased material.

b. Provide product that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

c. Provide form release agent that reduces formwork moisture

absorption, and does not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene. Submit documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

d. Submit manufacturer's product data on formwork release agent for use on each form-facing material.

D. Chamfer Materials

Use lumber materials with dimensions of 3/4 x 3/4 in.

E. Construction and movement joints

a. Submit details and locations of construction joints in accordance with the requirements herein.

b. Locate construction joints within middle one-third of spans of slabs, beams, and girders. If a beam intersects a girder within the middle one-third of girder span, the distance between the construction joint in the girder and the edge of the beam must be at least twice the width of the larger member.

c. For members with post-tensioning tendons, locate construction joints where tendons pass through centroid of concrete section.

d. Locate construction joints in walls and columns at underside of slabs, beams, or girders and at tops of footings or slabs.

e. Make construction joints perpendicular to main reinforcement.

f. Provide movement joints where indicated in Contract Documents or in accepted alternate locations.

g. Submit location and detail of movement joints if different from those indicated in Contract Documents.

h. Submit manufacturer's data sheet on expansion joint materials.

i. Provide keyways where indicated in Contract Documents. Longitudinal keyways indicated in Contract Documents must be at least 1-1/2 in. deep, measured perpendicular to the plane of the joint.

F. Other Embedded items

Use sleeves, inserts, anchors, and other embedded items of material and design indicated in Contract Documents.

2.03 CONCRETE MATERIALS

A. Cementitious Materials

1. Portland Cement

a. Unless otherwise specified, provide cement that conforms to ASTM C150/C150M Type IL, low alkali.

b. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

c. Submit information along with evidence demonstrating compliance with referenced standards. Submittals must include types of cementitious materials, manufacturing locations, shipping locations, and certificates showing compliance.

d. Cementitious materials must be stored and kept dry and free from contaminants.

2. Fly Ash

a. ASTM C618, Class F or Class C, except that the maximum allowable loss on ignition must not exceed 3 percent.

b. If fly ash is used it shall range from 15 to 30 percent by weight of cementitious material, provided the fly ash does not reduce the amount of cement in the concrete mix below the minimum requirements of local building codes. Where the use of fly ash cannot meet the minimum level,it shall not be used. Report the chemical analysis of the fly ash in accordance with ASTM C311/C311M. Evaluate and classify fly ash in accordance with ASTM D5759.

3. Slag Cement

ASTM C989/C989M, Grade 100 .

4. Silica Fume

Silica fume must conform to ASTM C1240, including the optional limits on reactivity with cement alkalis. Silica fume may be furnished as a dry, densified material or as slurry. Proper mixing is essential to accomplish proper distribution of the silica fume and avoid agglomerated silica fume which can react with the alkali in the cement resulting in premature and extensive concrete damage. Supervision at the batch plant, finishing, and curing is essential. Provide at the Contractor's expense the services of a manufacturer's technical representative, experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume. This representative must be present on the project prior to and during at least the

first 4 days of concrete production and placement using silica fume. A High Range Water Reducing admixture (HRWRA) must be used with silica fume.

5. Other Supplementary Cementitious Materials

Natural pozzolan must be raw or calcined and conform to ASTM C618, Class N, including the optional requirement for uniformity.

Ultra Fine Fly Ash (UFFA) and Ultra Fine Pozzolan (UFP) must conform to ASTM C618, Class F or N, and the following additional requirements:

a. The strength activity index at 28 days of age must be at least 95 percent of the control specimens.

b. The average particle size must not exceed 6 microns.

c. The sum of SiO2 + Al2O3 + Fe2O3 must be greater than 77 percent.

B. Water

a. Water or ice must comply with the requirements of ASTM C1602/C1602M.

b. Minimize the amount of water in the mix. Improve workability by adjusting the grading of the aggregate and using admixture rather than by adding water.

c. Water must be potable ; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

d. Protect mixing water and ice from contamination during storage and delivery.

e. Submit test report showing water complies with ASTM C1602/C1602M.

C. Aggregate

1. Normal-Weight Aggregate

a. Aggregates must conform to ASTM C33/C33M .

b. Aggregates used in concrete must be obtained from the same sources and have the same size range as aggregates used in concrete represented by submitted field test records or used in trial mixtures.

c. Provide sand that is at least 50 percent acid insoluble based on ASTM D3042.

d. Store and handle aggregate in a manner that will avoid segregation and prevents contamination by other materials or other sizes of aggregates. Store aggregates in locations that will permit them to drain

freely. Do not use aggregates that contain frozen lumps.

e. Submit types, pit or quarry locations, producers' names, aggregate supplier statement of compliance with ASTM C33/C33M, and ASTM C1293 expansion data not more than 18 months old.

D. Admixtures

a. Chemical admixtures must conform to ASTM C494/C494M.

b. Air-entraining admixtures must conform to ASTM C260/C260M.

c. Chemical admixtures for use in producing flowing concrete must conform to ASTM C1017/C1017M.

d. Do not use calcium chloride admixtures.

e. Use a corrosion-inhibiting admixture for concrete classified under exposure category C1 or C2.

f. Admixtures used in concrete must be the same as those used in the concrete represented by submitted field test records or used in trial mixtures.

g. Protect stored admixtures against contamination, evaporation, or damage.

h. To ensure uniform distribution of constituents, provide agitating equipment for admixtures used in the form of suspensions or unstable solutions. Protect liquid admixtures from freezing and from temperature changes that would adversely affect their characteristics.

i. Submit types, brand names, producers' names, manufacturer's technical data sheets, and certificates showing compliance with standards required herein.

2.04 MISCELLANEOUS MATERIALS

A. Concrete Curing Materials

Provide concrete curing material in accordance with ACI 301 Section 5 and ACI 308.1 Section 2. Submit product data for concrete curing compounds. Submit manufactures instructions for placement of curing compound.

B. Nonshrink Grout

Nonshrink grout in accordance with ASTM C1107/C1107M.

C. Floor Finish Materials

1. Liquid Chemical Floor Hardeners and Sealers

a. Hardener must be a colorless aqueous solution

containing a blend of inorganic silicate or siliconate material and proprietary components combined with a wetting agent; that penetrates, hardens, and densifies concrete surfaces. Submit manufactures instructions for placement of liquid chemical floor hardener.

b. Use concrete penetrating sealers with a low (maximum 100 grams/liter, less water and less exempt compounds) VOC content. Submit manufactures instructions for placement of sealers.

2. Abrasive Aggregate for Nonslip Aggregate Finish

Aggregate must be packaged, factory-graded fused aluminum oxide grits, or it may be crushed emery containing not less than 40-percent aluminum oxide and not less than 25-percent ferric oxide. Aggregate must be rust proof and nonglazing and must be unaffected by freezing, moisture, and cleaning materials.

3. Aggregate for Heavy-Duty Wear-Resistant Finish

Provide aggregate that is traprock or emery, as follows:

Traprock must be packaged, crushed, natural, fine-to-medium-grained, igneous rock, such as diabase, basalt, or black granite. Traprock aggregate must be well-graded in size from particles retained on No. 4 sieve 0.187 inch to particles passing 3/8-inch sieve.

Emery must be packaged, factory-graded, crushed, natural-emery ore, cubical or polyhedral in form, containing not less than 35-percent aluminum oxide and not less than 24-percent ferric oxide. Emery aggregate must be well graded in size from particles retained on No. 50 sieve 0.0118 inch to particles passing No. 8 sieve 0.0929 inch.

D. Expansion/Contraction Joint Filler

ASTM D1751 or ASTM D1752 Type I or Type II. Material must be 1/2 inch thick, unless otherwise indicated.

E. Joint Sealants

Submit manufacturer's product data, indicating VOC content.

1. Horizontal Surfaces, 3 Percent Slope, Maximum

ASTM D6690 or ASTM C920, Type M, Class 25, Use T.

2. Vertical Surfaces Greater Than 3 Percent Slope

ASTM C920, Type M, Grade NS, Class 25, Use T

3. Preformed Polychloroprene Elastomeric Type

ASTM D2628.

4. Lubricant for Preformed Compression Seals

ASTM D2835.

F. Vapor Retarder and Vapor Barrier

ASTM E1745 Class C polyethylene sheeting, minimum 10 mil thickness or other equivalent material with a maximum permeance rating of 0.04 perms per ASTM E96/E96M.

ASTM E1745 Class C polyethylene sheeting, minimum 15 milthickness or ASTM E1993/E1993M bituminous membrane or other equivalent material with a maximum permeance rating of 0.01 perms per ASTM E96/E96M.

Consider plastic vapor retarders and adhesives with a high recycled content, low toxicity low VOC (Volatile Organic Compounds) levels.

G. Dovetail Anchor Slot

Preformed metal slot approximately 1 inch by 1 inch of not less than 22 gage galvanized steel cast in concrete. Coordinate actual size and throat opening with dovetail anchors and provide with removable filler material.

2.05 CONCRETE MIX DESIGN

A. Properties and Requirements

a. Use materials and material combinations listed in this section and the contract documents.

b. Cementitious material content must be adequate for concrete to satisfy the specified requirements for strength, w/cm, durability, and finishability described in this section and the contract documents.

The minimum cementitious material content for concrete must meet the following requirements:

Nominal maximum size of aggregate, in.	**Minimum cementitious material content, pounds per cubic yard**
1-1/2	470
1	520
3/4	540
3/8	610

c. Selected target slump must meet the requirements this

section, the contract documents, and must not exceed 9 in. Concrete must not show visible signs of segregation.

d. The target slump must be enforced for the duration of the project. Determine the slump by ASTM C143/C143M. Slump tolerances must meet the requirements of ACI 117.

e. The nominal maximum size of coarse aggregate for a mixture must not exceed three-fourths of the minimum clear spacing between reinforcement, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

f. Concrete must be air entrained for members assigned to Exposure Class F1, F2, or F3. The total air content must be in accordance with the requirements of the paragraph titled DURABILITY.

g. Measure air content at the point of delivery in accordance with ASTM C173/C173M or ASTM C231/C231M.

h. Concrete for slabs to receive a hard-troweled finish must not contain an air-entraining admixture or have a total air content greater than 3 percent.

i. Concrete properties and requirements for each portion of the structure are specified in the table below. Refer to the paragraph titled DURABILITY for more details on exposure categories and their requirements.

	Minimum *f'c* psi	**Exposure Categories^**	**Miscellaneous Requirements**
Footings	4500 at 28 days	C0 C1 C2	Max. slump: 6 in. Nominal maximum aggregate size must be 3/4 in.
Concrete fill and Concrete Encasement	3500 at 28 days	C0 C1 C2; F1	Nominal maximum aggregate size must be 3/4 in.

	Minimum *f'c* psi	**Exposure Categories^**	**Miscellaneous Requirements**
Beams and elevated slabs	4500 at 28 days	C0 C1 C2; F3	Nominal maximum aggregate size must be 3/4 in.
Slabs-on-ground	4500 at 28 days	C0 C1 C2;F3	

B. Durability

1. Alkali-Aggregate Reaction

Do not use any aggregate susceptible to alkali-carbonate reaction (ACR). Use one of the three options below for qualifying concrete mixtures to reduce the potential of alkali-silica reaction (ASR):

a. For each aggregate used in concrete, the expansion result determined in accordance with ASTM C1293 must not exceed 0.04 percent at one year.

b. For each aggregate used in concrete, the expansion result of the aggregate and cementitious materials combination determined in accordance with ASTM C1567 must not exceed 0.10 percent at an age of 16 days.

c. Alkali content in concrete (LBA) must not exceed 4 pounds per cubic yard for moderately reactive aggregate or 3 pounds per cubic yard for highly reactive aggregate. Reactivity must be determined by testing in accordance with ASTM C1293 and categorized in accordance with ASTM C1778. Alkali content is calculated as follows:
LBA = (cement content, pounds per cubic yard) × (equivalent alkali content of portland cement in percent/100 percent)

2. Freezing and Thawing Resistance

a. Provide concrete meeting the following requirements based on exposure class assigned to members for freezing-and-thawing exposure in Contract Documents:

Exposure class	**Maximum *w/cm****	**Minimum *f'c*, psi**	**Air content**	**Additional Requirements**
F0	N/A	2500	N/A	
F1	0.55	3500	Depends on aggregate size	N/A
F2	0.45	4500	Depends on aggregate size	See limits on maximum cementitious material by mass
F3	0.40	5000	Depends on aggregate size	See limits on maximum cementitious material by mass

Exposure class	Maximum *w/cm**	Minimum *f'c*, psi	Air content	Additional Requirements
F3 plain concrete	0.45	4500	Depends on aggregate size	See limits on maximum cementitious material by mass

*The maximum *w/cm* limits do not apply to lightweight concrete.

b. Concrete must be air entrained for members assigned to Exposure Class F1, F2, or F3. The total air content must meet the requirements of the following table:

Nominal maximum aggregate size, in.	Total air content, percent*^	
	Exposure Class F2 and F3	Exposure Class F1
3/8	7.5	6.0
1/2	7.0	5.5
3/4	6.0	5.0
1	6.0	4.5
1-1/2	5.5	4.5
2	5.0	4.0
3	5.5	3.5

*Tolerance on air content as delivered must be plus/minus 1.5 percent.

^For f'c greater than 5000 psi, reducing air content by 1.0 percentage point is acceptable.

c. Submit documentation verifying compliance with specified requirements.

d. For sections of the structure that are assigned Exposure Class F3, submit certification on cement composition verifying that concrete mixture meets the requirements of the following table:

Cementitious material	**Maximum percent of total cementitious material by mass***
Fly ash or other pozzolans conforming to ASTM C618	25
Slag cement conforming to ASTM C989/C989M	50
Silica fume conforming to ASTM C1240	10
Total of fly ash or other pozzolans, slag cement, and silica fume	50^
Total of fly ash or other pozzolans and silica fume	35^

*Total cementitious material also includes ASTM C150/C150M, ASTM C595/C595M, ASTM C845/C845M, and ASTM C1157/C1157M cement. The maximum percentages above must include:

i. Fly ash or other pozzolans present in ASTM C1157/C1157M or ASTM C595/C595M Type IP blended cement.

ii. Slag cement present in ASTM C1157/C1157M or ASTM C595/C595M Type IS blended cement.

iii. Silica fume conforming to ASTM C1240 present in ASTM C1157/C1157M or ASTM C595/C595M Type IP blended cement.

^Fly ash or other pozzolans and silica fume must constitute no more than 25 percent and 10 percent, respectively, of the total mass of the cementitious materials.

3. Corrosion and Chloride Content

a. Provide concrete meeting the requirements of the following table based on the exposure class assigned to members requiring protection against reinforcement corrosion in Contract Documents.

b. Submit documentation verifying compliance with specified requirements.

c. Water-soluble chloride ion content contributed from constituents including water, aggregates, cementitious materials, and admixtures must be determined for the concrete mixture by ASTM C1218/C1218M at age between 28 and 42 days.

d. The maximum water-soluble chloride ion (Cl-) content in concrete, percent by mass of cement is as follows:

Exposure class	**Maximum *w/cm****	**Minimum f'c, psi**	**Maximum water-soluble chloride ion (CL-) content in concrete, percent by mass of cement**
Reinforced concrete			
C0	N/A	2500	1.00
C1	N/A	2500	0.30
C2	0.4	5000	0.15
Prestressed concrete			
C0	N/A	2500	0.06
C1	N/A	2500	0.06
C2	0.4	5000	0.06

*The maximum w/cm limits do not apply to lightweight concrete.

4. Sulfate Resistance

a. Cementitious materials are acceptable if they meet the maximum expansion requirements listed in the following table:

Exposure class	**Maximum expansion when tested using ASTM C1012/C1012M**		
	At 6 months	**At 12 months**	**At 18 months**
S1	0.10 percent	N/A	N/A
S2	0.05 percent	0.10 percent^	N/A
S3	N/A	N/A	0.10 percent

^The 12-month expansion limit applies only when the measured expansion exceeds the 6-month maximum expansion limit.

5. Concrete Temperature

The temperature of concrete as delivered must not exceed 95°F.

C. Trial Mixtures

Trial mixtures must be in accordance to ACI 301.

D. Ready-Mix Concrete

Provide concrete that meets the requirements of ASTM C94/C94M.

Ready-mixed concrete manufacturer must provide duplicate delivery tickets with each load of concrete delivered. Provide delivery tickets with the following information in addition to that required by ASTM C94/C94M:

a. Type and brand cement

b. Cement and supplementary cementitious materials content in 94-pound bags per cubic yard of concrete

c. Maximum size of aggregate

d. Amount and brand name of admixtures

e. Total water content expressed by water cementitious material ratio

2.06 REINFORCEMENT

a. Bend reinforcement cold. Fabricate reinforcement in accordance with fabricating tolerances of ACI 117.

b. Submit manufacturer's certified test report for reinforcement.

c. Submit placing drawings showing fabrication dimensions and placement locations of reinforcement and reinforcement supports. Placing drawings must indicate locations of splices, lengths of lap splices, and details of mechanical and welded splices.

d. Submit request with locations and details of splices not indicated in Contract Documents.

e. Submit request to place column dowels without using templates.

g. Submit request for field cutting, including location and type of bar to be cut and reason field cutting is required.

A. Reinforcing Bars

a. Reinforcing bars must be deformed, except spirals, load-transfer dowels, and welded wire reinforcement, which may be plain.

b. ASTM A615/A615M with the bars marked S, Grade 60 ; or ASTM A996/A996M with the bars marked R, Grade 60, or marked A, Grade 60. Cold drawn wire used for spiral reinforcement must conform to ASTM A1064/A1064M.

c. Submit mill certificates for reinforcing bars.

1. Headed Reinforcing Bars

Headed reinforcing bars must conform to ASTM A970/A970M including Annex A1, and other specified requirements.

2. Bar Mats

a. Bar mats must conform to ASTM A184/A184M.

3. Headed Shear Stud Reinforcement

Headed studs and headed stud assemblies must conform to ASTM A1044/A1044M.

B. Mechanical Reinforcing Bar Connectors

a. Provide 125 percent minimum yield strength of the

reinforcement bar.

d. Submit data on mechanical splices demonstrating compliance with this paragraph.

C. Wire

a. Provide wire reinforcement that contains a minimum of 100 percent recycled content.See Section 01 33 29 SUSTAINABILITY REQUIREMENTS AND REPORTING for cumulative total recycled content requirements. Wire reinforcement may contain post-consumer or post-industrial recycled content. Provide flat sheets of welded wire reinforcement for slabs and toppings.

b. Plain or deformed steel wire must conform to ASTM A1064/A1064M.

D. Welded wire reinforcement

a. Use welded wire reinforcement specified in Contract Documents and conforming to one or more of the specifications given herein.

b. Plain welded wire reinforcement must conform to ASTM A1064/A1064M, with welded intersections spaced no greater than 12 in. apart in direction of principal reinforcement.

c. Deformed welded wire reinforcement must conform to ASTM A1064/A1064M, with welded intersections spaced no greater than 16 in. apart in direction of principal reinforcement.

E. Reinforcing Bar Supports

a. Provide reinforcement support types within structure as required by Contract Documents. Reinforcement supports must conform to CRSI RB4.1. Submit description of reinforcement supports and materials for fastening coated reinforcement if not in conformance with CRSI RB4.1.

b. Legs of supports in contact with formwork must be hot-dip galvanized, or plastic coated after fabrication, or stainless-steel bar supports.

F. Welding

a. Provide weldable reinforcing bars that conform to ASTM A706/A706M and ASTM A615/A615M and Supplement S1, Grade 60, except that the maximum carbon content must be 0.55 percent.

b. Comply with AWS D1.4/D1.4M unless otherwise specified. Do not tack weld reinforcing bars.

c. Welded assemblies of steel reinforcement produced under factory conditions, such as welded wire reinforcement, bar mats, and deformed bar anchors, are allowed.

d. After completing welds on zinc-coated (galvanized), epoxy-coated, or zinc and epoxy dual-coated reinforcement, coat welds and repair coating damage as previously specified.

PART 3 EXECUTION

3.01 EXAMINATION

a. Do not begin installation until substrates have been properly constructed; verify that substrates are level.

b. If substrate preparation is the responsibility of another installer, notify Contracting Officer of unsatisfactory preparation before processing.

c. Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify Contracting Officer and wait for instructions before beginning installation.

3.02 PREPARATION

Determine quantity of concrete needed and minimize the production of excess concrete. Designate locations or uses for potential excess concrete before the concrete is poured.

A. General

a. Surfaces against which concrete is to be placed must be free of debris, loose material, standing water, snow, ice, and other deleterious substances before start of concrete placing.

b. Remove standing water without washing over freshly deposited concrete. Divert flow of water through side drains provided for such purpose.

B. Subgrade Under Foundations and Footings

a. When subgrade material is semi-porous and dry, sprinkle subgrade surface with water as required to eliminate suction at the time concrete is deposited, or seal subgrade surface by covering surface with specified vapor retarder.

b. When subgrade material is porous, seal subgrade surface by covering surface with specified vapor retarder.

C. Subgrade Under Slabs on Ground

a. Before construction of slabs on ground, have underground work on pipes and conduits completed and approved.

b. Previously constructed subgrade or fill must be cleaned of foreign materials

c. Finish surface of capillary water barrier under interior slabs on ground must not show deviation in excess of 1/4 inch when tested with a 10-foot straightedge parallel with and at right angles to building lines.

d. Finished surface of subgrade or fill under exterior slabs on ground must not be more than 0.02-foot above or 0.10-foot

below elevation indicated.

D. Edge Forms and Screed Strips for Slabs

a. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface and must be strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment.

b. Align concrete surface to elevation of screed strips by use of strike-off templates or approved compacting-type screeds.

E. Reinforcement and Other Embedded Items

a. Secure reinforcement, joint materials, and other embedded materials in position, inspected, and approved before start of concrete placing.

b. When concrete is placed, reinforcement must be free of materials deleterious to bond. Reinforcement with rust, mill scale, or a combination of both will be considered satisfactory, provided minimum nominal dimensions, nominal weight, and minimum average height of deformations of a hand-wire-brushed test specimen are not less than applicable ASTM specification requirements.

3.03 FORMS

a. Provide forms, shoring, and scaffolding for concrete placement. Set forms mortar-tight and true to line and grade.

b. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch. Place chamfer strips in corners of formwork to produce beveled edges on permanently exposed surfaces. Do not bevel reentrant corners or edges of formed joints of concrete.

c. Provide formwork with clean-out openings to permit inspection and removal of debris.

d. Inspect formwork and remove foreign material before concrete is placed.

e. At construction joints, lap form-facing materials over the concrete of previous placement. Ensure formwork is placed against hardened concrete so offsets at construction joints conform to specified tolerances.

f. Provide positive means of adjustment (such as wedges or jacks) of shores and struts. Do not make adjustments in formwork after concrete has reached initial setting. Brace formwork to resist lateral deflection and lateral instability.

g. Fasten form wedges in place after final adjustment of forms and before concrete placement.

h. Provide anchoring and bracing to control upward and lateral movement of formwork system.

i. Construct formwork for openings to facilitate removal and to produce opening dimensions as specified and within tolerances.

j. Provide runways for moving equipment. Support runways directly on formwork or structural members. Do not support runways on reinforcement. Loading applied by runways must not exceed capacity of formwork or structural members.

k. Position and support expansion joint materials, waterstops, and other embedded items to prevent displacement. Fill voids in sleeves, inserts, and anchor slots temporarily with removable material to prevent concrete entry into voids.

l. Clean surfaces of formwork and embedded materials of mortar, grout, and foreign materials before concrete placement.

A. Coating

a. Cover formwork surfaces with an acceptable material that inhibits bond with concrete.

b. If formwork release agent is used, apply to formwork surfaces in accordance with manufacturer's recommendations before placing reinforcement. Remove excess release agent on formwork prior to concrete placement.

c. Do not allow formwork release agent to contact reinforcement or hardened concrete against which fresh concrete is to be placed.

B. Reshoring

a. Do not allow structural members to be loaded with combined dead and construction loads in excess of loads indicated in the accepted procedure.

b. Install and remove reshores or backshores in accordance with accepted procedure.

C. Reuse

a. Reuse forms providing the structural integrity of concrete and the aesthetics of exposed concrete are not compromised.

b. Wood forms must not be clogged with paste and must be capable of absorbing high water-cementitious material ratio paste.

c. Remove leaked mortar from formwork joints before reuse.

D. Forms for Standard Rough Form Finish

Provide formwork in accordance with ACI 301 Section 5 with a surface finish, SF-1.0, for formed surfaces that are to be concealed by other construction.

E. Forms for Standard Smooth Form Finish

Provide formwork in accordance with ACI 301 Section 5 with a surface finish, SF-3.0, for formed surfaces that are exposed to view. Do not provide mockup of concrete surface appearance and texture.

F. Form Ties

b. After ends or end fasteners of form ties have been removed, repair tie holes in accordance with ACI 301 Section 5 requirements.

G. Tolerances for Form Construction

a. Construct formwork so concrete surfaces conform to tolerances in ACI 117.

b. Position and secure sleeves, inserts, anchors, and other embedded items such that embedded items are positioned within ACI 117 tolerances.

c. To maintain specified elevation and thickness within tolerances, install formwork to compensate for deflection and anticipated settlement in formwork during concrete placement. Set formwork and intermediate screed strips for slabs to produce designated elevation, camber, and contour of finished surface before formwork removal. If specified finish requires use of vibrating screeds or roller pipe screeds, ensure that edge forms and screed strips are strong enough to support such equipment.

H. Removal of Forms and Supports

a. If vertical formed surfaces require finishing, remove forms as soon as removal operations will not damage concrete.

b. Remove top forms on sloping surfaces of concrete as soon as removal will not allow concrete to sag. Perform repairs and finishing operations required. If forms are removed before end of specified curing period, provide curing and protection.

c. Do not damage concrete during removal of vertical formwork for columns, walls, and sides of beams. Perform needed repair and finishing operations required on vertical surfaces. If forms are removed before end of specified curing period, provide curing and protection.

e. Form-facing material and horizontal facing support members may be removed before in-place concrete reaches specified compressive strength if shores and other supports are designed to allow facing removal without deflection of supported slab or member.

I. Strength of Concrete Required for Removal of Formwork

If removal of formwork, reshoring, or backshoring is based on concrete reaching a specified in-place strength, mold and field-cure cylinders in accordance with ASTM C31/C31M. Test cylinders in accordance with ASTM C39/C39M. Alternatively, use one or more of the methods listed herein to evaluate in-place concrete strength for formwork removal.

a. Tests of cast-in-place cylinders in accordance with ASTM C873/C873M. This option is limited to slabs with concrete depths from 5 to 12 in.

b. Penetration resistance in accordance with ASTM C803/C803M.

c. Pullout strength in accordance with ASTM C900.

3.04 WATERSTOP INSTALLATION AND SPLICES

a. Provide waterstops in construction joints as indicated.

b. Install formwork to accommodate waterstop materials. Locate waterstops in joints where indicated in Contract Documents. Minimize number of splices in waterstop. Splice waterstops in accordance with manufacturer's written instructions. Install factory-manufactured premolded mitered corners.

c. Install waterstops to form a continuous diaphragm in each joint. Make adequate provisions to support and protect waterstops during progress of work. Protect waterstops protruding from joints from damage.

A. PVC Waterstop

Make splices by heat sealing the adjacent waterstop edges together using a thermoplastic splicing iron utilizing a non-stick surface specifically designed for waterstop welding. Reform waterstops at splices with a remolding iron with ribs or corrugations to match the pattern of the waterstop. The spliced area, when cooled, must show no signs of separation, holes, or other imperfections when bent by hand in as sharp an angle as possible.

B. Rubber Waterstop

Rubber waterstops must be spliced using cold bond adhesive as recommended by the manufacturer.

C. Thermoplastic Elastomeric Rubber Waterstop

Fittings must be shop made using a machine specifically designed to mechanically weld the waterstop. A portable power saw must be used to miter or straight cut the ends to be joined to ensure good alignment and contact between joined surfaces. Maintain continuity of the characteristic features of the cross section of the waterstop (for example ribs, tabular center axis, and protrusions) across the splice.

D. Hydrophilic Waterstop

Miter cut ends to be joined with sharp knife or shears. The ends must be adhered with adhesive.

3.05 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

a. Unless otherwise specified, placing reinforcement and miscellaneous materials must be in accordance to ACI 301. Provide bars, welded wire reinforcement, wire ties, supports, and other devices necessary to install and secure reinforcement.

b. Reinforcement must not have rust, scale, oil, grease, clay, or

foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

c. Nonprestressed cast-in-place concrete members must have concrete cover for reinforcement given in the following table:

Concrete Exposure	**Member**	**Reinforcement**	**Specified cover, in.**
Cast against and permanently in contact with ground	All	All	3
Exposed to weather or in contact with ground	Slabs, joists, stirrups, spirals, ties, Walls	All	2
		All	2-1/2
Not exposed to weather or in contact with ground	Slabs, joists, and walls	No. 14 and No. 18 bars	1-1/2
		No. 11 bar and smaller	3/4
	Beams, columns, pedestals, and tension ties	Primary reinforcement	2

d. Cast-in-place prestressed concrete members must have concrete cover for reinforcement, ducts, and end fittings given in the following table:

Concrete	**Member**	**Reinforcement**	**Specified**
Cast against and permanently in contact with ground	All	All	3

Concrete	Member	Reinforcement	Specified
Exposed to weather or in contact with ground	Slabs, joists, and walls, stirrups, spiral ties	All	1-1/2
	Primary reinforcement in beams and columns	All	2
Not exposed to weather or in contact with ground	Slabs, joists, and walls	All	3/4
	Beams, columns, and tension ties	Primary reinforcement	1-1/2
		Stirrups, ties, spirals, and hoops	1

e. Precast nonprestressed or prestressed concrete members manufactured under plant conditions must have concrete cover for reinforcement, ducts, and end fittings given in the following table:

Concrete Exposure	**Member**	**Reinforcement**	**Specified cover, in.**
Exposed to weather or in contact with ground	Walls, Slabs, joists, stirrups, sprials, and ties	All	1-1/2
		All	2
	All other	No. 14 and No. 18 bars; tendons larger than 1-1/2 in.	2
		No. 6 through No. 11 bars; tendons and strands larger than 5/8 in. diameter through 1-1/2 in.	1-1/2
		No. 5 bar, W31 or D31 wire, and smaller; tendons and strands 5/8 in. diameter and smaller	1-1/4

Concrete Exposure	Member	Reinforcement	Specified cover, in.
Not exposed to weather or in contact with ground	Slabs, joists, and walls	No. 14 and No. 18 bars; tendons larger than 1-1/2 in. diameter	1-1/2
		Tendons and strands 1-1/2 in. diameter and smaller	3/4
	Beams, columns, pedestals, and tension ties	Primary reinforcement	1-1/2
		Stirrups, ties, spirals, and hoops	1

A. General

Provide details of reinforcement that are in accordance with the Contract Documents.

B. Vapor Retarder and Vapor Barrier

a. Install in accordance with ASTM E1643. Provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. Lap joints a minimum of 12 inches and tape.

b. Remove torn, punctured, or damaged vapor retarder and vapor barrier material and provide with new vapor retarder and vapor barrier prior to placing concrete. Concrete placement must not damage vapor retarder. Place a 2 inch layer of clean concrete sand on vapor retarder and vapor barrier before placing concrete.

C. Reinforcement Supports

Provide reinforcement support in accordance with CRSI RB4.1 and ACI 301 Section 3 requirements. Supports for coated or galvanized bars must also be coated with electrically compatible material for a distance of at least 2 inches beyond the point of contact with the bars.

D. Splicing

As indicated in the Contract Documents. For splices not indicated follow ACI 301. Do not splice at points of maximum stress. Overlap welded wire reinforcement the spacing of the cross wires, plus 2 inches. AWS D1.4/D1.4M. Approve welded splices prior to use. Repair the cut ends of hot-dipped galvanized reinforcement steel to completely coat exposed steel, ASTM A780/A780M.

E. Future Bonding

Plug exposed, threaded, mechanical reinforcement bar connectors with a greased bolt. Provide bolt threads that match the connector. Countersink the connector in the concrete. Caulk the depression after the bolt is installed.

F. Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement and support against displacement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

G. Fabrication

Shop fabricate reinforcing bars to conform to shapes and dimensions indicated for reinforcement, and as follows:

a. Provide fabrication tolerances that are in accordance with ACI 117.

b. Provide hooks and bends that are in accordance with the Contract Documents.

Reinforcement must be bent cold to shapes as indicated. Bending must be done in the shop. Rebending of a reinforcing bar that has been bent incorrectly is not be permitted. Bending must be in accordance with standard approved practice and by approved machine methods.

Deliver reinforcing bars bundled, tagged, and marked. Tags must be metal with bar size, length, mark, and other information pressed in by machine. Marks must correspond with those used on the placing drawings.

Do not use reinforcement that has any of the following defects:

a. Bar lengths, depths, and bends beyond specified fabrication tolerances

b. Bends or kinks not indicated on drawings or approved shop drawings

c. Bars with reduced cross-section due to rusting or other cause

Replace defective reinforcement with new reinforcement having

required shape, form, and cross-section area.

H. Placing Reinforcement

Place reinforcement in accordance with ACI 301.

For slabs on grade (over earth or over capillary water barrier) and for footing reinforcement, support bars or welded wire reinforcement on precast concrete blocks, spaced at intervals required by size of reinforcement, to keep reinforcement the minimum height specified above the underside of slab or footing.

For slabs other than on grade, supports for which any portion is less than 1 inch from concrete surfaces that are exposed to view or to be painted must be of precast concrete units, plastic-coated steel, or stainless steel protected bar supports. Precast concrete units must be wedge shaped, not larger than 3-1/2 by 3-1/2 inches, and of thickness equal to that indicated for concrete protection of reinforcement. Provide precast units that have cast-in galvanized tie wire hooked for anchorage and blend with concrete surfaces after finishing is completed.

Provide reinforcement that is supported and secured together to prevent displacement by construction loads or by placing of wet concrete, and as follows:

a. Provide supports for reinforcing bars that are sufficient in number and have sufficient strength to carry the reinforcement they support, and in accordance with ACI 301 and CRSI 10MSP. Do not use supports to support runways for concrete conveying equipment and similar construction loads.

b. Equip supports on ground and similar surfaces with sand-plates.

c. Support welded wire reinforcement as required for reinforcing bars.

d. Secure reinforcements to supports by means of tie wire. Wire must be black, soft iron wire, not less than 16 gage.

e. Reinforcement must be accurately placed, securely tied at intersections, and held in position during placing of concrete by spacers, chairs, or other approved supports. Point wire-tie ends away from the form. Unless otherwise indicated, numbers, type, and spacing of supports must conform to the Contract Documents.

f. Bending of reinforcing bars partially embedded in concrete is permitted only as specified in the Contract Documents.

I. Spacing of Reinforcing Bars

a. Spacing must be as indicated in the Contract Documents.

b. Reinforcing bars may be relocated to avoid interference with other reinforcement, or with conduit, pipe, or other embedded items. If any reinforcing bar is moved a distance exceeding one bar diameter or specified placing tolerance, resulting

rearrangement of reinforcement is subject to preapproval by the Contracting Officer.

J. Concrete Protection for Reinforcement

Additional concrete protection must be in accordance with the Contract Documents.

K. Welding

Welding must be in accordance with AWS D1.4/D1.4M.

3.06 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

In accordance with ASTM C94/C94M, ACI 301, ACI 302.1R and ACI 304R, except as modified herein. Batching equipment must be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

A. Measuring

Make measurements at intervals as specified in paragraphs SAMPLING and TESTING.

B. Mixing

a. Mix concrete in accordance with ASTM C94/C94M, ACI 301 and ACI 304R.

b. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the concrete temperature is less than 84 degrees F.

c. Place concrete within 60 minutes if the concrete temperature is greater than 84 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and submitted water-cementitious material ratio are not exceeded and the required concrete strength is still met. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required.

d. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture, within the manufacturer's recommended dosage, to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch. Do not reconstitute concrete that has begun to solidify.

C. Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.07 PLACING CONCRETE

Place concrete in accordance with ACI 301 Section 5. Concrete shall be placed within 15 minutes of discharge into non-agitating equipment.

A. Footing Placement

Concrete for footings may be placed in excavations without forms upon inspection and approval by the Contracting Officer. Excavation width must be a minimum of 4 inches greater than indicated.

B. Pumping

ACI 304R and ACI 304.2R. Pumping must not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment must not exceed 2 inches at discharge/placement. Do not convey concrete through pipe made of aluminum or aluminum alloy. Avoid rapid changes in pipe sizes. Limit maximum size of course aggregate to 33 percent of the diameter of the pipe. Limit maximum size of well-rounded aggregate to 40 percent of the pipe diameter. Take samples for testing at both the point of delivery to the pump and at the discharge end.

C. Cold Weather

Cold weather concrete must meet the requirements of ACI 306.1 unless otherwise specified. Do not allow concrete temperature to decrease below 50 degrees F. Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 37 degrees F in any one hour and 50 degrees F per 24 hours after heat application.

D. Hot Weather

Hot weather concrete must meet the requirements of ACI 301 ACI 305.1 unless otherwise specified. Maintain required concrete temperature using Figure 4.2 in ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying

equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

E. Bonding

Surfaces of set concrete at joints, must be roughened and cleaned of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner that exposes the aggregate uniformly and does not leave laitance, loosened particles of aggregate, nor damaged concrete at the surface.

Obtain bonding of fresh concrete that has set as follows:

a. At joints between footings and walls or columns, between walls or columns and the beams or slabs they support, and elsewhere unless otherwise specified; roughened and cleaned surface of set concrete must be dampened, but not saturated, immediately prior to placing of fresh concrete.

b. At joints in exposed-to-view work; at vertical joints in walls; at joints near midpoint of span in girders, beams, supported slabs, other structural members; in work designed to contain liquids; the roughened and cleaned surface of set concrete must be dampened but not saturated and covered with a cement grout coating.

c. Provide cement grout that consists of equal parts of portland cement and fine aggregate by weight with not more than 6 gallons of water per sack of cement. Apply cement grout with a stiff broom or brush to a minimum thickness of 1/16 inch. Deposit fresh concrete before cement grout has attained its initial set.

3.08 WASTE MANAGEMENT

Provide as specified in the Waste Management Plan and as follows.

A. Mixing Equipment

Before concrete pours, designate Contractor-owned site meeting environmental standards for cleaning out concrete mixing trucks. Minimize water used to wash equipment.

B. Hardened, Cured Waste Concrete

Crush and reuse hardened, cured waste concrete as fill or as a base course for pavement.

C. Reinforcing Steel

Collect reinforcing steel and place in designated area for recycling.

D. Other Waste

Identify concrete manufacturer's or supplier's policy for collection or return of construction waste, unused material, deconstruction waste, and/or packaging material. Return excess cement to supplier.

3.09 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

A. Defects

Repair surface defects in accordance with ACI 301 Section 5.

B. Not Against Forms (Top of Walls)

Surfaces not otherwise specified must be finished with wood floats to even surfaces. Finish must match adjacent finishes.

C. Formed Surfaces

1. Tolerances

Tolerances in accordance with ACI 117 and as indicated.

2. As-Cast Rough Form

Provide for surfaces not exposed to public view a surface finish SF-1.0. Patch holes and defects in accordance with ACI 301.

3. Standard Smooth Finish

Provide for surfaces exposed to public view a surface finish SF-3.0. Patch holes and defects in accordance with ACI 301.

D. [Enter Appropriate Subpart Title Here]

3.10 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

In accordance with ACI 301 and ACI 302.1R, unless otherwise specified. Slope slabs uniformly to drains where drains are provided. Where straightedge measurements are specified, Contractor must provide straightedge.

A. Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater. Grate tampers ("jitterbugs") shall not be used.

1. Scratched

Use for surfaces intended to receive bonded applied

cementitious applications. Finish concrete in accordance with ACI 301 Section 5 for a scratched finish.

2. Floated

Use for surfaces to receive waterproofing membranes, and exterior slabs where not otherwise specified. Finish concrete in accordance with ACI 301 Section 5 for a floated finish.

3. Concrete Containing Silica Fume

Finish using magnesium floats or darbies. Finish using techniques demonstrated in the sample installation.

4. Steel Troweled

Use for floors intended as walking surfaces . Finish concrete in accordance with ACI 301 Section 5 for a steel troweled finish.

5. Nonslip Finish

Use on surfaces of exterior platforms, steps, and landings; and on exterior and interior pedestrian ramps. Finish concrete in accordance with ACI 301 Section 5 for a dry-shake finish. After the selected material has been embedded by the two floatings, complete the operation with a broomed finish.

6. Broomed

Use on surfaces of exterior walks, platforms, patios, and ramps, unless otherwise indicated. Finish concrete in accordance with ACI 301 Section 5 for a broomed finish.

7. Pavement

Screed the concrete with a template advanced with a combined longitudinal and crosswise motion. Maintain a slight surplus of concrete ahead of the template. After screeding, float the concrete longitudinally. Use a straightedge to check slope and flatness; correct and refloat as necessary. Obtain final finish by belting. Lay belt flat on the concrete surface and advance with a sawing motion; continue until a uniform but gritty nonslip surface is obtained. a burlap drag. Drag a strip of clean, wet burlap from 3 to 10 feet wide and 2 feet longer than the pavement width across the slab. Produce a fine, granular, sandy textured surface without disfiguring marks. Round edges and joints with an edger having a radius of 1/8 inch.

8. Concrete Toppings Placement

The following requirements apply to the placement of toppings of concrete on base slabs that are either freshly placed and still plastic, or on hardened base slabs.

a. Placing on a Fresh Base: Screed and bull float the base

slab. As soon as the water sheen has disappeared, lightly rake the surface of the base slab with a stiff bristle broom to produce a bonding surface for the topping. Immediately spread the topping mixture evenly over the roughened base before final set takes place. Give the topping the finish indicated on the drawings specified herein.

b. Bonding to a Hardened Base: When the topping is to be bonded to a floated or troweled hardened base, roughen the base by scarifying, grit-blasting, scabbling, planing, flame cleaning, or acid-etching to lightly expose aggregate and provide a bonding surface. Remove dirt, laitance, and loose aggregate by means of a stiff wire broom. Keep the clean base wet for a period of 12 hours preceding the application of the topping. Remove excess water and apply a 1:1:1/2 cement-sand-water grout, and brush into the surface of the base slab. Do not allow the cement grout to dry, and spread it only short distances ahead of the topping placement. Do not allow the temperature differential between the completed base and the topping mixture to exceed 41 degrees F at the time of placing. Place the topping and finish as indicated.

9. Chemical-Hardener Treatment

Apply liquid-chemical floor hardener where indicated after curing and drying concrete surface. Dilute liquid hardener with water and apply in three coats. First coat must be one-third strength, second coat one-half strength, and third coat two-thirds strength. Apply each coat evenly and allow to dry 24 hours between coats.

Approved proprietary chemical hardeners must be applied in accordance with manufacturer's printed directions.

10. Colored Wear-Resistant Finish

a. Give finish to monolithic slab surfaces where indicated.

b. Apply dry shake materials for colored wear-resistant finish at the rate of 60 pounds per 100 square feet of surface.

c. Immediately following first floating operation, approximately two-thirds of specified weight of dry shake material must be uniformly distributed over surface and embedded by means of power floating. After first dry-shake application has been embedded, uniformly distribute remainder of dry-shake material over surface at right angles to first dry-shake application and embed by means of power floating. Trueness of surface and other requirements for floating operations not specified in this paragraph must be as specified for float finish.

d. After completion of float finish, apply a trowel finish as specified.

11. [Enter Appropriate Subpart Title Here]

B. Concrete Walks

Provide 4 inches thick minimum. Provide contraction joints spaced every 5 linear feet unless otherwise indicated. Cut contraction joints 1 inch deep, or one fourth the slab thickness whichever is deeper, with a jointing tool after the surface has been finished. Provide 0.5 inch thick transverse expansion joints at changes in direction where sidewalk abuts curb, steps, rigid pavement, or other similar structures; space expansion joints every 50 feet maximum. Give walks a broomed finish. Unless indicated otherwise, provide a transverse slope of 1/48. Limit variation in cross section to 1/4 inch in 5 feet.

C. Pits and Trenches

Place bottoms and walls monolithically or provide waterstops and keys.

D. Curbs and Gutters

Provide contraction joints spaced every 10 feet maximum unless otherwise indicated. Cut contraction joints 3/4 inch deep with a jointing tool after the surface has been finished. Provide expansion joints 1/2 inch thick and spaced every 100 feet maximum unless otherwise indicated. Perform pavement finish.

E. Splash Blocks

Provide at outlets of downspouts emptying at grade. Splash blocks may be precast concrete, and must be 24 inches long, 12 inches wide and 4 inches thick, unless otherwise indicated, with smooth-finished countersunk dishes sloped to drain away from the building.

3.11 JOINTS

A. Construction Joints

Make and locate joints not indicated so as not to impair strength and appearance of the structure, as approved. Joints must be perpendicular to main reinforcement. Reinforcement must be continued and developed across construction joints. Locate construction joints as follows:

1. Construction Joints for Constructability Purposes

a. In walls, at top of footing; at top of slabs on ground; at top and bottom of door and window openings or where required to conform to architectural details; and at underside of deepest beam or girder framing into wall.

b. In columns or piers, at top of footing; at top of slabs on ground; and at underside of deepest beam or girder framing into column or pier.

c. Near midpoint of spans for supported slabs, beams, and

girders unless a beam intersects a girder at the center, in which case construction joints in girder must offset a distance equal to twice the width of the beam. Make transfer of shear through construction joint by use of inclined reinforcement.

Provide keyways at least 1-1/2-inches deep in construction joints in walls and slabs and between walls and footings; approved bulkheads may be used for slabs.

B. Isolation Joints in Slabs on Ground

a. Provide joints at points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.

b. Fill joints with premolded joint filler strips 1/2 inch thick, extending full slab depth. Install filler strips at proper level below finish floor elevation with a slightly tapered, dress-and-oiled wood strip temporarily secured to top of filler strip to form a groove not less than 3/4 inch in depth where joint is sealed with sealing compound and not less than 1/4 inch in depth where joint sealing is not required. Remove wood strip after concrete has set. Contractor must clean groove of foreign matter and loose particles after surface has dried.

C. Contraction Joints in Slabs on Ground

a. Provide joints to form panels as indicated.

b. Under and on exact line of each control joint, cut 50 percent of welded wire reinforcement before placing concrete.

c. Sawcut contraction joints into slab on ground in accordance with ACI 301 Section 5.

d. Joints must be 1/8-inch wide by 1/5 to 1/4 of slab depth and formed by inserting hand-pressed fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. After concrete has cured for at least 7 days, the Contractor must remove inserts and clean groove of foreign matter and loose particles.

e. Sawcutting will be limited to within 12 hours after set and at 1/4 slab depth.

D. Sealing Joints in Slabs on Ground

a. Contraction and control joints which are to receive finish flooring material must be sealed with joint sealing compound after concrete curing period. Slightly underfill groove with joint sealing compound to prevent extrusion of compound. Remove excess material as soon after sealing as possible.

b. Sealed groove must be left ready to receive filling material that is provided as part of finish floor covering work.

3.12 CURING AND PROTECTION

Curing and protection in accordance with ACI 301 Section 5, unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer, hardener, or epoxy coating. Allow curing compound/sealer installations to cure prior to the installation of materials that absorb VOCs.

A. Requirements for Type III, High-Early-Strength Portland Cement

The curing periods are required to be not less than one-fourth of those specified for portland cement, but in no case less than 72 hours.

B. Curing Periods

ACI 301 Section 5, except 10 days for retaining walls, pavement or chimneys. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing are subject to approval by the Contracting Officer.

C. Curing Formed Surfaces

Accomplish curing of formed surfaces, including undersurfaces of girders, beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed before end of curing period, accomplish final curing of formed surfaces by any of the curing methods specified above, as applicable.

D. Curing Unformed Surfaces

a. Accomplish initial curing of unformed surfaces, such as monolithic slabs, floor topping, and other flat surfaces, by membrane curing.

b. Accomplish final curing of unformed surfaces by any of curing methods specified, as applicable.

E. Temperature of Concrete During Curing

When temperature of atmosphere is 41 degrees F and below, maintain temperature of concrete at not less than 55 degrees F throughout concrete curing period or 45 degrees F when the curing period is measured by maturity. When necessary, make arrangements before start of concrete placing for heating, covering, insulation, or housing as required to maintain specified temperature and moisture conditions for concrete during curing period.

When the temperature of atmosphere is 80 degrees F and above or during other climatic conditions which cause too rapid drying of concrete, make arrangements before start of concrete placing for installation of wind breaks, of shading, and for fog spraying, wet sprinkling, or moisture-retaining covering of light color as required to protect concrete during curing period.

Changes in temperature of concrete must be uniform and not exceed 37 degrees F in any one hour nor 80 degrees F in any 24-hour period.

F. Protection from Mechanical Injury

During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration and from damage caused by rain or running water.

G. Protection After Curing

Protect finished concrete surfaces from damage by construction operations.

3.13 FIELD QUALITY CONTROL

A. Aggregate Testing

1. Fine Aggregate

At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C136/C136M and COE CRD-C 104 for the fine aggregate or for each fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall be immediately reported to the Contracting Officer, concreting shall be stopped, and immediate steps taken to correct the grading.

2. Coarse Aggregate

At least once during each shift in which the concrete plant is operating, there shall be a sieve analysis in accordance with ASTM C136/C136M for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control coarser than the specification limits for samples taken other than as delivered to the mixer to allow for degradation during handling. When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of 5 tests are outside specification limits, the operation shall be considered out of control and reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

B. Concrete Sampling

ASTM C172/C172M. Collect samples of fresh concrete to perform tests specified. ASTM C31/C31M for making test specimens.

C. Concrete Testing

1. Slump Tests

ASTM C143/C143M. Take concrete samples during concrete placement/discharge. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cementitious material ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete.

2. Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3. Compressive Strength Tests

ASTM C39/C39M. Make eight 6 inch by 12 inch test cylinders for each set of tests in accordance with ASTM C31/C31M, ASTM C172/C172M and applicable requirements of ACI 305R and ACI 306R. Take precautions to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, two cylinders at 56 days and hold

two cylinder in reserve. Take samples for strength tests of each mix design of concrete placed each day not less than once a day, nor less than once for each 100 cubic yards of concrete for the first 500 cubic yards, then every 500 cubic yards thereafter, nor less than once for each 5400 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result must be the average of two cylinders from the same concrete sample tested at 28 days . Concrete compressive tests must meet the requirements of this section, the Contract Document, and ACI 301. Retest locations represented by erratic core strengths. Where retest does not meet concrete compressive strength requirements submit a mitigation or remediation plan for review and approval by the contracting officer. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

4. Air Content

ASTM C173/C173M or ASTM C231/C231M for normal weight concrete . Test air-entrained concrete for air content at the same frequency as specified for slump tests.

5. Unit Weight of Structural Concrete

ASTM C567/C567M and ASTM C138/C138M. Determine unit weight of lightweight and normal weight concrete. Perform test for every 20 cubic yards maximum.

6. Chloride Ion Concentration

Chloride ion concentration must meet the requirements of the paragraph titled CORROSION AND CHLORIDE CONTENT. Determine water soluble ion concentration in accordance with ASTM C1218/C1218M. Perform test once for each mix design.

7. Strength of Concrete Structure

The strength of the concrete structure will be considered to be deficient if any of the following conditions are identified:

a. Failure to meet compressive strength tests as evaluated.

b. Reinforcement not conforming to requirements specified.

c. Concrete which differs from required dimensions or location in such a manner as to reduce strength.

d. Concrete curing and protection of concrete against extremes of temperature during curing, not conforming to requirements specified.

e. Concrete subjected to damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration.

f. Poor workmanship likely to result in deficient strength.

Where the strength of the concrete structure is considered deficient submit a mitigation or remediation plan for review and approval by the contracting officer.

8. Non-Conforming Materials

Factors that indicate that there are non-conforming materials include (but not limited to) excessive compressive strength, inadequate compressive strength, excessive slump, excessive voids and honeycombing, concrete delivery records that indicate excessive time between mixing and placement, or excessive water was added to the mixture during delivery and placement. Any of these indicators alone are sufficient reason for the Contracting Officer to request additional sampling and testing.

Investigations into non-conforming materials must be conducted at the Contractor's expense. The Contractor must be responsible for the investigation and must make written recommendations to adequately mitigate or remediate the non-conforming material. The Contracting Officer may accept, accept with reduced payment, require mitigation, or require removal and replacement of non-conforming material at no additional cost to the Government.

9. Testing Concrete Structure for Strength

When there is evidence that strength of concrete structure in place does not meet specification requirements or there are non-conforming materials, make cores drilled from hardened concrete for compressive strength determination in accordance with ASTM C42/C42M, and as follows:

a. Take at least three representative cores from each member or area of concrete-in-place that is considered potentially deficient. Location of cores will be determined by the Contracting Officer.

b. Test cores after moisture conditioning in accordance with ASTM C42/C42M if concrete they represent is more than superficially wet under service.

c. Air dry cores, (60 to 80 degrees F with relative humidity less than 60 percent) for 7 days before test and test dry if concrete they represent is dry under service conditions.

d. Strength of cores from each member or area are considered satisfactory if their average is equal to or greater than 85 percent of the 28-day design compressive strength of the class of concrete.

e. Core specimens will be taken and tested by the Government. If the results of core-boring tests indicate that the concrete as placed does not conform to the drawings and specification, the cost of such tests and restoration required must be borne by the

Contractor.

Fill core holes solid with patching mortar and finished to match adjacent concrete surfaces.

Correct concrete work that is found inadequate by core tests in a manner approved by the Contracting Officer.

3.14 REPAIR, REHABILITATION AND REMOVAL

Before the Contracting Officer accepts the structure the Contractor must inspect the structure for cracks, damage and substandard concrete placements that may adversely affect the service life of the structure. A report documenting these defects must be prepared which includes recommendations for repair, removal or remediation must be submitted to the Contracting Officer for approval before any corrective work is accomplished.

A. Crack Repair

Prior to final acceptance, all cracks in excess of 0.02 inches wide must be documented and repaired. The proposed method and materials to repair the cracks must be submitted to the Contracting Officer for approval. The proposal must address the amount of movement expected in the crack due to temperature changes and loading.

B. Repair of Weak Surfaces

Weak surfaces are defined as mortar-rich, rain-damaged, uncured, or containing exposed voids or deleterious materials. Concrete surfaces with weak surfaces less than 1/4 inch thick must be diamond ground to remove the weak surface. Surfaces containing weak surfaces greater than 1/4 inch thick must be removed and replaced or mitigated in a manner acceptable to the Contracting Officer.

C. Failure of Quality Assurance Test Results

Proposed mitigation efforts by the Contractor must be approved by the Contracting Officer prior to proceeding.

-- End of Section --

Section 03400(03 04 00)
CUSTOM PRECAST CONCRETE

Part 1 - GENERAL

1.01 SUMMARY

A. Perform all work required to furnish and complete the proper installation of precast concrete.

B. Types of Precast Concrete work include:

1. Precast Concrete Seating
2. Precast Concrete Veneer (Panel Pavers & Risers at Stepped Terrace)

C. Setting material, grouts, sealants and caulks

D. Installation of precast concrete

E. Related work not specified under this section

1. Installation of Concrete reinforced substrate to receive precast

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM C-150
2. ASTM C-128
3. ASTM C-260
4. ASTM C-31
5. ASTM C-494
6. ASTM C-39

B. Precast Concrete Institute (PCI)

1.03 SUBMITTALS

A. Shop Drawings

1. Submit fabrication drawings of all precast concrete items showing detailed sections and profile for all precast items and relationship to foundational and structural support. Details shall show all reinforcing and cast in hardware. Details shall show joint patterning of adjacent and assembled pieces. Details shall reflect gradient of each installation location.

B. Samples

1. Submit 1 sample for color and texture approval.
    a. Custom Sample Number: A20 WHITE
    b. Finish: ACID WASH

C. Submit a copy of manufacturer's Quality Assurance and Procedure Manual

D. Performance Requirements

1. Compressive Strength 5,000 p.s.i. minimum
2. Air Content 6-8%
3. Water-Cement Ration .45
4. Deflection Max: L/720

E. Test Results

1. Manufacturer shall furnish test results attesting that materials meet specification requirements.

1.04 QUALITY ASSURANCE

A. Qualifications: Precast Concrete Manufacturer and Trade Contractor must have a minimum of 5 years of successful experience on projects of similar magnitude and complexity to the indicated project.

B. Manufacturer and trade contractor to be prequalified by Owner's Agent prior to bidding and failure to do so will void bid.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packaging and Shipping: precast concrete to be palletized, shrink wrapped and marked with legible manufacturer identification, including piece number and quantities.

B. Storage and Protection precast concrete to be stored in secure area in original packaging.

C. Protect from damage by other trades.

D. Report all damage due to shipment immediately. Customer is required to sign the Bill of Lading slip detailing the damaged product. Picture proof is required.

1.06 WARRANTY

A. For a period of two (2) years from delivery of precast concrete, manufacturer warrants the precast concrete products against defects in workmanship and materials per industry standards. This warranty does not cover the above products for cracking and faulting caused by settling due to improper or faulty substrates or improper installation; nor does it cover damage caused by impact, vandalism or natural disaster.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer:

1. Wausau Tile, Inc. | 1.800.388.8728 | info@wausautile.com | www.wausautile.com or approved equal.

B. Clarification Note: Drawings and specifications are based on manufacturer's proprietary literature from Wausau Tile, Inc. Other manufacturers shall comply with minimum levels of material specifications and detailing indicated on the drawings of specified herein.

2.02 MATERIAL REQUIREMENTS

A. Portland Cement: ASTM C-150 Specifications for Portland Cement.

B. Aggregates: Aggregate shall be blended to meet individual project requirements.

C. Coloring: Pigments used shall be inorganic, resistant to alkalinity and used per manufacturer's recommendations.

D. Reinforcement and Hardware:

1. Reinforce precast with deformed rods

as recommended by precast concrete manufacturer.

E. Skate stop notches on seat wall edges, per manufacturer. Submit options for review and approval prior to manufacturing.

F. Setting Materials, Caulks & Sealants

1. Color(s) to be selected by Landscape Architect.
2. Sealer: Colorless, pure acrylic water repellent sealer. Sealer to maintain natural look of concrete surface with no glaze or gloss, darkening or color change.
3. Precast manufacturer is not a reseller for any of the above products. Please contact the following supplier for information and recommendations on job specific installation materials.
4. Latex Modified Mortar:
   a. Large, Heavy Tile Mortar (Medium Bed): Laticrete MULTIMAX™ LITE as manufactured by LATICRETE International, Inc., or approved equal.
   b. Acceptable Supplier:
   LATICRETE International, Inc., 1 Laticrete Park North, Bethany, CT 06524-3423 USA Phone 800-243-4788, (203) 393-0010 technicalservices@laticrete.com, www.laticrete.com; www.laticrete.com/green or approved equal.

2.02 MANUFACTURED UNITS

A. Sizing Tolerances

1. All units to conform to shop drawings with a (+/-) 1/8" tolerance in dimension.

B. Precast Surfaces and Edges:

1. All exposed edges to have minimum of 1/8" radius to prevent chipping.
2. All finished surfaces to match approved control sample.
3. All precast concrete finished surfaces to be factory sealed.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine substrates for the following:

1. Defects or cracks in existing work or substrate.
2. Deviations beyond allowable tolerances for the substrate.

B. Continue with installation of precast units only when all defects have been corrected.

3.02 Project Conditions

A. Do not install products under environmental conditions outside setting material manufacturer's absolute limits.

B. Concrete substrate must be structurally sound, stable, and rigid enough to support stone and similar finishes.

Substrate deflection under all live, dead and impact loads, including concentrated loads, must not exceed L/480 for stone installations where L=span length, except where local building codes or stone manufacturer specify more stringent deflection requirements.

C. Surfaces and ambient temperatures must be between 40˚F (4˚C) and 90˚F (32˚C) during installation and throughout the cure time.

D. Bonding surface must be clean and free of dirt, oil, grease, paint, concrete sealers, curing compounds, and other potential bond inhibiting contaminants.

E. Rough or uneven concrete surfaces should be made smooth with a latex modified mortar to provide a wood float (or better) finish. Dry, dusty concrete slabs should be dampened, and excess water swept off. Installation may be made on a damp surface but not in standing water or puddles.

F. Expansion Joints must be maintained from the substrate through the stonework from all construction or expansion joints in the substrate in accordance with project specifications, details, and industry standards (e.g. TCNA EJ-171 Movement Joint Guidelines for Ceramic, Glass and Stone). Do not cover substrate joints with mortar and/or stone.

3.03 INSTALLATION

1. Mortar Set Application

a. Substrate of concrete. Must be within a tolerance of 1/8" in all dimensions.

b. The height of the mortar bed is established based product limits and d. The mortar bed is then placed or screeded over primed substrate.

1. Setting bed must be continuous under the entire length of precast. Setting materials utilized per manufacturer's recommended instruction.

c. Apply MULTIMAX™ LITE to the substrate with the flat side of the trowel, pressing firmly to work into surface. Comb on additional mortar using a 1/2” x 1/2” (12 mm x 12 mm) notched trowel. Back butter precast concrete unit to ensure full bedding of the precast concrete unit into the mortar. Place into wet, sticky mortar and beat in using a beating block and rubber mallet to embed precast concrete unit and adjust level. Work in manageable sections spreading only as much mortar as can be covered with precast concrete unit before it skins over. If mortar is skinned over (not sticky), remove and replace with fresh mortar. Check for a minimum of 95% coverage by periodically removing a precast concrete unit and

inspecting bedding mortar transfer onto back of precast concrete unit. All precast concrete unit edges and corners must be fully supported and embedded in mortar. This will help minimize the occurrence of cracks in the precast concrete unit resulting from voids in the setting bed. Immediately clean mortar from the stone face using a damp sponge while the mortar is fresh as mortar will be difficult to remove once it has fully set. Immediately remove mortar from the stone surface with a clean, damp sponge while mortar is fresh. Mortars will be difficult to remove once they dry on the surface.

B. Joints
   1. Joints between adjacent precast should be 1/8”-1/4”.
C. Caulking of Precast
   1. Clean all joints thoroughly, removing all debris.
   2. Wipe all joints with caulk manufacturer's recommended cleaner prior to application.
   3. Use urethane caulk. (Color match caulk to precast per Landscape Architect selection.)
   4. Clean up after caulking as per caulk manufacturer's recommendations.
D. Precast Concrete products setting or installation methods are to be reviewed by the manufacturer and setting materials supplier.
E. Final Cleaning of Precast Concrete
   1. Check all surfaces and caulking, make repairs as necessary.
   2. Clean precast concrete units with a pH balanced soap and in accordance with manufacturer's recommendations.
F. Protection:
   1. Upon completion, the work shall be ready for final inspection and acceptance by owner or owner’s agent.
   2. General Contractor shall protect the finished work from the time the installing contractor completes the work.
G. Finish:
   1. Overall match to approved sample and per industry standards.
   2. All products to be factory sealed.

PART 4 - CARE AND MAINTENANCE

4.1
A. Cleaning
   1. To preserve the appearance and extend the life of the Precast Concrete, cleaning and maintenance processes must be in place. When using the following procedures, please follow the product manufacturer's

instructions regarding the use of any equipment or cleaning materials described here.

a. Power sweep, then pressure wash precast surface. Spot clean any stained areas.
b. Spot clean any stained areas by using a neutral, non-aggressive cleaner. This may require effort to remove some of the tougher marks or stains.
1. Example of off-the-shelf cleaners: Citrus cleaner, Simple Green
c. Always start with the most neutral cleaner and work your way toward the more aggressive cleaners.
d. In extreme cases, contact the Manufacturer to discuss options
e. Be sure to use plastic, rubber or nylon tip equipment; this will help prevent scratches on the concrete.

2. Precast Concrete is built to withstand aggressive cleaning; however, the more aggressive the cleaner, the more risk is involved. Strict adherence to all product warnings is suggested.
3. In all cases after cleaning and/or patching, it is recommended that the Precast be sealed. This will help protect the product from environmental effects. Contact manufacturer to obtain sealer and stain information based on specific job.

B. Maintenance

1. Annual maintenance is recommended; however, incases of extreme use, the best time for application is when the appearance of the product is showing wear or is appearing dull.
2. Check the precast for broken and chipped pieces. If damaged, contact manufacturer before repairing to order a patch kit and obtain patching procedures.
3. De-icing salts can damage concrete, causing them to scale or break apart. If necessary, these chemicals should be used sparingly and with caution on our concrete products.
a. Salt based products are not recommended
4. De-icers should be used only when necessary to help loosen snow and ice, and make removal easier. Never over-apply de-icing products. Mix the de-icers with sand to increase their effectiveness and reduce overall use.
a. Always read and follow label directions when applying de-icing materials.
b. Calcium magnesium acetate

chloride tends to cause the least amount of damage to Precast Concrete

5. Other manufacturer’s products used in conjunction with the Precast Concrete may require additional maintenance. Including but not limited to: Wood, Metals, Plastics, etc. Contact product specific manufacturers for their maintenance requirements.

END OF SECTION

SECTION 03500
CONCRETE VAULTS AND CHAMBERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Precast concrete utility structures, non-circular in plan, and appurtenant items.
   a. Valve and meter vaults.
   b. StormTrap (or approved equal) underground storage chambers.
   c. Site Saver (or approved equal) stormwater trash rack chamber.
2. Design and fabrication of precast concrete utility structures.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 01357 – Delegated Design Procedures
2. Section 05011 – Stormwater Casing
3. Section 02200 - Earthwork
4. Section 02250 – Trenching, Pipe Embedment and Backfill
5. Section 03300 – Cast-in-place Concrete
6. Section 03370 – Sanitary Sewer Manhole Construction
7. Section 03400 – Custom Precast Concrete

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
   a. C857, Standard Practice for Minimum Design Loading for Underground Precast Concrete Utility Structures.
   b. C858, Standard Specification for Underground Precast Concrete Utility Structures.
   c. C890, Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
   d. C990, Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
   e. D1227, Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.

1.3 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:
   a. Acknowledgement that products submitted meet requirements of standards referenced.
   b. Manufacturer's installation instructions.
2. Concrete mix design(s):
   a. Include submittal information defined in Specification Section 03300 & 03400.
   b. Certification in accordance with ASTM C858, Section 12.
3. Fabrication and/or layout drawings:
   a. Include detailed diagrams of utility structures showing typical components and dimensions, reinforcement, and other details.
   b. Itemize, on separate schedule, elevations or sectional breakdown of each utility structure with all components and refer to drawing identification number or notation.

c. Indicate required penetration details for all piping entering each structure.

4. Drawings and calculations: All Drawings, including layout drawings, certifications and calculations shall be sealed by a Professional Engineer registered in the state where the project is located.
   a. Provide certification stating that calculations provided have been prepared specifically for this Project and that they match and pertain to the Shop Drawings provided.
   b. Provide a summary document as part of the above certification listing the design criteria used for precast design including:
      1) Codes and standards.
      2) Soil load.
      3) Exterior groundwater load.
      4) Live loads.
      5) Other loads.
5. Test Reports:
   a. Copies of source quality control tests, including compressive strength and air content, for units provided.

1.4 SITE CONDITIONS

A. Design groundwater elevation for precast structure design shall be the 100-year flood elevation shown on the Contract Documents.

1. If the 100-year flood elevation is not shown on the Contract Documents, the design groundwater elevation shall be equal to the ground surface elevation at the structure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Access doors:
2. Manhole rings, covers and frames:
   a. Conform to requirements of Specification Section 05011
3. Manhole rings, covers and frames:
   a. Neenah Foundry.
   b. Deeter Foundry.
   c. Clay and Bailey.
4. Manhole steps:
   a. M. A. Industries.
   b. Neenah Foundry.
   c. Deeter Foundry.
5. Black mastic joint compound:
   a. Kalktite 340.
   b. Tufflex.
   c. Plastico.
6. Premolded joint sealant:
   a. NPC Bidco, Inc., C-56.
   b. Ram-Nek, Henry Co.
   c. EZ-Stik, Press-Seal Gasket Corp.
   d. CS-102, Conseal.
7. Elastomeric joint seals:

a. Kent Seal.

8. External joint wrap.
   a. NPC, Bidco, Inc.
   b. EZ-Wrap, Press-Seal Gasket Corp.
   c. RUBR-Nek, Henry Co.
9. Emulsified fibrated asphalt compound:
   a. Sonneborn Hydrocide 700B Semi-Mastic.

B. Alternative manufacturers may be submitted for engineering approval.

2.2 PRECAST UTILITY STRUCTURE COMPONENTS

A. Provide utility structures with interior dimensions as shown on the Drawings.

B. Provide the following components for each utility structure:
   1. Precast base section with integral or cast in place base slab.
   2. Precast wall section(s).
   3. Precast flat top.
      a. Where reinforcement is shown for top slab, furnish slab with reinforcing as designed, but not less than reinforcing shown on Drawings.

C. Provide openings and appurtenances as shown on Drawings.
   1. Access doors:
      a. Cast access doors into top slab.
      b. Where access door frames have drainage channels, cast PVC drain lines in top slab to drain location shown on Drawings. If no drain location is shown, drain frames to outer edge of top slab.
      c. Protect doors and frames from damage during concrete placement and shipping.
   2. Manhole frames and covers:
      a. Furnish and install in accordance with Specification Section 05011
      b. Cast frames into top slab.

D. Concrete:
   1. Conform to requirements of Specification Section 03300.
   2. Conform to requirements of ASTM C858, where stricter than Specification Section 03300.
      a. Minimum 28-day compressive strength 4500 psi.
      b. All portions of precast utility structure are considered to be exposed to freeze-thaw cycles.

E. Joints:
   1. Joints of precast riser and top sections:
      a. Preformed flexible joint sealants: ASTM C990.
      b. Exterior joint wrap.
   2. Pipe and conduit entry for utility structures.
      a. In accordance with Drawings, Owner requirements, and published standard details.

F. Coatings:
   1. Vertical wall surfaces:
      a. Emulsified fibrated asphalt compound meeting ASTM D1227 Type I for all vertical wall exterior surfaces.

2.3 DESIGN

A. General Design Requirements:

1. Design precast units and appurtenances in accordance with ASTM C858.
    a. Notify Engineer and furnish cast-in-place structures if sizes of precast utility structures shown on Drawings can not be designed or fabricated.

B. Design loads:

1. Design precast units for all loads and load cases described in ASTM C857, with the following values and selections:
    a. Minimum uniform live load for exposed roof slabs shall be 150 PSF.
    b. Wheel loads shall be considered.
        1) Use wheel load designation A-16 (HS20-44) as shown in ASTM C857, Table 1.
        2) Wheel loads and uniform live load do not act concurrently.
    c. Unit weight of soil W shall be taken as no less than 100 LB/CUFT.
    d. Minimum lateral soil pressure coefficient (K_0): 0.50.

C. Specific Design Requirements:

1. Out-of-plane shear:
    a. Out-of-plane shear in structure walls and slabs shall be shown in the calculations.
    b. Wall thickness shall be determined based on meeting design requirements for out-of-plane shear resulting from soil and groundwater loads.
    c. Wall sections shall be designed as one-way spans between corners for calculation of out-of-plane shear. Transfer of shear or bending load shall not be considered to be transferred across joints between precast units or between walls and slabs, unless unit as integrally cast together.
    d. Use of shear steel reinforcement to increase out-of-plane shear capacity shall be prohibited.
2. The distribution of moments in adjacent walls of different lengths in rectangular structures shall be considered.
3. Design precast units taking into account reduced cross section at openings and penetrations.
4. Structure shall be checked for buoyancy.
    a. The minimum factor of safety for uplift with the design groundwater elevation shall be 1.25, unless a larger factor of safety is required by the local governing body or building code.
    b. The minimum factor of safety for uplift at the fully submerged condition shall be no less than 1.1.
    c. If the buoyant weight of soil above base slab extensions beyond the external dimensions of the structure is used to resist uplift, the volume of soil considered to resist uplift shall be limited to soil within the vertical projection of the edge of the base slab extensions.

PART 3 - EXECUTION

3.1 PRECAST UTILITY STRUCTURE CONSTRUCTION

A. General:

1. Prepare subgrade for base as required by Specification Section 02200.
    a. For precast base slabs, place and compact 6 inches of Granular Fill or Bedding Material as shown on Drawings.
    b. For cast-in-place concrete base slabs, support base section and prepare bottom joint with preformed strip-type hydrophilic waterstop in accordance with Specification Section 03300.
    c. Confirm that base is level and fully supported by stable material.
2. For structures with open pipe flow, place inverts with concrete fill.

3. Ensure accurate vertical placement and leveling prior to placement of interior concrete fill.
    a. Provide vertical alignment tolerance of maximum 1 inch horizontal to 10 feet vertical.

B. Build each structure to dimensions shown on plans and at such elevation that pipe sections built into wall of structure will be true line of pipe extensions.

C. For all horizontal mating surfaces between precast concrete units, apply premolded flexible joint sealant to clean mating surfaces in accordance with sealant manufacturer's written instructions. Apply sufficient pressure to each concrete unit to seat unit in sealant.

D. Seal all pipe penetrations in manhole.

1. Where post-installed seals are permitted, form pipe openings smooth and well shaped.
2. After installation, seal exterior of penetration with non-shrink grout.
3. After grout cures, wire brush smooth and apply two coats emulsified fibrated asphalt compound to minimum wet thickness of 1/8 inches to ensure complete seal.

E. Set top slab level to elevation shown on Drawings.

3.2 FIELD QUALITY CONTROL

A. Any proposed repairs of precast components or structures shall be submitted to Engineer for approval.

B. Structures shall be observed for signs of leakage during periods of high groundwater.

C. No leakage that includes visible flow through joints between precast concrete sections or through pipe penetrations shall be permitted.

D. Damp spots on interior wall surfaces shall be considered leakage and shall not be permitted.

1. Damp spots shall be defined as spots where moisture from a source outside the structure can be picked up on a dry hand.
2. Locate the source of water movement through the wall and permanently seal.

END OF SECTION

SECTION 04150
SELECT MASONRY MORTARING

PART 1 – GENERAL

1.1 SUMMARY

A. Scope of work - Provide masonry material, installation materials and accessories as indicated on drawings, as specified herein, and as needed for complete and proper installation.
B. Related Documents - provisions within General and Supplementary General Conditions of the Contract, Division 1 - General Requirements, and the Drawings apply to this Section.

1.2 SECTION INCLUDES

A. Mortaring for precast concrete seating (freestanding and terraced).
B. Limestone curbs, steps, edge bands, cheek walls, and wall caps.
C. Installation Products; adhesives, mortars, grouts and sealants
D. Thresholds, trim, cementitious backer units and other accessories specified herein.

1.6 RELATED SECTIONS

A. Section 03 30 00 Cast-in-Place Concrete
B. Section 04 40 00 Stonework: Limestone Curbs, Steps, Edge Bands, and Wall Cap

1.9 REFERENCE STANDARDS

A. American Iron and Steel Institute (AISI) Specification for the Design of Cold-Formed Steel Structural Members
B. American Society For Testing And Materials (ASTM) C144 Standard Specification for Aggregate for Masonry Mortar
C. American Society For Testing And Materials (ASTM) C150 Standard Specification for Portland Cement
D. American Society for Testing and Materials (ASTM) C794 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
E. American Society for Testing and Materials (ASTM) C920 Standard Specification for Elastomeric Joint Sealants
F. American Society for Testing and Materials (ASTM) D1248 Standard Test Method for Staining of Porous Substances by Joint Sealants
G. International Organization for Standardization (ISO) 13007 Standards for Grouts and Adhesives
H. Materials and Methods Standards Association (MMSA) Bulletins 1-16

1.10 SYSTEM DESCRIPTION

A. Masonry veneer, installed over concrete walls using latex Portland cement mortar and latex Portland cement grout.

1.11 SUBMITTALS

A. Submit shop drawings and manufacturers' product data under provisions of Section 01300
B. Submit product samples as required in Drawings unit under provisions of Section 01300
C. Submit manufacturers' installation instructions under provisions of Section 01300
D. Submit proof of warranty.
E. Submit sample of installation system demonstrating compatibility/functional relationships between adhesives, mortars, grouts and other components under provision of Section 01300. Submit proof from manufacturer or supplier verifying suitability of specified material for specific application and use; including dimensional stability, water absorption, freeze/thaw resistance (if applicable), resistance to thermal cycling, and other characteristics that the project may require. These characteristics must be reviewed and approved by the project design professional(s).
F. Submit list from manufacturer of installation system/adhesive/mortar/grout identifying a minimum of three (3) similar projects, each with a minimum of ten (10) years of service.
G. For alternate materials, at least thirty (30) days before bid date submit independent laboratory test results confirming compliance with specifications listed in Part 2 - Products.

1.12 QUALITY ASSURANCE

A. Manufacturer (single source responsibility): Company specializing in specified materials with three (3) years minimum experience. Obtain specified materials from a single source with resources to provide products of consistent quality in appearance and physical properties.
B. Installation System Manufacturer (single source responsibility): Company specializing in adhesives, mortars, grouts and other installation materials with ten (10) years minimum experience and ISO 9001 certification. Obtain installation materials from single source manufacturer to ensure consistent quality and full compatibility.
C. Submit laboratory confirmation of adhesives, mortars, grouts and other installation materials:
    1. Identify proper usage of specified materials using positive analytical method.
    2. Identify compatibility of specified materials using positive analytical method.
    3. Identify proper color matching of specified materials using a positive analytical method.
D. Installer qualifications: company specializing in specified materials with five (5) years documented experience with installations of similar scope, materials and design.

1.13 MOCK-UPS

A. Provide mock-up as specified in drawings and specifications along with respective installation adhesives, mortars, grouts and other installation materials.

1.14 PRE-INSTALLATION CONFERENCE

Pre-installation conference: At least three weeks prior to commencing work attend a meeting at the jobsite to discuss conformance with requirements of specification and job site conditions. Representatives of owner, architect, general contractor, subcontractor, Manufacturer(s), Installation System Manufacturer and any other parties who are involved in the scope of this installation must attend the meeting.

1.15 DELIVERY, STORAGE AND HANDLING

A. Acceptance at Site: deliver and store packaged materials in original containers with seals unbroken and labels, including grade seal, intact until time of use, in accordance with manufacturer's instructions.
B. Store specified materials and installation system materials in a dry location; handle in a manner to prevent chipping, breakage, and contamination.
C. Protect latex additives, organic adhesives, epoxy adhesives and sealants from freezing or overheating in accordance with manufacturer's instructions; store at room temperature when possible.
D. Store Portland cement mortars and grouts in a dry location.

1.16 PROJECT/SITE CONDITIONS

A. Provide ventilation and protection of environment as recommended by manufacturer.
B. Prevent carbon dioxide damage to specified materials as well as adhesives, mortars, grouts and other installation materials, by venting temporary heaters to the exterior.
C. Maintain ambient temperature not less than 50ºF (10ºC) or more than 100ºF (38ºC) during installation and for a minimum of seven (7) days after completion. Setting of Portland cement is retarded by low temperatures. Protect work for extended period of time and from damage by other trades. Installation with latex Portland cement mortars requires substrate, ambient and material temperatures at least 37ºF (3ºC). There is to be no ice in substrates. Freezing after installation will not damage latex Portland cement mortars. Protect Portland cement based mortars and grouts from direct sunlight, radiant heat, forced ventilation (heat & cold) and drafts until cured to prevent premature evaporation of moisture. Epoxy mortars and grouts require surface temperatures between 60ºF (16ºC) and 90ºF (32ºC) at time of installation. It is the General Contractor’s responsibility to maintain temperature control.

1.17 SEQUENCING AND SCHEDULING

A. Coordinate installation of tile work with related work.
B. Proceed with work only after curbs, vents, drains, piping, and other projections through substrate have been installed and when substrate construction and framing of openings have been completed.

1.18 WARRANTY

A. The Contractor warrants the work of this Section to be in accordance with the Contract Documents and free from faults and defects in materials and workmanship for a period as determined by local or project requirements. The manufacturer of adhesives, mortars, grouts and other installation materials shall provide

a written twenty five (25) year warranty, which covers materials and labor - reference LATICRETE Warranty Data Sheet 025.0 for complete details and requirements.

1.19 MAINTENANCE

Submit maintenance data under provisions of specifications. Include cleaning methods, cleaning solutions recommended, stain removal methods, as well as polishes and waxes recommended.

1.20 EXTRA MATERIALS STOCK

Upon completion of the work of this Section, offer to the Owner 2% minimum additional materials used in the Work, as well as extra stock of adhesives, mortars, grouts and other installation materials for the Owner's use in replacement and maintenance. Extra stock is to be from same production run or batch as original tile and installation materials.

PART 2 - PRODUCTS

2.3 INSTALLATION MATERIALS MANUFACTURER

A. LATICRETE International, Inc., 1 Laticrete Park North, Bethany, CT 06524-3423 USA Phone 800-243-4788, (203) 393-0010 technicalservices@laticrete.com, www.laticrete.com; www.laticrete.com/green

2.5 INSTALLATION PRODUCTS – EXTERIOR

A. Latex-Portland Cement Mortar for thick beds, screeds, leveling beds and scratch/plaster coats: LATICRETE 3701 fortified Mortar Bed as manufactured by LATICRETE International, Inc.

B. Latex Portland Cement Thin Bed Mortar: LATICRETE 254 Platinum as manufactured by LATICRETE International, Inc.

C. Large, Heavy Tile Mortar (Medium Bed): LATICRETE MULTIMAX™ LITE as manufactured by LATICRETE International, Inc.

PART 3 – EXECUTION

1.1 SUBSTRATE EXAMINATION

A. Verify that surfaces to be covered with specified materials are:
   1. Sound, rigid and conform to good design/engineering practices;
   2. Systems, including the framing system and panels, over which materials will be installed shall be in conformance with the International Residential Code (IRC) for residential applications, the International Building Code (IBC) for commercial applications, or applicable building codes.
   3. Clean and free of dust, dirt, oil, grease, sealers, curing compounds, laitance, efflorescence, form oil, loose plaster, paint, and scale;
   4. For thin-bed installations when a cementitious bonding material will be used, including medium bed mortar: maximum allowable variation in the substrate – for material with edges shorter than 15” (375mm), maximum allowable variation is ¼” in 10’ (6mm in 3m) from the required plane, with no more than 1/16” variation in 12” (1.5mm variation in 300mm) when measured from the high points in the surface. For material with at least one edge 15” (375mm) in length, maximum allowable variation is 1/8” in 10’ (3mm in 3m) from the required plane, with no more than 1/16” variation in 24” (1.5mm variation in 600mm) when measured from the high points in the surface. For modular substrate units, such as exterior glue plywood panels or adjacent concrete masonry units, adjacent edges cannot exceed 1/32” (0.8mm) difference in height. For thick bed (mortar bed) installations, maximum allowable variation in the installation substrate to be (1/4” in 10’ (6mm in 3m).
   5. Not leveled with gypsum or asphalt based compounds

B. Concrete surfaces shall be:
   1. Cured a minimum of 28 days at 70°F (21°C), including an initial seven (7) day period of wet curing;
   2. Wood float finished, or better, if the installation is to be done by the thin bed method;

C. Advise General Contractor and Architect of any surface or substrate conditions requiring correction before tile work commences. ***Beginning of work constitutes acceptance of substrate or surface conditions.***

3.4 INSTALLATION - EXTERIOR ADHERED VEENERS

A. **Pre-float Method (exterior adhered veneers):** Over clean, dimensionally stable and sound concrete and masonry substrates, apply latex-Portland cement thick-bed mortar as scratch/leveling coat in compliance with current revision of Masonry Veneer Manufacturer's Association (MVMA) "**Installation Guide for Adhered Concrete Masonry Veneer**" and/or veneer manufacturer's specific written installation instructions. Float surface of scratch/leveling coat plumb, true and allow mortar to set until firm. For installation of thin brick, masonry veneer, and stone, follow appropriate "**Exterior Adhered Veneers Method"** for **"Stacked Veneer" or "Pointed / Grouted"** veneer installations.

B. **Exterior Adhered Veneers (Tile Council of North America / Marble Institute of America Methodology):** Install latex Portland cement mortar in compliance with current revisions of ANSI A108.02 (3.11), A108.1B and ANSI A108.5. Use the appropriate trowel notch size to ensure proper bedding of the tile, brick or stone selected. Work the latex Portland cement mortar into good contact with the substrate and comb with notched side of trowel. Spread only as much latex Portland cement mortar as can be covered while the mortar surface is still wet and tacky. When installing large format (>8" x 8"/200mm x 200mm) tile/stone, rib/button/lug back tiles, pavers or sheet mounted ceramics/mosaics, spread latex Portland cement mortar onto the back of (i.e. 'back-butter') each piece/sheet in addition to trowelling latex Portland cement mortar over the substrate. Beat each piece/sheet into the latex Portland cement mortar with a beating block or rubber mallet to insure full bedding and flatness. Allow installation to set until firm. Clean excess latex Portland cement mortar from tile or stone face and joints between pieces.

C. **Exterior Adhered Veneers (Pointed/Grouted – Masonry Veneer Manufacturer's Association Methodology):** Moisten the back of each veneer unit and the top of the scratch coat so the surfaces appear damp but are free of standing water. Install masonry veneer adhesive mortar in compliance with current revisions of Masonry Veneer Manufacturer's Association (MVMA) "**Installation Guide for Adhered Concrete Masonry Veneer**" and/or veneer manufacturer's specific written installation instructions. Use the appropriate installation tools to ensure proper bedding of veneer unit. Work the masonry veneer adhesive mortar into good contact with the back of the veneer unit making sure the entire unit is buttered to a nominal ½" (12mm) thickness. DO NOT COVER JUST THE PERIMETER! Buttered masonry veneer units should be firmly worked onto the scratch coat and slid slightly back and forth or with a slight rotating motion. Allow installation to set until firm. Clean excess latex Portland cement mortar from masonry veneer or stone face and joints between pieces. Installing masonry veneer from the top down will minimize cleanup requirements.

D. **Exterior Adhered Veneers (Stacked Veneer - Masonry Veneer Manufacturer's Association Methodology):** Moisten the back of each veneer unit and the top of the scratch coat so the surfaces appear damp but are free of standing water. Install masonry veneer adhesive mortar in compliance with current revisions of Masonry Veneer Manufacturer's Association (MVMA) "**Installation Guide for Adhered Concrete Masonry Veneer**" and/or veneer manufacturer's specific written installation instructions. Use the appropriate installation tools to ensure proper bedding of veneer unit. Work the masonry veneer adhesive mortar into good contact with the back of the veneer unit making sure the entire unit is buttered to a nominal ½" (12mm) thickness. DO NOT COVER JUST THE PERIMETER! Buttered masonry veneer units should be firmly worked onto the scratch coat and slid slightly back and forth or with a slight rotating motion. Allow installation to set until firm. Clean excess latex Portland cement mortar from masonry veneer or stone face and joints between pieces. Tight fitted masonry veneer should be applied from the corners toward the middle of the wall, and from the bottom toward the top of the wall.

E. **Grouting or Pointing (Exterior Adhered Veneers):**
Pointing Mortar (for joints up to 1 1/4" (12mm): Allow thin brick, masonry, and stone installations to cure a minimum of 24 hours @ 70° F (21°C). Verify grout joints are free of dirt, debris or tile spacers. Sponge or wipe dust/dirt off veneer face and remove any water standing in joints. Surface temperature must be between 40-90° F (4-32°C). Use 2 quarts (1.9 L) of clean potable water for 25 lb. (11.4 kg) of LATICRETE® MVIS™ Premium Pointing Mortar. Place water in a clean mixing container and add mortar slowly. Mix with a slow speed mixer to a smooth stiff consistency. Allow mortar to slake for 5 minutes. Remix mortar. Pointing mortar/grout may be installed using a grout bag, filling the joints to the desired depth, ensuring the mortar is forced into all voids. The curing time will vary significantly with temperature and humidity. Once applied allow to firm to "thumbprint" hardness, trowel, rake and/or dry, soft bristled brush to the desired finish.

F. **Weeps / Pressure Equalization Vents:** To be designed and detailed by project architect / engineer. Most building codes permit weeps no less than 3/16 inch (5 millimeters) in diameter and spaced no more than 33 inches (840 millimeters) on-center. Wick and tube weep spacing recommended at no more than 16 inches (400 millimeters) on-center. Install weeps and/or vent tubes through movement joints, conforming to the size, type and composition specified and as per weep/vent manufacturer's recommendations, on 2 foot (600 millimeters) centers minimum, and at all locations indicated in shop drawings, plans and details. Ensure that all weeps and/or equalization tubes are properly placed to reach the waterproofing membrane and/or cavity they are designed to drain/vent, and are clear of dirt, debris, sealant or other obstructions.

G. **Expansion and Control Joints:** Provide control or expansion joints as located in contract drawings and in full conformity, especially in width and depth, with architectural details.

1. Substrate joints must carry through, full width, to surface of tile, brick, masonry veneer, or stone.
2. Install expansion joints in tile, brick, masonry veneer, or stone work over construction/cold joints or control joints in substrates.
3. Install expansion joints where tile, brick, masonry veneer, or stone abut restraining surfaces (such as perimeter walls, curbs, and columns), changes in plane and corners.
4. Joint placement depends on application – Follow the Masonry Veneer Manufacturers Association's (MVMA) Installation Guide and Detailing Options for Compliance with ASTM C1780.
5. Joint width: ≥ ⅛" (3mm) and ≤ 1" (25mm).
6. Joint width: depth ~2:1 but joint depth must be ≥ ⅛" (3mm) and ≤ ½" (12mm).

Layout (field defined by joints): 1:1 length: width is optimum but must be ≤ 2:1. Remove all contaminants and foreign material from joint spaces/surfaces, such as dirt, dust, oil, water, frost, setting/grouting materials, sealers and old sealant/backer. Use LATICRETE LATASIL™ 9118 Primer for underwater and permanent wet area applications, or for porous stone (e.g. limestone, sandstone etc…) installations. Install appropriate backing material (e.g. closed cell backer rod) based on expansion joint design and as specified in section 07 92 00. Apply masking tape to the ace of tile, brick or stone veneer. Use a caulking gun, or other applicator, to completely fill joints with sealant. Within 5-10 minutes of filling joint, 'tool' sealant surface to a smooth finish. Remove masking tape immediately after tooling joint. Wipe smears or excess sealant off the face of non-glazed tile, brick, stone or other absorptive surfaces immediately.

K. **Sealer (Exterior Adhered Veneers):**
Read entire label before using. Use only as directed. Always test in a small inconspicuous area with a 24-hour cure time to determine ease of application and desired results. Allow new grout installations to cure for 72 hours prior to application. Make sure the surface is clean and free of waxes and coatings. Sealer may be applied to damp surfaces one hour after standing water has been removed. Surface temperature is to be between 50 degrees Fahrenheit and 80 degrees Fahrenheit (10 degrees Celsius and 26.7 degrees Celsius). Ensure that the area is well-ventilated during application and until the surface is dry. Keep children and pets out of the area until the treated surface is dry.

1. Ensure cap is closed and sealed. Shake well before use.
2. Mask off surfaces not intended to be treated.
3. Liberally apply an even coat using a paint pad, paint brush, paint roller, or low-pressure solvent-resistant sprayer. Do not thin the sealer before using.
4. Allow sealer to penetrate the surface for 10–15 minutes; denser materials may require more time for the sealer to penetrate. During this time, distribute any excess sealer over the entire area to ensure even penetration.
5. Thoroughly wipe down the entire surface with a clean, dry cloth to completely remove all excess sealer from the surface. DO NOT ALLOW SEALER TO COMPLETELY DRY ON THE SURFACE.
6. A second coat may be needed for porous, absorbent surfaces. If a second coat is required, it should be applied one hour after the initial application as directed in steps 2 through 5.
7. If the sealer was not completely wiped off ant residue which appears, wipe entire surface with a towel dampened with sealer. Use a white, nylon pad to loosen residue and follow with a clean, white absorbent towel to remove.
8. Keep newly sealed installations free from contamination for 6 hours at 70 degrees Fahrenheit / 21 degrees Celsius.

9. A full cure is achieved in 24 to 72 hours at 70 degrees Fahrenheit / 21 degrees Celsius. Use of the treated surface may resume in 6–8 hours. If use of the surface must resume sooner, cover the treated surface with red rosin paper to protect it until full cure has been achieved.
10. Rags and equipment that are wet with sealer may be flammable. Clean up promptly after work is completed. Clean equipment with mineral spirits and allow it to dry in a well-ventilated area. Allow rags to dry in a well-ventilated area out of reach. When dry, dispose in accordance with local waste disposal regulations.

Recommended Surfaces: Brick; concrete / masonry; homogeneous granite; veined granite; unpolished, honed and textured limestone; quartzite, bluestone, sandstone, slate, and travertine

Storage and Handling Instructions: Avoid prolonged exposure to vapors. Use in a well-ventilated area. Do not ingest. Avoid contact with eyes and skin. KEEP OUT OF THE REACH OF CHILDREN. Do not freeze or store above 100 degrees Fahrenheit /38 degrees Celsius. Do not mix with other chemicals. Do not release to natural waterways.

L. **Adjusting:** Correction of defective work for a period of one (1) year following substantial completion, return to job and correct all defective work. Defective work includes, without limitation, tiles broken in normal abuse due to deficiencies in setting bed, loose tiles or grout, and all other defects which may develop as a result of poor workmanship.

3.5 CLEANING

Clean excess mortar/epoxy from veneer surfaces with water before they harden and as work progresses. Do not contaminate open grout/caulk joints while cleaning. Sponge and wash veneers diagonally across joints. Do not use acids for cleaning. Polish with clean dry cloth. Remove surplus materials and leave premises broom clean.

3.6 PROTECTION

A. Protect finished installation until Owner's final acceptance and under provisions of specifications.
B. Due to the slow rate of portland cement hydration and strength development at low temperatures, protect installations exposed to these conditions from traffic for longer than normal periods. Protection applies to the substrate, the installation of adhesives and joint grouts, post-installation (rain and temperature protection) until suitable cure, and also the storage and handling of the cladding material. Extend period of protection of tile work at lower temperatures, below 60°F (15°C), and at high relative humidity (>70% R.H.) due to retarded set times of mortar/adhesives. For every 18°F (10°C) below 70°F (21°C) installation materials take twice as long to cure. Large format tiles and stones also require longer curing periods in cooler temperature / high humidity environments.
B. Keep finished work undisturbed until full cure. Suitable protection is to be included in the scope of work.
C. Each component must reach a proper cure prior to installing the subsequent installation product.
D. Tent / shade and heat areas that will be subjected to the elements, or freezing temperatures, during installation and cure periods.
E. Protect newly installed exterior adhered veneer installations from direct exposure to rain for 7 days at 70 degrees Fahrenheit / 21 degrees Celsius. Protection and corrective action primarily requires temporary enclosures or tarpaulins prior to, during, and immediately after installation to shield from rain. If prolonged exposure occurs, surfaces that appear dry may be saturated internally and require testing to determine suitability of certain overlay substrates, membranes, and adhesives. Protection applies to the substrate, the installation of adhesives and joint grouts, post-installation (rain and temperature protection) until suitable cure, and also the storage and handling of the cladding material.
F. Replace, or restore, work of other trades damaged or soiled by work under this section.

PART 4 – HEALTH AND SAFETY

The use of personal protection such as rubber gloves, suitable dust masks, safety glasses and industrial clothing is highly recommended. Discarded packaging, product wash and waste water should be disposed of as per local, state or federal regulations.

END OF SECTION

SECTION 04400
STONEWORK – LIMESTONE CURBS, STEPS, EDGE BANDS, CHEEKWALLS, AND WALL CAPS

PART I – GENERAL

1.1 RELATED DOCUMENTS

Related documents include but are not limited to Drawings, Specifications, and General Provisions of the Contract; ASTM C-568, Standard Specification for Limestone Building Stone; ASTM C-97, Test Methods for Absorption and Bulk Specific Gravity of Building Stones; ASTM C-99, Test Method for Modulus of Rupture of Building Stone; ASTM C-170, Test Method for Compressive Strength of Building Stone; Indiana Limestone Association (ILI) – Indiana Limestone Handbook, latest edition; ILIA – How to Avoid Small Area Stains and Blemishes.

1.2 SUMMARY

1.2.1 Extent of limestone work is indicated on drawings and schedules.

1.2.2 General: Provide Limestone in accordance with the contract documents.

The work shall include the following:

Limestone
Mockups
Installation of stonework

1.2.3 Related work specified elsewhere:

Limestone Masonry Veneer
Cast-In-Place Concrete
Sealants

1.3 SYSTEM DESCRIPTION

1.3.1 General: Design, fabricate, and install stonework to withstand normal loads from wind, gravity, movement of structural support, and thermally induced movement, as well as to resist deterioration under conditions of normal use including exposure to weather, without failure.

1.3.2 Performance Requirements—General: The requirements shown by the general stone details are intended to establish basic dimensions of units or modules, plus profiles and sight lines for the stonework. Within these limitations, the contractor shall be responsible for the design of the stonework, and shall request approval of, and make whatever modifications and additions to the details as may be required to fulfill the performance requirements. The visual concept shall be maintained as shown, including profiles and alignment of components.

1.3.3 Performance Requirements—Stone

Physical Properties: Limestone physical properties shall meet or exceed the values listed in the ILI – Indiana Limestone Handbook, latest edition.

Safety Factors-Stone: Safety factors for Limestone shall be not less than as listed in the ILI – Indiana Limestone Handbook.

1.4 SUBMITTALS

1.4.1 Product Data: Submit manufacturer's technical data for all stone, stonework accessories, and other manufactured products required.

1.4.2 Shop Drawings: Submit cutting and setting drawings indicating sizes, dimensions, sections, and profiles of stones; arrangement and provisions for jointing, supporting, anchoring, and bonding stonework; and details showing relationship with, attachment to, and reception or, related work. The drawings shall include the details as developed by the design professional as defined in the performance requirements section. Include large scale details of decorative surfaces and inscriptions.

1.4.4 Samples: Submit the following samples: Limestone samples in form of sets of three, consisting of stones not less than 12" square. Sample sets will show a range of variations in color and grain to be expected in completed work. Sealant samples for each type and color of joint sealant required.

1.4.5 Data for Limestone stonework: For limestone stonework, submit the following data which has been signed and stamped by a qualified professional engineer registered in Missouri who thereby certifies preparing or supervising the preparation of the data to comply with the performance requirements and recognized engineering principles and practices:

Engineering calculations as defined in the performance section.

Connection details as defined in the performance section.

1.5 QUALITY ASSURANCE

1.5.1 Single Source Responsibility for Stone: Obtain limestone from a single quarry source with resources to provide materials of specified consistent quality. The fabricator and the quarry shall have sufficient capacity to quarry, cut, and deliver the stonework on schedule. Both fabricator and quarry must be members in good standing of Missouri Limestone Producers Association.

1.5.2 Single Source Responsibility for Mortar Materials: Obtain mortar ingredients of uniform quality and from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

1.5.3 Single Source Responsibility for Other Materials: Obtain each type of stone accessory, sealants, and other materials from one manufacturer for each product.

1.5.4 Information on Drawings and in Specifications establishes requirements for both aesthetic effects and performance of the limestone. Aesthetic effects are indicated by dimensions, arrangement, alignment and profiles of components and assemblies as they relate to sight lines and relationships to one another and to adjoining work. Performance is indicated by criteria that is subject to verification by either preconstruction or field test, if applicable, or by in service experience.

Do not modify intended aesthetic effects, as judged solely by landscape architect, except with landscape architect's approval and only to the extent exclusively needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to architect for review and approval.

1.5.5 Installer Qualifications: Engage an installer with not less than 10 years experience and who has successfully completed stonework similar in material, design and extent to that indicated for this project. Submit list of completed projects; include project names, addresses, and names of architects and owners.

1.5.6 Preconstruction Tests: Contractor shall obtain material tests as noted below:

Preconstruction Testing Service: Contractor shall employ and pay qualified independent testing laboratories to perform preconstruction testing indicated.

Test limestone for compliance with physical property requirements for Limestone Building Stone, Type II, as listed in ASTM C-568. Conduct tests using specimens randomly selected from, and representative of, actual materials proposed for incorporation in the work.

The following test reports shall be submitted:

ASTM C 99 Modulus of Rupture

ASTM C 170 Compressive Strength

1.5.7 Field-Constructed Mock-up: Prepare mock-ups for the stonework, as specified in the drawings. Purpose of mock-ups is further verification of selections made for color and finish under sample submittals and establishing standard of quality for aesthetic effects expected in completed work. Build mockups to comply with following requirements:

Locate mock-ups on site where indicated or, if not indicated, as directed by architect/engineer.

Build mock-ups containing elements typical of the stonework in this project. The extent of the mock-up shall be defined by this section.

Erect mock-ups only after notifying architect/engineer when construction will begin.

Retain mock-ups during construction as standard for judging completed stonework. When directed, demolish mock-ups and remove from site.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Deliver masonry materials to project in undamaged condition.

1.6.2 Store and handle stone and related materials to prevent their deterioration or damage:

Do not use pinch or wrecking bars on stonework.

Lift with wide-belt type slings where possible; do not use wire rope or ropes containing tar or other substances which might cause staining.

Store stone on non-staining wood skids or pallets, covered with non-staining, waterproof membrane. Place and stack skids and stone to distribute weight evenly and to prevent breakage or cracking of stones.

Store cementitious materials off the ground, under cover and in dry location.

1.7 PROJECT CONDITIONS

1.7.1 Protect stonework during erection as follows:

Cover top of stonework with non-staining waterproof sheeting at end of each day's work. Cover partially completed stonework installations when work is not in progress. Extend cover a minimum of 24" down both sides and hold securely in place.

Prevent staining of stone from mortar, grout, sealants, and other sources. Immediately remove such materials from stone without damage to the stonework.

Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.

1.7.2 Cold Weather Protection: Comply with the following requirements.

Remove ice or snow formed on stonework beds by carefully applying heat until top surface is dry to the touch.

Remove stonework damaged by freezing conditions.

Perform the following construction procedures while stonework is progressing:

Temperature ranges indicated apply to air temperatures existing at time of installations.

In heating mortar materials, maintain mixing temperatures selected within 10° F (6° C); do not heat water for mortar to above 160° F (71° C).

Mortar: At 40° F (4.4° C) and below, produce mortar temperatures between 40° F (4.4° C) and 120° F (49° C) by heating mixing water and, at temperatures of 32° F (0° C) and below, sand as well. Always maintain temperature of mortar on boards above freezing.

At 25° F (-4° C) to 20° F (-7° C), heat both sides of walls under construction using salamanders or other heat sources and use windbreaks or enclosures when wind is in excess of 15 mph.

At 20° F (-7° C) and below, provide enclosure and auxiliary heat to maintain an air temperature of at least 40° F (4.4° C) for 24 hours after setting stonework and heat stones so that they are above 20° F (-7° C) at time of installation.

PART II - PRODUCTS

2.1 MATERIALS - GENERAL

2.1.1 Comply with referenced standards and other requirements indicated applicable to each type of material required.

2.1.2 Provide stone from a single quarry for each grade, color, and finish of stone required.

2.1.3 Make quarried blocks available for inspection by architect/engineer.

2.2 LIMESTONE: Limestone Stone Standard: ASTM C568.

2.2.1 Classification: Category II (Medium Density).

2.2.2 Finish of Exterior Limestone, as follows:

Finish Limestone to match drawing instruction, approved samples and/or mock-ups of Limestone.

2.2.3 Furnish Stone in accordance with approved samples and jobsite mock-up for type, variety, grade (if applicable), color, and other characteristics relating to aesthetic effects.

2.2.4 Limestone Grade and Color: Provide color indicated below in accordance with grade and color classification established by ILI - Indiana Limestone Handbook.

a. Cottonwood - Top Ledge

2.3 MORTAR AND GROUT - GENERAL

2.3.1 Portland Cement: ASTM C 150, Type I except Type III may be used for cold weather construction. Provide gray or white cement as needed to produce mortar color required.

2.3.2 Hydrated Lime: ASTM C 207. Type S

2.3.3 Aggregate: ASTM C 144; and as indicated below:

For joints narrower than 1/4” use aggregate graded with 100 percent passing the No. 8 sieve and 95 percent the No. 16 Sieve.

2.3.4 Water: Clean, non-alkaline, and potable

2.3.5 Latex Modified Mortar

a. Latex-Portland Cement Mortar for thick beds, screeds, leveling beds and scratch/plaster coats: LATICRETE 3701 fortified Mortar Bed as manufactured by LATICRETE International, Inc., or approved equal.

b. Latex Portland Cement Thin Bed Mortar: LATICRETE 254 Platinum as manufactured by LATICRETE International, Inc., or approved equal.

c. Large, Heavy Tile Mortar (Medium Bed): LATICRETE MULTIMAX™ LITE as manufactured by LATICRETE International, Inc., or approved equal

2.4 STONE ACCESSORIES

2.4.1 Setting Shims: Lead, stainless steel, or plastic shims, non-staining to stone, sized to suit joint thicknesses and bed depths of stonework involved without intruding into required depths of joint sealants.

2.5 DAMPROOFING

2.5.1 Cementitious Dampproofing for Limestone: Non-staining, non-corrosive cementitious products recommended by ILI and compatible with joint sealants.

2.6 MORTAR AND GROUT - MIXES

2.6.1 General: Do not add mixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, anti-freeze compounds, or calcium chloride, unless otherwise indicated.

2.6.2 Mixing: Combine and thoroughly mix cementitious materials, water and aggregates in a mechanical batch mixer; comply with referenced ASTM standard for mixing time and water content, unless otherwise indicated.

2.6.3 Setting Mortar: Comply with ASTM C 270, Proportion Specification, for types of mortars and applications required below, unless otherwise indicated: Set Limestone with Type S mortar unless otherwise indicated.

2.7 STONE FABRICATION

2.7.1 General: Fabricate stonework in sizes and shapes required to comply with the requirements as shown on approved shop drawings.

2.7.2 Comply with recommendations of the MLPA.

2.7.3 Cut and drill sinkages and holes in stones for anchors, fasteners, supports, and lifting devices as indicated or needed to set stonework securely in place; shape beds to fit supports.

2.7.4 Cut stones to produce pieces of thickness, size, and shape indicated or required and within fabrication tolerances recommended by MLPA.

2.7.5 Thickness of Stone: Provide stone thicknesses required to comply with performance requirements but not less than shown on architectural drawings.

2.7.6 Control depth of stones and back-checks to maintain a clearance between backs of stones and surfaces or projections of structural members, fireproofing (if any), backup walls, and other work behind stones.

2.7.7 Cut joints (bed and vertical) straight and at 90° angle to face, unless otherwise indicated.

2.7.8 Quirk-miter corners, unless otherwise indicated; shall provide for cramp anchorage in top and bottom bed joints of corner pieces.

2.7.9 Cut stones to produce joints of uniform width and in locations indicated in drawings.

2.7.10 Contiguous Work: Provide chases, reveals, reglets, openings, and similar features as required to accommodate contiguous work.

2.7.11 Fabricate molded work, including washes and drips, to produce stone shapes having a uniform profile throughout their entire length and with precisely formed arises slightly eased to prevent snipping, and matched at joints between units.

2.7.12 Carve and cut decorative surfaces and inscriptions to conform with shaded drawings or models approved by architect. Use skilled stone carvers experienced in the successful performance of work similar to that indicated.

2.7.13 Finish exposed faces and edges of stones to comply with requirements indicated for finish under each type and application of stone required and to match approved samples and field-constructed mock-ups.

PART III - EXECUTION

3.1 EXAMINATION

3.1.1 Require installer to examine surfaces to receive stonework and conditions under which stonework will be installed and to report in writing any conditions which are not in compliance with requirements. Do not proceed with installation until surfaces and conditions comply with requirements indicated in specifications or elsewhere for execution of other work which affects stonework.

3.2 PREPARATION

3.2.1 Advise installers of other work about specific requirements relating to placement of inserts, flashing reglets and similar

items which will be used by stonework installer for anchoring, supporting and flashing of stonework. Furnish installers of other work with drawings or templates showing locations of these items. General contractor or concrete contractor will provide drawings to locate weld-plates and embeds for connection of stone skin or its system.

3.2.2 Clean stone surfaces which have become dirty or stained prior to setting to remove soil, stains and foreign materials. Clean stones by thoroughly scrubbing stones with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no acid, caustic, or abrasives.

3.2.3 Concrete substrate must be structurally sound, stable, and rigid enough to support stone and similar finishes. Substrate deflection under all live, dead and impact loads, including concentrated loads, must not exceed L/480 for stone installations where L=span length, except where local building codes or stone manufacturer specify more stringent deflection requirements.

3.2.4 Surfaces and ambient temperatures must be between 40˚F (4˚C) and 90˚F (32˚C) during installation and throughout the cure time.

3.2.5 Bonding surface must be clean and free of dirt, oil, grease, paint, concrete sealers, curing compounds, and other potential bond inhibiting contaminants.

3.2.6 Rough or uneven concrete surfaces should be made smooth with a latex modified mortar to provide a wood float (or better) finish. Dry, dusty concrete slabs should be dampened, and excess water swept off. Installation may be made on a damp surface but not in standing water or puddles.

3.2.7 Expansion Joints

a. Expansion Joints must be maintained from the substrate through the stonework from all construction or expansion joints in the substrate in accordance with project specifications, details, and industry standards (e.g. TCNA EJ-171 Movement Joint Guidelines for Ceramic, Glass and Stone). Do not cover substrate joints with mortar and/or stone.

3.3 SETTING STONE - GENERAL

3.3.1 Execute stonework by skilled mechanics, and employ skilled stone fitters at the site to do necessary field cutting as stones are set.

Use power saws to cut stones; for exposed edges, produce edges which are cut straight and true. Mallet and chisel will be permitted provided craftsmen are skilled in their use.

3.3.2 Contiguous Work: Provide chases, reveals, reglets, openings and other spaces as indicated for accommodating contiguous work. Close up opening in stonework after other work is in place with stonework which matches that already set.

3.3.3 Set stones to comply with requirements indicated on drawings and final shop drawings. Install anchors, supports, fasteners and other attachments indicated or necessary to secure stonework in place. Shim and adjust anchors, supports and accessories to set stones accurately in locations indicated with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.

3.3.4 Mix 3701 Fortified Mortar Bed to a stiff, semi-dry consistency by adding approximately 2 – 3.2 quarts (1.9 – 3 L) of water to a 60 lb. bag (27.2 kg) of 3701 Fortified Mortar Bed. The mortar should be able to pack into a ball but will crumble when squeezed. Just before placing mortar bed, apply a slurry bond coat approximately 1/16” (1.5 mm) thick, made from 254 Platinum, 254 Platinum Plus or MULTIMAX™ LITE mixed with water. While the slurry bond coat is still wet and tacky spread, screed, and ensure the mortar bed is well compacted to the appropriate elevation. Then allow to dry/cure for 24 hours prior to placing stone per “Direct Bond to Concrete and Hardened Mortar Bed” instructions above using 254 Platinum, 254 Platinum Plus or MULTIMAX™ LITE.

3.3.5 When placing stone immediately over a fresh mortar bed, apply another slurry bond coat of 254 Platinum, 254 Platinum Plus or MULTIMAX™ LITE to the surface of the fresh placed mortar bed and to the back of the stones. While the slurry bond coat is wet and sticky, place the stone and beat in well.

3.3.6 Grout joints between stones can be filled with Grout while placing stones or after 24 hour cure time. Refer to applicable product data sheets for mixing and installation instructions. Immediately remove mortar from the stone surface with a clean, damp sponge while mortar is fresh. Mortars will be difficult to remove once they dry on the surface.

3.3.7 Construction Tolerances: Set stones to comply with the following tolerances:

Variation from Plumb: For lines and surfaces of columns, wall and arises, do not exceed 1/4” in 10’, 3/8” in a story height or 20’ maximum, nor 1/2” in 40’ or more. For

external corners, expansion joints and other conspicuous lines do not exceed 1/4” in any story or 20’ maximum, nor 1/2” in 40’ or more.

Variation from Level: For grades indicated for exposed lintels, sills parapets, horizontal grooves and other conspicuous lines, do not exceed 1/2” in any bay or 20’ maximum, not 3/4” in 40’ or more.

Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2” in any bay or 20’ maximum, nor 3/4” in 40’ or more.

Variation in Cross-Sectional Dimensions: For columns and thickness of walls from dimensions indicated, do not exceed minus 1/4”, nor plus 1/2”.

Note: The tolerances in this section are masonry industry setting tolerances and are provided for the convenience of the specifier. As a production industry, the Indiana Limestone industry can not and does not control them.

3.3.8 Provide expansion joints, control joints, and pressure-relieving joints of widths and at locations indicated or required. Use no mortar or shims in expansion joints.

3.4 INSTALLATION OF JOINT SEALANTS

3.4.1 See Section 07900 Indiana Limestone Handbook for joint adjacent to plaza concrete.

3.5 DAMPROOFING

3.5.1 Coat limestone with cementitious dampproofing as follows:

Stone at Grade: Beds, joints, and back surfaces to at least 12 inches above finish-grade elevations.

Stone Extending below Grade: Beds, joints, back surfaces below grade.

Allow cementitious coatings to fully cure prior to setting stones in place.

Exercise due care when handling dampproofed stone to avoid chipping or off-setting of stones.

3.6 ADJUSTING AND CLEANING

3.6.1 Repairing Damaged Stone: Repair of stone may be permitted on a case by casa basis: is an accepted practice and will be permitted. Some chipping is expected; repair of small chips is not required if it does not detract from the overall appearance

of the work, or impair the effectiveness of the mortar or sealant. The criteria for acceptance of chips and repairs will be per standards and practices of the industry unless other criteria are mutually agreed upon by the limestone supplier and the architect.

3.6.2 Remove and replace stonework of the following description:

Stones so damaged that repair is impossible, either structurally or aesthetically.
Defective joints.
Stones and joints not in conformance with approved samples and field-constructed mock-ups.
Stonework not complying with other requirements indicated.

3.6.3 Replace in manner which results in stonework conforming to approved samples and field-constructed mock-ups, complying with other requirements and showing no evidence of replacement.

3.6.4 Clean stonework using clean water and stiff bristle fiber brushes. Do not use wire brushes, acid type cleaning agents, or other materials or methods which could damage stone. Mechanical or pressure cleaning methods may be used if approved by architect. Protect limestone when adjacent brick is being acid-washed.

3.7 PROTECTION

Provide final protection and maintain conditions, in a manner acceptable to fabricator and installer, which ensures stonework being without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 04410

STONE MASONRY VENEER - LIMESTONE

PART 1 -GENERAL

1.1 SUMMARY

A. Section includes:
Stone wall veneer anchored to concrete backup.

1.2 REFERENCES

A. ASTM A 123-02: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM C 97-02: Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.

C. ASTM C99/C99M - Standard Test Method for Modulus of Rupture of Dimension Stone

D. ASTM C 119-23: Terminology Relating to Dimension Stone

E. ASTM C 170-90 (1999): Test Method for Compressive Strength of Dimension Stone

F. ASTM C 270-03: Specification for Mortar for Unit Masonry

G. ASTM C 568: Specification for Limestone Dimension Stone

H. ASTM C 1242-03: Guide for the Selection, Design, and Installation of Exterior Dimension Stone Anchors and Anchoring Systems

I. ASTM C 1354-96: Test Method for Strength of Individual Stone Anchorages in Dimension Stone

J. Indiana Limestone Association (ILIA) - Indiana Limestone Handbook, latest edition.

K. ILIA - How to Avoid Small Area Stains and Blemishes

1.3 DEFINITIONS

A. Definitions contained in ASTM C 119 apply to this Section.

1.4 SUBMITTALS

A. Product Data: For each stone type and each manufactured product shown on Drawings or specified.
   1. For each stone variety used on Project, include physical property data.

B. Samples: Submit samples for each stone type required, exhibiting the full range of color characteristics expected.
   1. Submit a min. of 2 each, 12 inches x 12 inches in size, in each color and finish specified.
   2. In the case of more variegated stones, color photos shall be submitted in addition to the number of samples to show the full range of color and markings to be expected.
   3. Mortar Samples: Full range of exposed color and texture.

1.5 QUALITY ASSURANCE

A. Source Limitations for Stone: Obtain limestone quarried within 500 miles of the Project Site. Make available documentation as requested by the Design Professional.

B. Visual Mockup: Provide full sized mock-up of the approved stone or stones in the approved finishes. The approved mock-up shall become the standard for the project.
   1. Do not build-in mock-up panels as part of structure; locate mock-up panels in location that will not be disrupted during construction.
   2. Build mockup of stone veneer wall as shown on 'Drawings'.
   3. Size: Min. 6' Length x 2'Height (Exposed) x Wall Width per mock-up.
   4. Color consistency: demonstrate color consistency with mockup; color range shall not exceed range of color established by samples.
   5. Include typical components and anchors.
   6. Install two different options for mortar color per mockup.
   7. Demolish mockup and remove from site after completion of stone cladding work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store and handle materials to prevent deterioration or damage.
   1. Stone shall be carefully packed and loaded for shipment using reasonable care and customary precautions against damage in transit. Material, which may cause staining, or discoloration shall not be used for blocking or packing.

B. Properly store cementitious materials. Do not use damp cementitious materials.

C. Store masonry accessories, including metal items, to prevent corrosion and contamination.

1.7 PROJECT CONDITIONS

A. Protect stone as follows:
   1. At the end of each day's work, cover tops of walls with non-staining, waterproof covering. Protect partially finished work when not being worked on.
   2. Prevent staining of stone from mortar, grout, sealants, and other sources. Immediately remove such materials without damaging stone.
   3. Protect base of walls using coverings spread on ground and over wall surface.
   4. Protect sills, ledges, and other projections from mortar.

B. Cold-Weather Requirements: Comply with ACI 530.1/ASCE 6/TMS 602.

C. Hot-Weather Requirements: Comply with ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 STONE SOURCES

A. Stone Masonry Veneer shall come from a single quarry, with sufficient reserves to satisfy the requirements of the project. The limestone supplier shall have the capabilities to cut and finish the stone without delaying the project.

B. Stone Source Examination: Make quarried blocks available for examination by Design Professional.

C. Stone veneer shall match the size, color, and type used in the adjacent Phase One Mill Creek project.

2.2 STONE MATERIAL

A. Limestone: Complies with ASTM C568/C568M, Type II (Medium Density) Classification.
   1. Variety: Cottonwood – Top Ledge
   2. Absorption by Weight: 7.5 maximum percentage; ASTM C97/C97M.
   3. Density: 135 lbs/cu ft (2160 kg/cu m), minimum; ASTM C97/C97M.
   4. Compressive Strength: 4000 psi (28 MPa), minimum; ASTM C170/C170M.
   5. Modulus of Rupture: 700 psi (3.4 MPa), minimum; ASTM C99/C99M
   6. Limestone shall be free of cracks, seams, or starts, which may impair its structural integrity or function. Color or other visual characteristics indigenous to the particular material and adequately demonstrated in the sampling or mock-up phases will be accepted provided they do not compromise the structural or durability capabilities of the material. Texture and finish shall be within the range of samples approved by the Design Professional.

B. Match approved samples.

C. Stone Type: Limestone per Drawings
   1. Stone Variety: As specified on Drawings
   2. Location: Exterior wall
   3. Finish: As specified on Drawings
   4. Nominal Thickness: As specified on Drawings

2.3 MORTAR MATERIALS

A. Setting Mortar, Full Bed Veneer: ASTM C270, Proportion Specifications, Type S, non-staining, and in proportions as recommended by manufacturer.

B. Joint Width: Provide 3/8-inch minimum width, 3/4-inch maximum width.

C. Concave mortar joints, unless otherwise noted.

D. Portland Cement: ASTM C150/C150M, Type I.
   1. Provide gray or white cement as necessary for selected mortar color.
   2. For cold weather applications, use ASTM C150/C150M, Type III (high early strength).
   3. Mortar Color: Submit samples.

E. Hydrated Lime: ASTM C207, Type S (special hydrated lime for masonry purposes).

F. Aggregate: ASTM C144; for mortar joints narrower than 1/4 inch (6.4 mm) provide with 100 percent passing No. 8 Sieve and 95 percent passing No. 16 Sieve.

G. Water: Clean, non-alkaline, and potable.

H. Mixing: Combine and thoroughly mix cementitious materials, aggregates, and water in a mechanical batch mixer; comply with ASTM C305 for mixing time and water content, unless noted otherwise.

I. Do not add mixtures such as air-entraining agents, accelerators, retarders, water repellents, anti-freeze compounds, or calcium chloride, unless noted otherwise

J. Mortar Pigments: Natural and synthetic iron oxides. Use only pigments with a record of satisfactory performance in mortar and containing no carbon black.

K. Pigmented Mortar: Provide pigments to produce color required.
   1. Pigments shall not exceed 10 percent of portland cement by weight.
   2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
   3. Mix to match Design Professional's sample.

2.4 ANCHORS

A. General: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.

B. Types: Pins, dowels, clips, anchors, straps, tiebacks, bolts, washers, nuts, and other devices of type, size, and configuration required by delegated engineering or conditions.

C. Material: ASTM for stainless steel applicable to device, Type 304.

D. Cast-in-Place Concrete Inserts: 1. Material and Finish Product Quality Standards:
   1. Channels: ASTM A 666, Type 304 stainless steel.
   2. T-Bolts: ASTM F 738M, Type 304 stainless steel.
   3. Washers: ASTM A 240 or ASTM A 480, Type 304, stainless steel, dimensions and permissible variations according to ASTM F 436, Type 1 or ASME B18.22.1, Type A, flat; lock washers not acceptable.
   4. Stainless Steel Nuts: ASTM F 594, Group 1, Alloy 304, nylon inserts.

E. Post-Installed Anchor Bolts for Concrete and Masonry:
   1. Product Quality Standards: ACI 318, D.1 and ICC-ES AC193; approved for cracked concrete conditions when used in concrete that is cracked or may become cracked under connected load.
   2. Material and Finish: ASTM F 593, Group 1, Alloy 304 stainless steel.

F. Threaded Fasteners: Stainless steel heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers. 1. Bolts: ASTM F 593, Group 1, Alloy 304. 2. Nuts: ASTM F 594, Group 1, Alloy 304.

G. Dovetail Anchor Slots: Fabricated from stainless steel sheet, not less than 0.0336 in thick, with bent tab anchors. Prevent intrusion of concrete or debris into slots

2.5 STONE FABRICATION

A. Limestone Quarry: Quarry limestone in contiguously extracted, matching blocks from a single bed of quarry stratum in a manner to ensure fabricated limestone will match approved submittals; fabrication from random sequence of blocks not permitted.

B. Fabricate stone to comply with ILIA - Indiana Limestone Handbook, latest edition.

C. Fabricate stone to produce pieces indicated on Drawings.

D. Fabricate pieces of thickness, size, and shape as indicated or required for this Work within fabrication tolerances recommended by ILIA - Indiana Limestone Handbook, latest edition.

E. Clean sawed backs of stone, unless otherwise indicated.

F. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.

2.6 DAMPROOFING

A. Cementitious Dampproofing for Limestone: Non-staining, non-corrosive cementitious products recommended by ILI and compatible with joint sealants.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and conditions with Installer present.

B. Examine substrate to verify that dovetail slots, inserts, reinforcement, veneer anchors, and other items installed in substrates and required for or extending into stone masonry are correctly installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean surfaces that are dirty or stained. Scrub with fiber brushes, then drench with clear water. Use cleaning compounds recommended by manufacturer.

3.3 SETTING OF STONE MASONRY

A. Perform necessary field trimming as stone is set.
   1. Use hammer and chisel to split stone that is fabricated with split surfaces.
   2. Pitch face at field-split edges as needed to match stones that are not field split.

B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.

C. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.

D. Set stone to comply with requirements indicated on Drawings. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

E. Maintain uniform joint widths. Minor variations are required to maintain bond alignment.
   1. At narrowest points, joints not less than: 3/8 inch.
   2. At widest points, joints not more than: 3/4 inch.

F. Dampproofing
   1. Coat limestone with cementitious dampproofing as follows:
      a. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches above finish-grade elevations.
      b. Stone Extending below Grade: Beds, joints, back surfaces below grade.
   2. Allow cementitious coatings to fully cure prior to setting stones in place.
   3. Exercise due care when handling dampproofed stone to avoid chipping or off-setting of stones.

3.4 STONE MASONRY COURSING

A. See Drawings for Pattern.

3.5 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

B. Variation from Level: For top of wall, do not exceed 1/4 inch in 20 feet.

C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet or more

D. Measure variation from level, plumb, and position shown in plan as variation of the average plane of the face of each stone from level, plumb, or dimensioned plane.

E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.

3.6 ANCHORED MASONRY INSTALLATION

A. Anchor stone masonry to concrete and unit masonry with veneer anchors.

B. Embed veneer anchors in mortar joints of stone masonry.

C. Space anchors not more than 16 inches on-center vertically and 24 inches on-center horizontally. Install additional anchors within 12 inches of openings, joints, and perimeter of wall.

D. Set stone in full bed of mortar with full head joints. Build anchors into joints as stone is set.

E. Rake out joints for pointing with mortar to uniform depths.

3.7 POINTING

A. Remove dust and mortar particles from stone joints. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar.

B. Place and compact pointing mortar in layers not more than 3/8 inch deep.

C. Tool joints when pointing mortar is thumbprint hard to produce the following joint profile:
   1. Joint Profile: See Drawings.

3.8 ADJUSTING

A. Remove and replace damaged stone masonry. Repair stone masonry according to ILI – Repairing Damage to Indiana Limestone.

B. Remove and replace defective joints.

C. Remove and replace stone masonry not matching approved Samples and mock-ups.

D. Remove and replace stone masonry not complying with other requirements indicated.

E. Replace stone masonry to match approved Samples and mock-ups, comply with other requirements, and show no evidence of replacement.

3.9 CLEANING

A. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

B. Final Cleaning: Clean stone masonry according to
   1. ILI’s Indiana Limestone Handbook
   2. ILI’s How to Avoid Small Area Stains and Blemishes

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.

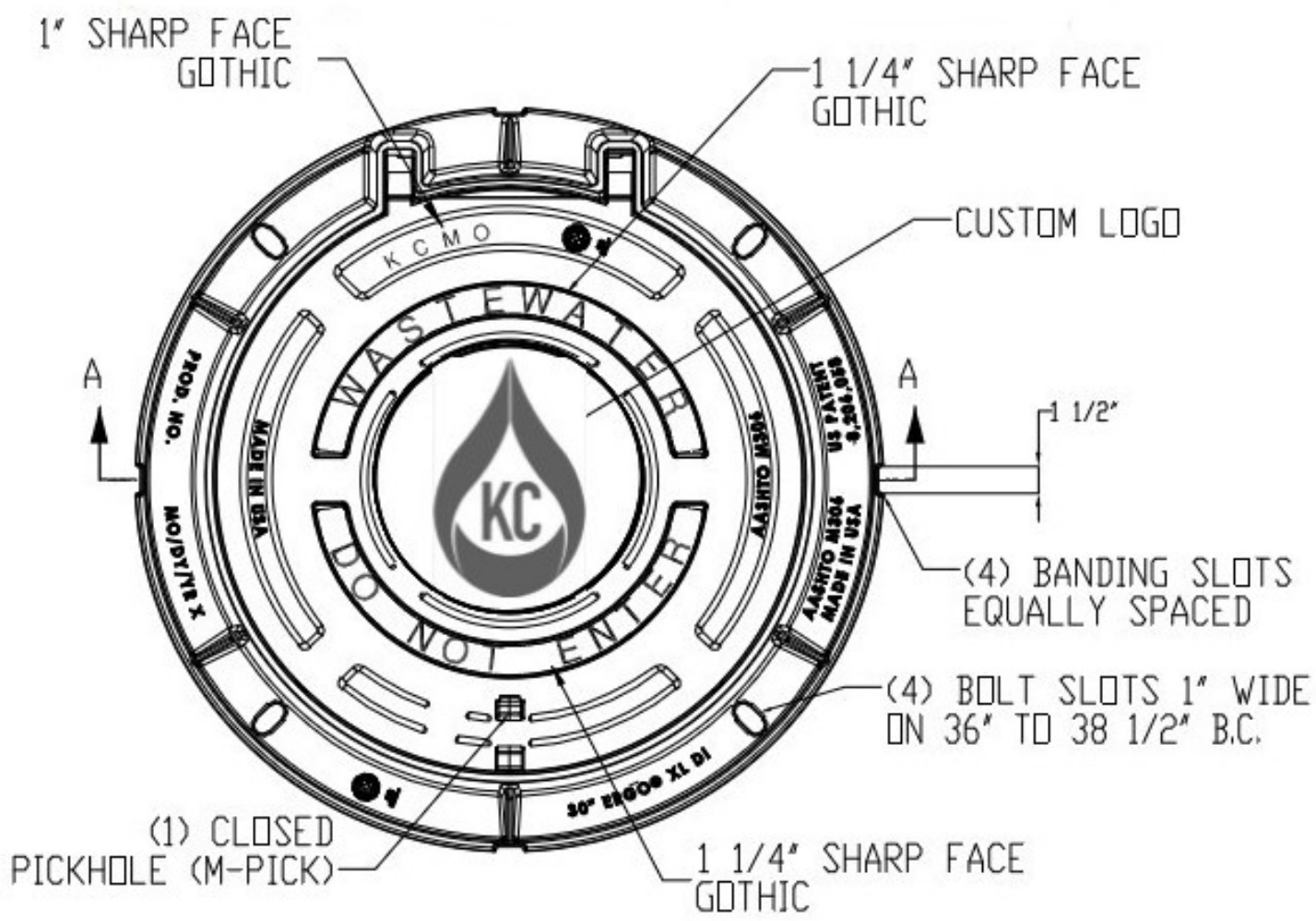


Figure 1: Standard Sanitary Sewer Manhole Markings
For Ductile Iron Castings

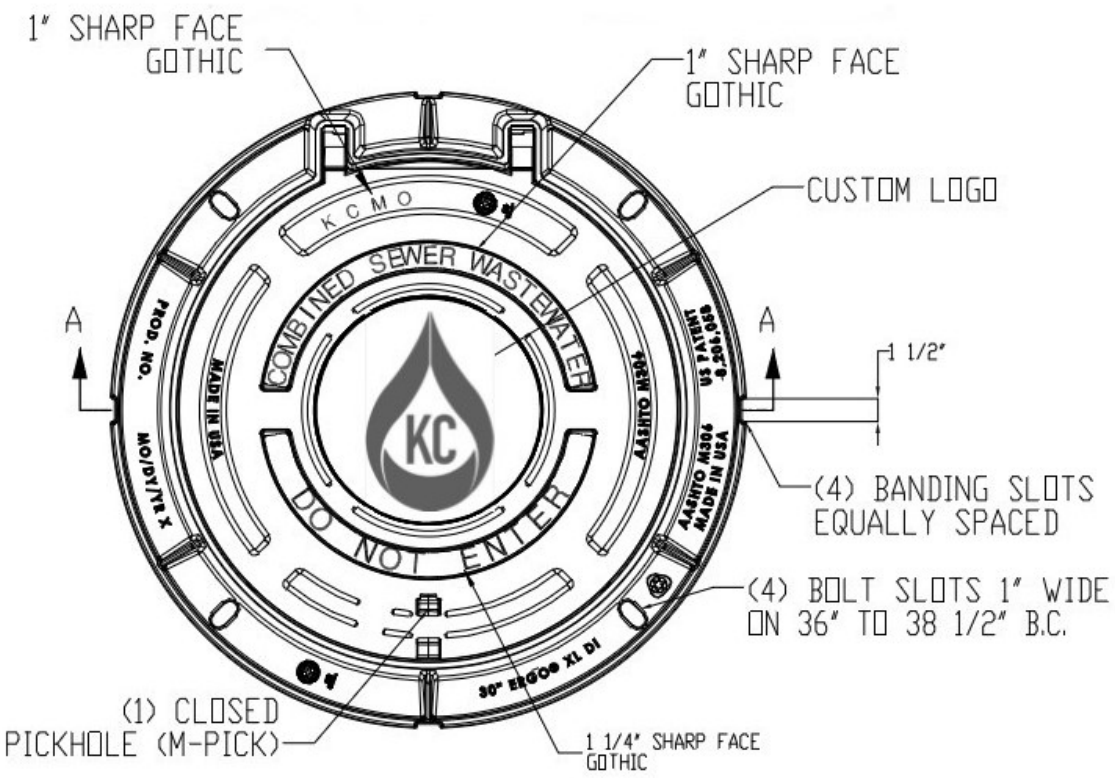


Figure 2: Optional Sanitary Sewer Manhole Markings
For Ductile Iron Castings
See Section 01015 – Specific Project Requirements

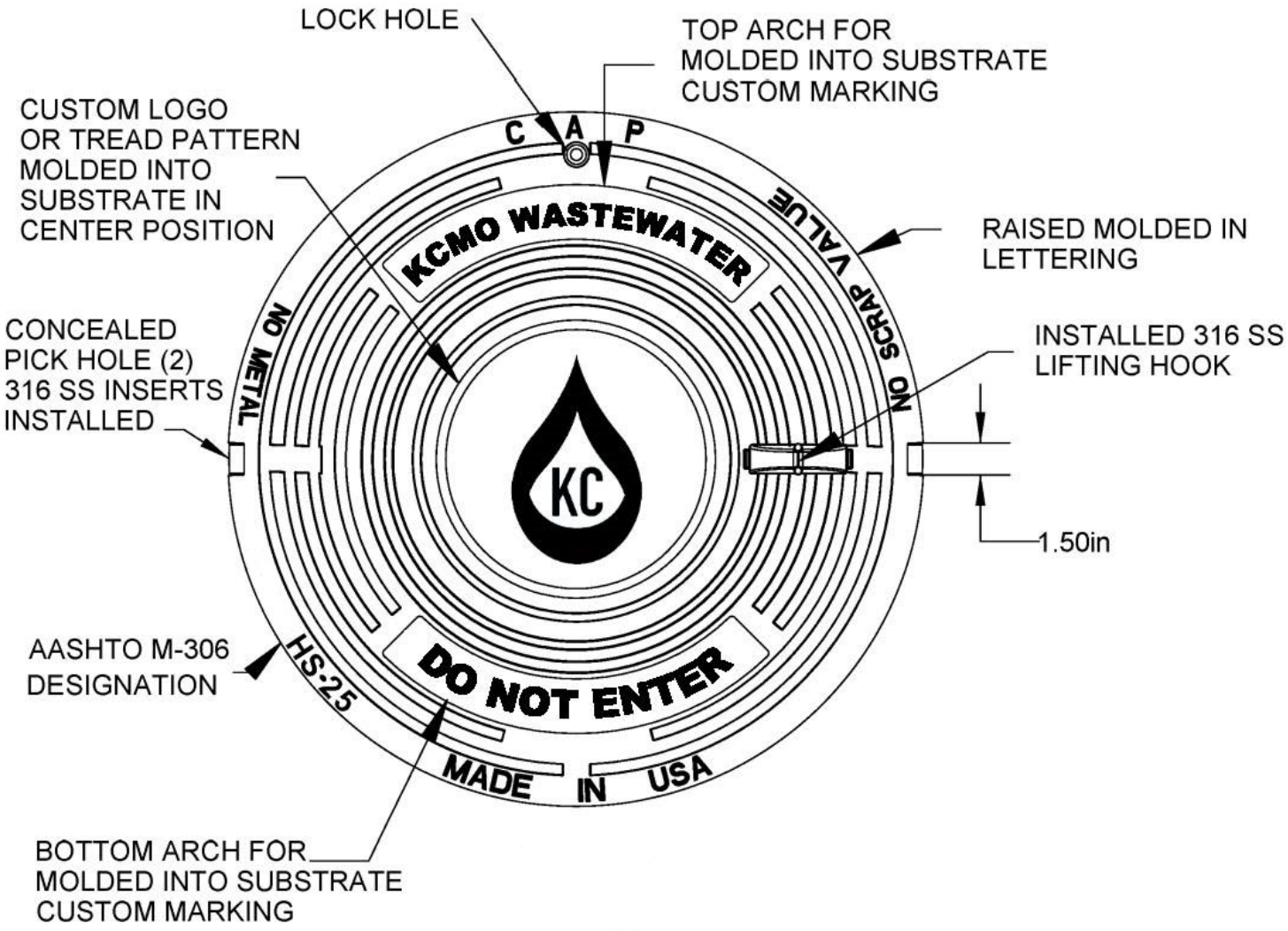


Figure 3: Standard Sanitary Sewer Manhole Markings
For Composite Castings

END OF SECTION

SECTION 05011 – STORMWATER CASTINGS

PART 1 - GENERAL

1.01 SUMMARY

A. This specification covers ductile iron castings for stormwater structures. Unless otherwise specified, all castings for stormwater structures shall have a clear opening of 30 inches and hinged covers.

1.02 DESCRIPTION

A. This specification is for stormwater ductile iron castings. Prior to the Contractor supplying castings, all manufacturers shall be approved as suppliers for the City of Kansas City, Missouri (City) and shall be able to demonstrate that there is an acceptable quality control program at the producing foundry.

1.03 SPECIFICATION MODIFICATIONS

A. It is understood that throughout this section these Specifications may be modified by appropriate items in Section 01015 – Specific Project Requirements or as otherwise indicated on the Contract Drawings.

1.04 RELATED SECTIONS

A. Section 01015 – Specific Project Requirements.
B. Section 01300 – Submittals.
C. Section 03370 – Sanitary Sewer Manhole Construction.

1.05 CODES AND STANDARDS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. The version of the codes and standards in effect at the time of the Notice to Bidders shall be used, except as noted on the Drawings or in the Specific Project Requirements section of these specifications.
B. American Association of State Highway and Transportation Offices (AASHTO):
   AASHTO M306 (Latest Revision) – Drainage, Sewer, Utility, and Related Castings.
   Standard Specifications for Highway Bridges.
C. American Society for Testing and Materials (ASTM) International:

ASTM A536	Standard Specification for Ductile Iron Castings.
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
ASTM C478	Standard Specification for Precast Reinforced Concrete Manholes Sections.

D. U.S. Environmental Protection Agency: Material Safety and Data Sheet.
E. Federal Register: 29 CFR 1910.1200 Hazard Communications.
F. Federal Standards:
   FED-STD-123 Marking for Domestic Shipment (Civilian Agencies).
G. United States Customs Service:
   Custom Regulation Chapter 1, Part 134, Article 19, U.S.C. 1304.

1.06 CONTACTOR SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals:
   1. Certified shop drawings for all castings, product data, manufacturer's catalog cut sheets, specifications and installation details.
   2. Casting identification and location:
      (a) Iron Casting submittals shall include a certification of conformance in accordance with AASHTO M306 (Part 9, Certification) and HS-25 loading.
      (b) A foundry certification shall be furnished stating that samples representing each lot have been tested, inspected and are in accordance with this specification.
   3. A manufacturer's affidavit certifying that the furnished castings comply with the provisions of these specifications, regardless of whether or not the purchaser has an inspector at the plant.
   4. All submittals shall be approved by the City before castings are ordered by the Contractor.

1.07 QUALITY ASSURANCE

A. The Contractor is responsible for the quality assurance and quality control of the work.
B. The Manufacturer shall guarantee items to be free of defects.
C. Manufacturer shall have a quality control process in place and shall provide a copy of their "Quality Control Manual."
D. The manufacturer shall keep records of all tests, MSDS sheets, foundry, lot records, product liability insurance and any customs documentation control data for a period of 3 years. The supplier agrees to furnish copies of records within two weeks after the receipt of request for such records.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Check materials upon arrival. Identify and segregate as to types, functions, and sizes. Store materials off of the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.
B. Unless otherwise specified on the purchase order, cleaning, preservation, and packaging of castings shall be in accordance with the manufacturer's commercial practice. Packing and marking shall also be adequate to ensure acceptance and safe delivery by the carrier for the mode of transportation employed.
C. If the number of the defective items exceeds two and one half percent of the lot, the purchaser will reject the remaining quantity in the lot and the supplier will redeliver the remaining quantity of the lot.
D. All castings shall be marked in accordance with the requirements of Federal Standard No. 123 and with Chapter 1, Part 134 of the United States Customs Service Regulations, including 19 U.S.C. 1304 paragraph, as applicable. Failure to conform to the above requirements will be just cause for rejection of castings.

PART 2 - PRODUCTS

2.01 DUCTILE IRON CASTINGS

A. Castings shall be manufactured and tested in accordance with ASTM A536 and AASHTO M306-10 HS-25 loading.

2.02 WORKMANSHIP AND FINISH

A. Castings shall be of uniform quality, free from all defects, holes, shrinkage, cracks and any other surface defect. Ductile iron castings shall be ground smooth and well cleaned by shot blasting. Runners, risers, fins, and other cast-on pieces shall be removed.
B. As-cast dimensions may vary by one half the maximum shrinkage possessed by the metal or ± 1/16 in/ft.
C. As-cast weight may vary by ±5 percent from the drawing/specification weight.
D. For traffic service castings, bearing surfaces between manhole rings and covers or grates and frames shall be cast or machined with such precision to prevent rocking.
E. Circular manhole frames and covers shall be furnished with machined horizontal bearing surfaces unless otherwise specified in the standard details.
F. In other matters of workmanship and finish, the castings shall conform to any points agreed upon by the City and the manufacturer/supplier.

2.03 MANHOLE FRAMES AND COVERS

A. Frames and covers shall be as specified and shall be of the type suitable for the application. The frames and covers shall be circular and the covers with vent holes.
B. Markings – See Figure 1 at the end of this section for approved markings.
C. The minimum clear opening shall be 30 inches for all castings for stormwater structures.
D. All covers shall have provisions for ease of opening, such as concealed pick holes.
E. All frames and covers shall be "Traffic Rated" in accordance with AASHTO M306 HS-25 Loading.
F. Unless specified in Section 01015 – Specific Project Requirements or noted on the contract drawings, cam locks are not required.
G. Special Requirements for Paved Areas:
    1. Definition: Areas subject to vehicular traffic. Includes, but is not limited to, all paved areas.
    2. All manhole frames and covers shall be adjustable and self- leveling. Frames and covers shall be adjustable to meet any slope and grade of the roadway (from 0 to 17 percent) and shall be able to be raised or lowered in ¼ inch increments, up to 2¼ inches. Ring height shall be adjustable after installation without disturbing the surrounding pavement.
    3. Acceptable manufactures include the following (or approved equal):
        (a) Hinged ErgoXL Self-Level Manhole Frame and Cover with Gasket Cover as manufactured by East Jordan.
        (b) PAMREX VIATOP (reference #CDVT6OQG) as manufactured by CertainTeed.
H. Special Requirement for Curb Inlets, Green Spaces and Un-Paved Areas:
    1. Areas that are not normally subject to vehicular traffic. Includes, but is not limited to, greenways, easements and curb inlets.
    2. Ductile iron covers shall be hinged with drain holes and incorporate 90 degree blocking system to prevent accidental closure.
    3. Flange shall incorporate bedding slots or bolt holes except castings for curb inlets.
    4. Acceptable manufacturers include the following (or pre-approved equal):
        (a) Pamrex models as manufactured by CertainTeed.
        (b) ErgoXL as manufactured by East Jordan.
        (c) ErgoXL TF as manufactured by East Jordan.

2.04 FRAME AND CHIMNEY SEALING SYSTEM

A. Per Section 03370 – Sanitary Sewer Manhole Construction.

PART 3 - EXECUTION

3.01 MANHOLE FRAMES AND COVERS

A. The Contractor shall coordinate the installation of the castings with the work of the other trades in order to avoid delays. Install inserts or anchors as required by individual items.
B. Install items as specified and in accordance with the manufacturer's instructions.
C. Install items plumb, level, in alignment and anchor securely. All manhole frames with hinged lids shall be anchored at four points.

3.02 CLEANING

A. Clean all items after installation to remove rust, dirt, oil, grease and other deleterious substances.
B. Clean all welds, bolted connections and abraded areas and apply the shop coating. Touch up damaged areas with the shop coating.

3.03 WARRANTY

A. All castings shall have a lifetime warranty against manufacture defects for all components.

Figure 1 on page 5.

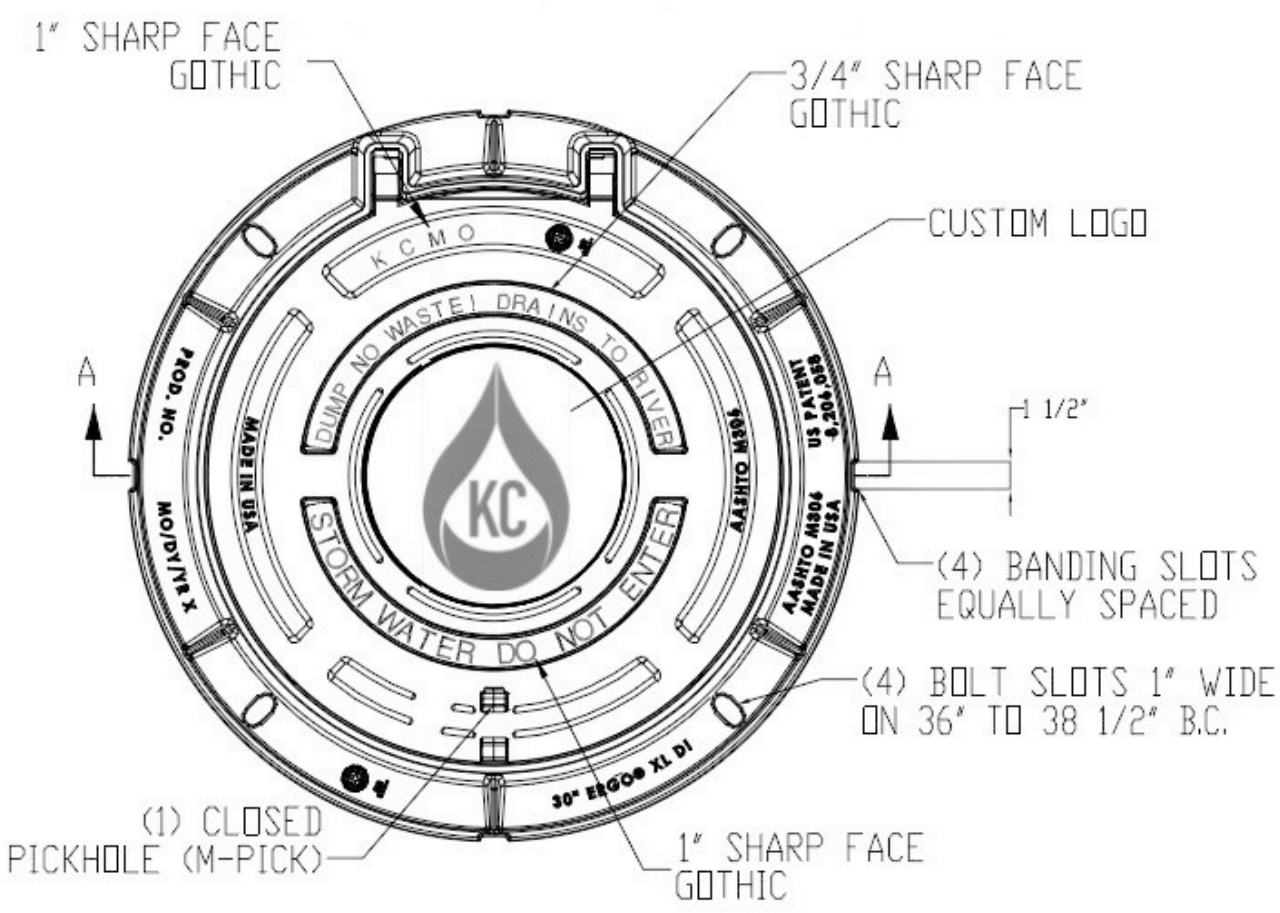


Figure 1: Standard Stormwater Markings

END OF SECTION

SECTION 05710
EXTERIOR METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stainless Steel Handrail, Stainless Steel Weir Edge Rail, and Powder Coated Steel Guardrail.
2. Engineering design of metal railing systems, including railings, guardrail, posts, post bases, and anchorage to concrete.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Architectural Manufacturers Association (AAMA):
   a. 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
2. U.S. Department of Justice, Architectural and Transportation Barriers Compliance Board (Access Board):
   a. Americans with Disabilities Act (ADA):
      1) Accessibility Guidelines for Buildings and Facilities (ADAAG).
3. ASTM International (ASTM):
   a. A36, Standard Specification for Carbon Structural Steel.
   b. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
   c. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   d. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
   e. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
   f. A276, Standard Specification for Stainless Steel Bars and Shapes.
   g. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
   h. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
   i. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
   j. D6386, Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
4. American Welding Society (AWS):
   a. D1.1, Structural Welding Code - Steel.
5. National Association of Architectural Metal Manufacturers (NAAMM):
   a. AMP 521, Pipe Railing Systems Manual.
6. Occupational Safety and Health Administration (OSHA):
   a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
7. Building Code:
   a. International Building Code, as adopted by the City of Kansas City, Missouri.

B. Qualify welding procedures and welding operators in accordance with AWS.

1.3 DEFINITIONS

A. Hardware: As defined in ASTM A153/A153M.

B. Galvanizing: Hot-dip galvanizing per ASTM A123/A123M or ASTM A153/A153M with minimum coating of 2.0 oz of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.

C. Guardrail: A system of building components located near the open sides of elevated walking surfaces for the purpose of minimizing the possibility of an accidental fall from the walking surface to the lower level.

D. Handrail: A horizontal or sloping rail intended for grasping by the hand for guidance or support.

E. Railing: A generic term referring to guardrail, handrail and/or stair rails.

F. Stair Rail: A guardrail, installed at the open side of stairways with either a handrail mounted to the inside face of the guardrail, or where allowed by applicable codes, with the top rail mounted at handrail height and serving the function of a handrail.

G. PVDF: Polyvinylidene fluoride.

1.4 SUBMITTALS

A. Shop Drawings:

1. Fabrication and/or layout drawings.
    a. Plan showing profile, location, section and details of each railing, and type and details of anchorage system.
    b. Location and type of expansion joints.
    c. Materials of construction including shop-applied coatings.
2. Product technical data including:
    a. Acknowledgement that products submitted meet requirements of standards referenced.
    b. Manufacturer's installation instructions.
3. Engineering Design:
    a. Engineering design of metal railing systems, including railings, posts, post bases, and anchorage to concrete, sealed by a Missouri Professional Engineer.
    b. Engineering design of independent concrete footings, where reinforced concrete support structures are not shown on the Drawings.
    c. Furnish design in accordance with Section 01357.

B. Samples:

1. Powder Coated Color Samples- Full Range

C. Informational Submittals:

1. Certification of welders and welding procedures indicating compliance with AWS.
2. Certification that railings have been designed and fabricated to meet the loading requirements specified.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver and handle railings to preclude damage.

B. Store railings on skids, keep free of dirt and other foreign matter which will damage railings or finish and protect from corrosion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Welded railing systems:
   a. Any manufacturer meeting this Specification Section.
2. Galvanizing repair paint:
   a. ZRC Products.
3. PVDF powder coating:
   a. PPG Duranar.
   b. Sherwin Williams.
   c. TCI Powder coating.
   d. TIGER Drylac.

2.2 MATERIALS

A. Pipe: ASTM A53, Types E or S, Grade B, or ASTM A501.

B. Steel Sheet, Bar (Pickets) and Plate: ASTM A36.

C. Stainless Steel Tubing and Pipe: ASTM A269, ASTM A312 or ASTM A554, Type 316.

D. Stainless Steel Bar and Plate: ASTM A276.

E. Galvanizing Repair Paint:
   1. High zinc dust content paint for regalvanizing welds and abrasions.
   2. Dried film shall contain not less than 95% zinc dust by weight.
   3. ZRC Products "ZRC."

F. Expansion and Adhesive Anchors: See Specification Section 03 15 19.

G. Welding Electrodes: AWS D1.1, E70 Series.

2.3 FABRICATION

A. General:
   1. Verify field conditions and dimensions prior to fabrication.
   2. For fabrication of items which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
      a. Remove blemishes by grinding and buffing or by welding and grinding, prior to cleaning, treating and application of surface finishes.
   3. Form exposed work with smooth, short radius bends, accurate angles and straight edges.
      a. Ease exposed edges to a radius of approximately 1/32 inches.
      b. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
   4. Form exposed connections with flush, smooth, hairline joints, using stainless steel splice locks to splice sections together or by welding.
   5. Provide for anchorage of type indicated on the Drawings or as required by field conditions.
      a. Drill or punch holes with smooth edges.

B. Design Requirements:
   1. Design railing and anchorage system in accordance with NAAMM AMP 521 to withstand loading as required by the Building Code.
      a. Design other railing system elements, including anchorage to concrete, in accordance with the Building Code.
   2. Design railings in accordance with accessibility requirements per the Building Code and ADAAG.

C. Custom fabricate pipe railings to dimensions and profiles indicated.
   1. Guardrails:

a. Top rails and intermediate rails: Schedule 40 or as shown in Drawings.
b. Vertical posts: Schedule 80 or as shown in Drawings

2. Handrails and Weir Edge Rail as shown in Drawings.
3. Vertical pickets: as shown in Drawings.
   a. Where details are not indicated, set vertical pickets to requirements of the building code or OSHA Standards, whichever requires the more restrictive design.
4. Space vertical posts as required by loading requirements. Do not space handrail posts more than 4 feet on-center.
   a. Avoid locating vertical posts at changes in direction of railing.
   b. Hold vertical post back from corner and provide radiused corners.
5. Base plate for vertical guardrail posts mounted to top of concrete surface:
   a. 3/8 x 6 x 6 inches square plate welded to the vertical post.
   b. Predrilled to accept four anchors.

D. Welded Railing Fabrication:

1. All welding to be continuous in accordance with AWS D1.1.
   a. All welded railing joints shall have full penetration welds.
2. All exposed welds to be ground and buffed smooth and flush to match and blend with adjoining surfaces.
   a. NAAMM AMP 521, Type 2.
3. No ragged edges, surface defects, or undercutting of adjoining surfaces will be accepted.
4. Fit exposed ends of guardrails and handrails with solid terminations.
   a. Return ends of handrails to wall but do not attach to wall.
5. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly of units at project site.

E. Install weeps to drain moisture from hollow sections of railing at exterior locations and in high humidity areas.

1. Drill 1/4 inches weep hole in railings closed at bottom:
   a. 1 inches above walkway surface at bottom of posts.
      1) 1 inches above solid rod at removable railing sections.
   b. At low point of intermediate rails.
   c. Drill hole prior to galvanizing.
   d. Do not drill weep holes:
      1) In bottom of base plate.

F. Expansion Joints:

1. Joints to be designed to allow expansion and contraction of railing and still meet design loads required.
   a. Top rail splices and expansion joints shall be located within 8 inches of post or other support.
   b. Where railings span wall or pavement expansion joints; provide a railing expansion joint in the span crossing the wall or pavement expansion joint.
2. Provide expansion joints in any continuous run exceeding 20 feet in length.
   a. Space expansion joints at not more than 40 feet on center.
3. Provide minimum 0.10 inches of expansion joint for each 20 feet length of top rail for each 25 DegF differential between installation temperature and maximum design temperature.
   a. Maximum expansion joint width at time of installation shall not exceed 3/8 inches.
      1) Provide additional expansion joints as required to limit expansion joint width.
4. Provide slip-joint with internal sleeve.

a. Extend slip joint min 2 inches beyond joint at maximum design width.
b. Fasten internal sleeve securely to one side
    1) Provide allen-head set screw located in bottom of rail.
    2) Rivets or exposed screw heads are not acceptable.

G. Finish:
1. Handrail and Weir Edge Rail: Stainless steel, No. 7 high luster.
2. Guardrail: Powder coated:
    a. Hot-dip galvanize after fabrication.
    b. Prepare galvanized surfaces in accordance with ASTM D6386.
    c. PVDF powder coating:
        1) Minimum 70% resin content.
        2) Meet requirements of AAMA 2605.
    d. Color: Submit Color Samples for selection and approval.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to installation, inspect and verify condition of substrate.

B. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation.

3.2 INSTALLATION

A. Install handrails, weir edge rails, and guardrails to meet loading requirements of the building code. Weir edge rails shall meet loading requirements for guardrails.

B. Install products in accordance with NAAMM AMP 521 and manufacturer's instructions.

C. Set work accurately in location, alignment and elevation; plumb, level, and true.
1. Measure from established lines and items which are to be built into concrete, masonry or similar construction.

D. Align railings prior to securing in place to assure proper matching at butting and expansion joints and correct alignment throughout their length.
1. Provide shims as required.

E. Install proper sized expansion joints based on temperature at time of installation and differential coefficient of expansion of materials in all railings as recommended by manufacturer.
1. Lubricate expansion joint splice bar for smooth movement of railing sections.

F. Anchor railings according to Drawings. Furnish and install engineering design of anchorage to concrete, sealed by a Missouri Professional Engineer, where anchorage details are not shown on the Drawings.

G. Repair damaged galvanized surfaces in accordance with ASTM A780.
1. Properly prepare surface in accordance with galvanizing repair paint manufacturer's recommendations.
2. Apply minimum 6 mils DFT of galvanizing repair paint in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 12310
SITE FURNISHINGS

PART 1 -GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, appurtenances, tools, equipment, and services for Site Furnishings, as indicated, and in accordance with Contract Documents.

B. Section includes, but not limited to:
   1. Litter Receptacles
   2. Decorative Bollards
   3. Relocated Benches

C. Completely coordinate with work of other trades.

1.2 QUALITY ASSURANCE

A. Source Limitations: When practicable, obtain site furnishing through one source from single manufacturer.

1.3 SUBMITTALS

A. Product Data:
   1. For each type of product indicated. Provide information showing complete detail, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors. Mark items requiring field assembly for erection identification and furnish erection drawings and instruction.

B. Samples:
   1. Initial Selection Samples: Submit manufacturer's standard colors, textures, and finishes available for each material used.
   2. Verification Sample: Submit representative samples of each material that is to be exposed in finish work, showing full rage of color and finish.

C. Project Information:
   1. Site Furnishings Schedule: For site furnishings use same designations indicated on Drawings when preparing Schedule.

D. Contract Closeout Information:
   1. Maintenance Data for Site Furnishings.

1.4 WARRANTY

A. Manufacturer's 1 year warranty covering repair or replacement resulting from defects in material or workmanship.

PART 2 -PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. LITTER RECEPTACLES
   1. Manufacturer: Victor Stanley
   2. Model RB-36
   3. Description: 36-gallon flared litter receptacle with tapered formed lid.
   4. Color/Mounting: per Drawings.

B. DECORATIVE BOLLARDS
   1. Manufacturer: Reliance Foundry
   2. Model- per Drawing
   3. Color/Mounting: per Drawings.

C. Other manufacturers desiring approval comply with Section 01630.

2.2 RELOCATED BENCHES

A. Existing benches shall be salvaged for re-use as noted in the Drawings.

2.3 MATERIALS - GENERAL

A. Anchors, Fasteners, Fittings, and Hardware:
   1. Manufacturer's standard, corrosion-resistant, coated or non-corrodible materials, commercial quality.
   2. Angle Anchors: For inconspicuously bolting legs of site furnishings to on or below grade substrate; one per leg as required.

B. Grout:
   1. Non-shrink, nonmetallic, premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM-C1107.
   2. Grout shall be for exterior applications.

C. Erosion Resistant Anchoring Cement:
   1. Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement.
      a. Formulation manufactured for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound.
      b. Resistant to erosion from water exposure without needing protection by sealer or waterproof coating.
   2. Anchoring cement shall be for exterior applications.

2.4 FABRICATION - GENERAL

A. Metal Components:
   1. Form to required shapes and sizes with true, consistent curves, lines, and angles.
   2. Separate dissimilar metal materials to prevent electrolytic action.

B. Welded Connections:
   1. Weld connections continuously.
   2. Weld solid members with full-length, full-penetration welds.
   3. Weld hollow members with full-circumference welds.
   4. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing.
   5. Welded surfaces shall match contours of adjoining surfaces.

C. Pipes and Tubes:

1. Form simple and compound curves by bending members in jigs.
2. Produce uniform curvature for each repetitive configuration required.
3. Maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of railing components.

D. Exposed Surfaces:
1. Polished, sanded, or otherwise finished.
2. Surfaces shall be smooth, free of burrs, barbs, splinters, and sharpness.
3. Edges and ends shall be rolled, rounded, or capped.

E. Factory Assembly:
1. Assemble components in factory to greatest extent possible to minimize field assembly.
2. Clearly mark units required for assembly infield.

2.5 FINISHES - GENERAL

A. Comply with NAAMM "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work:
1. Variations in appearance of abutting or adjacent pieces are acceptable only if they are within range of approved samples.
2. Noticeable variations in same piece are not acceptable.
3. Variations in appearance of other components are acceptable if they are within the range of approved samples.
4. Assemble or install to minimize contrast.

2.6 STEEL AND GALVANIZED STEEL FINISHES

A. Baked Enamel, Powder Coat Finish: Manufacturer's standard, baked, polyester, powder coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC plastisol finish, with flame retardant added.
1. Comply with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

PART 3 -EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated or in-ground installation required, install site furnishings after landscaping and paving have been completed.

C. Field verify location of site furnishings with Landscape Architect Prior to installation.

D. Install site furnishings level, plumb, true, and positioned at locations indicated on Drawings.

E. Any damage to the finish of the relocated benches shall be repaired per the original manufacturer’s instructions.

3.3 CLEANING

A. After completing site furnishing installation, inspect components.

B. Remove spots, dirt, and debris.

C. Repair damaged finishes to match original finish or replace component.

-- End of Section --

SECTION 260500
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:

1. Basic requirements for electrical systems.
2. Electrical equipment support pedestals and/or racks.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
2. Section 260533 - Raceways and Boxes for Electrical Systems.

1.2 REFERENCES

A. Definitions

1. For the purposes of providing materials and installing electrical work the following definitions shall be used.
   a. Outdoor area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
   b. Corrosive area: Areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.
   c. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

B. Referenced Standards:

1. Aluminum Association (AA):
   a. ADM, Aluminum Design Manual.
2. American National Standards Institute (ANSI).
3. ASTM International (ASTM):
   a. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   b. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   a. C2, National Electrical Safety Code (NESC).
5. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).

6. National Electrical Manufacturers Association (NEMA).
7. Underwriters Laboratories, Inc. (UL).

C. Products to be listed by a Nationally Recognized Testing Laboratory (NRTL) in accordance with applicable product standards.

1. Applicable product standards including, but not limited to, ANSI, FM, IEEE, NEMA and UL.
2. NRTL includes, but is not limited to, CSA Group Testing and Certification (CS), FM Approvals LLC (FM), Intertek Testing Services NA, Inc. (ETL), and Underwriters Laboratories, Inc. (UL).

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination

1. Coordinate installation of the electric service the serving utility.
   a. The serving utility for this Project is Evergy.
   b. Provide the electric service as indicated on the Drawings and per the serving utility's electric service standards.

1.4 SUBMITTALS

A. General requirements applicable to all Division 26 specifications:

1. See Specification Section 01330 for requirements for:
   a. The mechanics and administration of the submittal process.
   b. The content process of Submittals.

B. Requirements applicable to this Specification Section:

1. Shop Drawings:
   a. Concrete and reinforcing steel, per Division 3 requirements.
2. Product Data:
   a. Provide submittal data for all products specified in PART 2 of this Specification Section.

1.5 OPERATION AND MAINTENANCE DATA

A. General requirements applicable to all Division 26 specifications:

1. See Specification Section 01782 for requirements for:
   a. The mechanics and administration of the submittal process.
   b. The content process of Operation and Maintenance Manuals.

B. No Operation and Maintenance Data submittal is required for this Specification Section.

C. When a Specification Section includes products specified in another Specification Section, each Specification Section shall have the required Shop Drawing transmittal form per

Specification Section 01330 and all Specification Sections shall be submitted simultaneously.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect nameplates on electrical equipment to prevent defacing.

1.7 AREA DESIGNATIONS

A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.

1. Outdoor areas:

a. Wet.

b. Also, corrosive when specifically designated on the Drawings or in the Specifications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, refer to specific Electrical Specification Sections and specific material paragraphs below for acceptable manufacturers.

B. Provide all components of a similar type by one (1) manufacturer.

2.2 MATERIALS

A. Electrical Equipment Support Pedestals and/or Racks:

1. Manufacturers:

a. Modular strut:

1) Unistrut Building Systems.

2) B-Line by Eaton.

3) Globe Strut.

4) Superstrut by Thomas & Betts.

2. Material requirements:

a. Modular strut:

1) Aluminum: AA Type 6063-T6.

b. Mounting hardware:

1) Stainless steel.

c. Anchorage per Division 3.

d. Concrete and reinforcing steel: See Division 3 specifications.

B. Equipment pads (interior and exterior):

1. Concrete and reinforcing steel: See Division 3 specifications.

C. Field touch-up of galvanized surfaces.

1. Zinc-rich primer.

a. One coat, 3.0 mils, ZRC by ZRC Products.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Install and wire all equipment, including pre-purchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specification Sections and ensure that equipment is ready and safe for energization.

B. Install equipment in accordance with the requirements of:

1. NFPA 70.
2. IEEE C2.
3. The manufacturer's instructions.

C. In general, conduit routing is not shown on the Drawings.

1. The Contractor is responsible for routing all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.
2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.

D. When complete branch circuiting is not shown on the Drawings:

1. A homerun indicating panelboard name and circuit number will be shown and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.
2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.
3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.
4. See Section 260519 for combining multiple branch circuits in a common conduit.

E. Do not use equipment that exceeds dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70.

F. Install equipment plumb, square and true with construction features and securely fastened.

G. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operation and maintenance requirements of other equipment.

H. Avoid interference of electrical equipment operation and maintenance with structural members, building features and equipment of other trades.

1. When it is necessary to adjust the intended location of electrical equipment, unless specifically dimensioned or detailed, the Contractor may make adjustments of up to 3 inches in equipment location with the Engineer's approval.

I. Provide electrical equipment support system per the following area designations:

1. Wet and/or corrosive areas:

a. Aluminum system consisting of aluminum channels and fittings with stainless steel nuts and hardware.

J. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the manufacturer.

1. See Division 3.
2. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.

K. Provide non-metallic corrosion resistant spacers to maintain 1/4 inches separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Basins, Clarifiers, Digesters, Reservoirs, etc.

L. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.

M. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.

N. Provide field markings and/or documentation of available short-circuit current (available fault current) and related information for equipment as required by the NFPA 70 and other applicable codes.

O. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.

3.2 FIELD QUALITY CONTROL

A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.

B. Replace equipment and systems found inoperative or defective and re-test.

C. The protective coating integrity of support structures and equipment enclosures shall be maintained.

1. Repair galvanized components utilizing a zinc rich paint.
2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
3. Repair surfaces which will be inaccessible after installation prior to installation.
4. See Specification Section 260533 for requirements for conduits and associated accessories.

D. Replace nameplates damaged during installation.

END OF SECTION

SECTION 260519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for:
   a. Building wire.
   b. Control cable.
   c. Instrumentation cable.
   d. Wire connectors.
   e. Insulating tape.
   f. Pulling lubricant.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 260500 - Common Work Results for Electrical.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Insulated Cable Engineers Association (ICEA):
   a. S-58-679, Standard for Control Cable Conductor Identification.
2. National Electrical Manufacturers Association (NEMA):
   a. ICS 4, Industrial Control and Systems: Terminal Blocks.
3. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):
   a. WC 57/S-73-532, Standard for Control Cables.
   b. WC 70/S-95-658, Non-Shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
4. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
5. Underwriters Laboratories, Inc. (UL):
   a. 44, Standard for Safety Thermoset-Insulated Wires and Cables.
   b. 83, Standard for Safety Thermoplastic-Insulated Wires and Cables.
   c. 467, Standard for Safety Grounding and Bonding Equipment.
   d. 486A, Standard for Safety Wire Connectors and Soldering Lugs for use with Copper Conductors.
   e. 486C, Standard for Safety Splicing Wire Connections.
   f. 510, Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
   g. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

h. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.

i. 2250, Standard for Safety Instrumentation Tray Cable.

1.3 DEFINITIONS

A. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.

B. Instrumentation Cable:

1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
2. The following are specific types of instrumentation cables:
   a. Analog signal cable:
      1) Used for the transmission of low current (e.g., 4-20mA DC) or low voltage (e.g., 0-10 VDC) signals, using No. 16 AWG and smaller conductors.
      2) Commonly used types are defined in the following:
         a) TSP: Twisted shielded pair.

C. Control Cable: Multi-conductor, insulated, with outer sheath containing building wires, No. 14, No. 12 or No. 10 AWG.

D. Building Wire: Single conductor, insulated, with or without outer jacket depending upon type.

1.4 SUBMITTALS

A. Product Data:

1. Provide submittal data for all products specified in PART 2 of this Specification Section.
2. See Section 260500 for additional requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Building wire and control cable:
   a. Aetna Insulated Wire.
   b. Alphawire.
   c. Cerrowire.
   d. Encore Wire Corporation.
   e. General Cable.
   f. Okonite Company.
   g. Southwire Company.
2. Instrumentation cable:
   a. Analog cable:
      1) Alphawire.
      2) Belden Inc.
      3) General Cable.

3. Wire connectors:
   a. Burndy Corporation.
   b. Buchanan.
   c. Ideal.
   d. Ilsco.
   e. 3M Co.
   f. Teledyne Penn Union.
   g. Thomas and Betts.
   h. Phoenix Contact.
4. Insulating and color coding tape:
   a. 3M Co.
   b. Plymouth Bishop Tapes.
   c. Red Seal Electric Co.

2.2 MANUFACTURED UNITS

A. Building Wire:

1. Conductor shall be copper with 600 V rated insulation.
2. Conductors shall be stranded, except for conductors used in lighting and receptacle circuits which may be stranded or solid.
3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 for type XHHW-2 insulation.

B. Control Cable:

1. Conductor shall be copper with 600 V rated insulation.
2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
3. Conform to NEMA/ICEA WC 57/S-73-532 and UL 44 and UL 1277 for type XHHW-2 insulation with an overall PVC jacket.
4. Number of conductors as required, provided with or without bare ground conductor of the same AWG size.
   a. When a bare ground conductor is not provided, an additional insulated conductor shall be provided and used as the ground conductor (e.g., 6/c No. 14 w/g and 7/c No. 14 are equal).
5. Individual conductor color coding:
   a. ICEA S-58-679, Method 1, Table E-2.
   b. See PART 3 of this Specification Section for additional requirements.
6. Conform to NFPA 70 Type TC.

C. Electrical Equipment Control Wire:

1. Conductor shall be copper with 600 V rated insulation.
2. Conductors shall be stranded.

3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
4. Conform to UL 44 for Type SIS insulation.
5. Conform to UL 83 for Type MTW insulation.

D. Instrumentation Cable:

1. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
2. Analog cable:
   a. Tinned copper conductors.
   b. 300 V or 600 V PVC insulation with PVC jacket.
   c. Twisted with 100% foil shield coverage with drain wire.
   d. Individual conductor color coding: ICEA S-58-679, Method 1, Table E-2.
   e. Conform to UL 2250, UL 1581 and NFPA 70 Type ITC.

E. Wire Connectors:

1. Twist/screw on type:
   a. Insulated pressure or spring type solderless connector.
   b. 600 V rated.
   c. Ground conductors: Conform to UL 486C and/or UL 467 when required by local codes.
   d. Phase and neutral conductors: Conform to UL 486C.
2. Mechanical screw type:
   a. 600 V rated.
   b. Ground conductors: Conform to UL 467.
   c. Phase and neutral conductors: Conform to UL 486A.
3. Terminal block type:
   a. High density, screw-post barrier-type with white center marker strip.
   b. 600 V and ampere rating as required, for power circuits.
   c. 600 V, 20 ampere rated for control circuits.
   d. 300 V, 15 ampere rated for instrumentation circuits.
   e. Conform to NEMA ICS 4 and UL 486A.

F. Insulating and Color Coding Tape:

1. Pressure sensitive vinyl.
2. Premium grade.
3. Heat, cold, moisture, and sunlight resistant.
4. For cold weather or outdoor location, tape must also be all-weather.
5. Color:
   a. Insulating tape: Black.
   b. Color coding tape: Fade-resistant color as specified herein.
6. Comply with UL 510.

G. Pulling Lubricant: Cable manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Permitted Usage of Insulation Types:

1. Type XHHW-2:
   a. Building wire and control cable in conduit in outdoor areas and below grade.
2. Type SIS and MTW:
   a. For the wiring of control equipment within control panels and field wiring of control equipment within switchgear, switchboards, motor control centers.

B. Conductor Size Limitations:

1. Feeder and branch power conductors shall not be smaller than No. 12 AWG unless otherwise indicated on the Drawings.
2. Control conductors shall not be smaller than No. 14 AWG unless otherwise indicated on the Drawings.
3. Instrumentation conductors shall not be smaller than No. 18 AWG unless otherwise indicated on the Drawings.

C. Color Code All Wiring as Follows:

1. Building wire:

	240 V, 208 V, 240/120 V, 208/120 V	480 V, 480/277 V
Phase 1	Black	Brown
Phase 2	Red *	Orange
Phase 3	Blue	Yellow
Neutral	White	White or Gray
Ground	Green	Green

* Orange when it is a high leg of a 120/240 V Delta system.

   a. Conductors No. 6 AWG and smaller: Insulated phase, neutral and ground conductors shall be identified by a continuous colored outer finish along its entire length.
2. Control cables ICEA S-58-679, Method 1, Table E-2:
   a. When a bare ground is not provided, one of the colored insulated conductors shall be re-identified by stripping the insulation from the entire exposed length or using green tape to cover the entire exposed length.

b. When used in power applications the colored insulated conductors used as phase and neutral conductors may have to be re-identified with 3 inches of colored tape, per the Table herein, applied at the terminations.

D. Install all wiring in raceway unless otherwise indicated on the Drawings.

E. Feeder, branch, control and instrumentation circuits shall not be combined in a raceway, cable tray, junction or pull box, except as permitted in the following:

1. Where specifically indicated on the Drawings.
2. Where field conditions dictate and written permission is obtained from the Engineer.
3. Control circuits shall be isolated from feeder and branch power and instrumentation circuits but combining of control circuits is permitted.
   a. The combinations shall comply with the following:
      1) 12 VDC, 24 VDC and 48 VDC may be combined.
      2) 125 VDC shall be isolated from all other AC and DC circuits.
      3) AC control circuits shall be isolated from all DC circuits.
4. Instrumentation circuits shall be isolated from feeder and branch power and control circuits but combining of instrumentation circuits is permitted.
   a. The combinations shall comply with the following:
      1) Analog signal circuits may be combined.
5. Multiple branch circuits for similar loads may be combined in a common raceway, such as multiple lighting circuits or multiple receptacle circuits or other 120Vac circuits. Do not combine lighting and receptacle circuits.
   a. Do not combine control device circuits with lighting or receptacle circuits.
   b. Contractor is responsible for making the required adjustments in conductor and raceway size, in accordance with all requirements of the NFPA 70, including but not limited to:
      1) Up sizing conductor size for required ampacity de-ratings for the number of current carrying conductors in the raceway.
      2) The neutral conductors may not be shared.
      3) Up sizing raceway size for the size and quantity of conductors.

F. Ground the drain wire of shielded instrumentation cables at one end only.

1. The preferred grounding location is at the load (e.g., control panel), not at the source (e.g., field mounted instrument).

G. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.

1. Feeder and branch power circuits:

a. Device outlet boxes:

1) Twist/screw on type connectors pre-filled with epoxy for use on No. 8 and smaller wire.

b. Junction and pull boxes and wireways:

1) Twist/screw on type connectors pre-filled with epoxy for use on No. 8 and smaller wire.

c. Manholes or handholes:

1) Twist/screw on type connectors pre-filled with epoxy for use on No. 8 AWG and smaller wire.

2. Control circuits:

a. Junction and pull boxes: Terminal block type connector.

b. Manholes or handholes: Twist/screw on type connectors pre-filled with epoxy.

c. Control panels: Terminal block or strips provided within the equipment or field installed within the equipment by the Contractor.

3. Instrumentation circuits can be spliced where field conditions dictate and written permission is obtained from the Engineer.

a. Maintain electrical continuity of the shield when splicing twisted shielded conductors.

b. Junction and pull boxes: Terminal block type connector.

c. Control panels: Terminal block or strip provided within the equipment or field installed within the equipment by the Contractor.

4. Non-insulated compression and mechanical screw type connectors shall be insulated with tape or hot or cold shrink type insulation to the insulation level of the conductors.

H. Insulating Tape Usage:

1. For insulating connections made in cold weather or in outdoor locations: 8.5 mil, all weather vinyl tape.

I. Color Coding Tape Usage: For color coding of conductors.

END OF SECTION

SECTION 260526
GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for grounding and bonding system(s).

B. Related Specification Sections include but are not necessarily limited to:

1. Section 260500 - Common Work Results for Electrical.
2. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
3. Section 260533 - Raceways and Boxes for Electrical Systems.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
   a. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   a. 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.
3. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
4. Underwriters Laboratories, Inc. (UL):
   a. 467, Grounding and Bonding Equipment.

B. Assure ground continuity is continuous throughout the entire Project.

1.3 SUBMITTALS

A. Product Data.

1. Provide submittal data for all products specified in PART 2 of this Specification Section.
2. See Section 260500 for additional requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Ground rods and bars and grounding clamps, connectors and terminals:
   a. ERICO by Pentair.

b. Harger Lightning & Grounding.
c. Heary Bros. Lightning Protection Co. Inc..
d. Burndy by Hubbell.
e. Robbins Lightning, Inc.
f. Blackburn by Thomas & Betts.
g. Thompson Lightning Protection, Inc.

2.2 COMPONENTS

A. Wire and Cable:

1. Bare conductors: Soft drawn stranded copper meeting ASTM B8.
2. Insulated conductors: Color coded green, per Section 26 05 19.

B. Conduit: As specified in Section 260533.

C. Ground Rods:

1. 3/4 inches x 10 feet.
2. Copper-clad:
   a. 10 mil minimum uniform coating of electrolytic copper molecularly bonded to a rigid steel core.
   b. Corrosion resistant bond between the copper and steel.
   c. Hard drawn for a scar-resistant surface.

D. Grounding Clamps, Connectors and Terminals:

1. Mechanical type:
   a. Standards: UL 467.
   b. High copper alloy content.
2. Compression type for interior locations:
   a. Standards: UL 467.
   b. High copper alloy content.
   c. Non-reversible.
   d. Terminals for connection to bus bars shall have two bolt holes.
3. Compression type suitable for direct burial in earth or concrete:
   a. Standards: UL 467, IEEE 837.
   b. High copper alloy content.
   c. Non-reversible.
   d. Factory filled with oxide inhibiting compound.

PART 3 -EXECUTION

3.1 INSTALLATION

A. General:

1. Install products in accordance with manufacturer's instructions.

2. Size grounding conductors and bonding jumpers in accordance with NFPA 70, Article 250, except where larger sizes are indicated on the Drawings.
3. Remove paint, rust, or other non-conducting material from contact surfaces before making ground connections. After connection, apply manufacturers approved touch-up paint to protect metallic surface from corrosion.
4. Do not splice grounding electrode conductors except at ground rods.
5. Install ground rods and grounding electrode conductors in undisturbed, firm soil.
   a. Provide excavation required for installation of ground rods and conductors.
   b. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.
   c. Unless otherwise specified, connect conductors to ground rods with compression type connectors.
   d. Provide sufficient slack in conductor to prevent conductor breakage during backfill or due to ground movement.
   e. Backfill excavation completely, thoroughly tamping to provide good contact between backfill materials and ground rods and conductors.

B. Grounding Electrode System:

1. Provide a grounding electrode system in accordance with NFPA 70, Article 250 and as indicated on the Drawings.
2. Grounding electrode conductor terminations:
   a. Ground rod: Compression type, unless otherwise specified.
3. Single ground rod grounding system:
   a. Single ground rod system consists of a single ground rod.
   b. Place ground rod a minimum of 2 feet-6 inches below grade.
   c. Grounding conductor: Bare conductor, sized as indicated on the Drawings.

C. Supplemental Grounding Electrode:

1. Provide the following grounding in addition to the equipment ground conductor supplied with the feeder conductors whether or not shown on the Drawings.
   a. See Grounding Electrode System paragraph for conductor termination requirements.
2. Metal light poles:
   a. Connect metal pole and pole base reinforcing steel to a ground rod.
   b. Grounding conductor: Bare #6 AWG minimum.
3. Equipment support rack and pedestals mounted outdoors:
   a. Connect metallic structure to a ground rod.
   b. Grounding conductor: #6 AWG minimum.

D. Raceway Bonding/Grounding:

1. Install all metallic raceway so that it is electrically continuous.
2. Provide an equipment grounding conductor in all raceways with insulation identical to the phase conductors, unless otherwise indicated on the Drawings.
3. NFPA 70 required grounding bushings shall be of the insulating type.
4. Provide double locknuts at all panels.
5. Bond all conduits, at entrance and exit of equipment, to the equipment ground bus or lug.
6. Provide bonding jumpers if conduits are installed in concentric knockouts.
7. Make all metallic raceway fittings and grounding clamps tight to ensure equipment grounding system will operate continuously at ground potential to provide low impedance current path for proper operation of overcurrent devices during possible ground fault conditions.

E. Equipment Grounding:

1. Ground all utilization equipment with an equipment grounding conductor.

F. Handhole Grounding:

1. Provide a ground rod, as needed, in each handhole with exposed metal parts.
   a. Expose a minimum of 4 inches of the rod above the floor for field connections to the rod.
2. Connect all exposed metal parts (e.g., conduits and cable racks) to the ground rod.

3.2 FIELD QUALITY CONTROL

A. Leave grounding system uncovered until observed by Owner.

B. Acceptance testing:

C. Provide a continuity test on the components of the grounding electrode system.

D. Complete grounding system: Resistance of 5 ohms or less.

E. Test resistance of installed ground system after backfilling and before connection to any other grounded system including underground piping, utility services or other building ground systems.

1. Test ground grid resistance by fall-of-potential method.

END OF SECTION

SECTION 260533
RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for:
   a. Conduits.
   b. Conduit fittings.
   c. Conduit supports.
   d. Wireways.
   e. Outlet boxes.
   f. Pull and junction boxes.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 260500 - Common Work Results for Electrical.
2. Section 260543 - Underground Work for Electrical Systems.
3. Section 262726 - Wiring Devices.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Aluminum Association (AA).
2. ASTM International (ASTM):
   a. D2564, Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
3. National Electrical Manufacturers Association (NEMA):
   a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
   b. RN 1, Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
   c. TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
   d. TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
   e. C80.1, Electric Rigid Steel Conduit (ERSC).
   f. C80.5, Electrical Aluminum Rigid Conduit (ERAC).
   g. OS 1, Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
4. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
5. Underwriters Laboratories, Inc. (UL):
   a. 6, Electrical Rigid Metal Conduit - Steel.

b. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.

c. 360, Standard for Liquid-Tight Flexible Metal Conduit.

d. 467, Grounding and Bonding Equipment.

e. 514A, Metallic Outlet Boxes.

f. 514B, Conduit, Tubing, and Cable Fittings.

g. 651, Standard for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.

h. 870, Standard for Wireways, Auxiliary Gutters, and Associated Fittings.

1.3 SUBMITTALS

A. Shop Drawings:

1. Identify dimensional size of pull and junction boxes to be used.

B. Product Data:

1. Provide submittal data for all products specified in PART 2 of this Specification Section.

2. See Section 260500 for additional requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

A. See Section 20500.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Rigid metal conduits and electrical metallic tubing:

a. Allied Tube and Conduit.

b. Western Tube and Conduit Corporation.

c. Wheatland Tube.

d. Patriot Aluminum Products, LLC.

2. PVC coated rigid metal conduits:

a. Robroy Industries.

3. Atkore - Calbond Rigid nonmetallic conduit:

a. Prime Conduit.

b. Cantex, Inc.

c. Osburn Associates, Inc.

4. Flexible conduit:

a. AFC Cable Systems.

b. Anamet, Inc.

c. Electri-Flex Company.

d. International Metal Hose Company.

e. Southwire Company, LLC.

5. Wireway:

a. Hoffman Engineering.
b. Wiegmann by Hubbell.
c. Square D by Schneider Electric.

6. Conduit fittings and accessories:
   a. Appleton by Emerson Electric Co.
   b. Carlon by Thomas & Betts.
   c. Cantex, Inc.
   d. Crouse-Hinds by Eaton.
   e. Killark by Hubbell.
   f. Osburn Associates, Inc.
   g. O-Z/Gedney by Emerson Electric Co.
   h. Raco by Hubbell.
   i. Steel City by Thomas & Betts.
   j. Thomas & Betts.
7. Support systems:
   a. Unistrut by Atkore International, Inc.
   b. B-Line by Eaton.
   c. Kindorf by Thomas & Betts.
   d. Minerallac Company.
   e. CADDY by Pentair.
   f. Superstrut by Thomas & Betts.
8. Outlet, pull and junction boxes:
   a. Appleton by Emerson Electric Co.
   b. Crouse-Hinds by Eaton
   c. Killark by Hubbell.
   d. O-Z/Gedney by Emerson Electric Co.
   e. Steel City by Thomas & Betts.
   f. Raco by Hubbell
   g. Bell by Hubbell.
   h. Hoffman Engineering.
   i. Wiegmann by Hubbell.
   j. B-Line by Eaton.
   k. Adalet.
   l. RITTAL North America LLC.
   m. Stahlin by Robroy Enclosures.

2.2 RIGID METAL CONDUITS

A. PVC-Coated Rigid Steel Conduit (PVC-RGS):

1. Nominal 40 mil Polyvinyl Chloride Exterior Coating:
   a. Coating: Bonded to hot-dipped galvanized rigid steel conduit conforming to NEMA/ANSI C80.1.
   b. The bond between the PVC coating and the conduit surface: Greater than the tensile strength of the coating.
2. Nominal 2 mil, minimum, urethane interior coating.

3. Urethane coating on threads.
4. Conduit: Epoxy prime coated prior to application of PVC and urethane coatings.
5. Female Ends:
   a. Have a plastic sleeve extending a minimum of one pipe diameter or 2 inches, whichever is less beyond the opening.
   b. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit to be used with it.
6. Pass high temperature water PVC coating adhesion test and be ETL Verified PVC-001.
7. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.1, UL 6, NEMA RN 1.

B. Rigid Aluminum Conduit (RAC):

1. AA Type 6063 aluminum alloy, T-1 temper.
2. Maximum copper content of 0.10%.
3. Extruded, seamless.
4. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.5, UL 6.

2.3 RIGID NONMETALLIC CONDUIT

A. Schedule 80 (PVC-80):

1. Polyvinyl-chloride (PVC) plastic compound which includes inert modifiers to improve weatherability and heat distribution.
2. Rated for direct sunlight exposure.
3. Fire retardant and low smoke emission.
4. Shall be suitable for use with 90 degrees C wire and shall be marked "maximum 90 degrees C".
5. Standards: NFPA 70 Type PVC, NEMA TC 2, UL 651.

2.4 FLEXIBLE CONDUIT

A. PVC-Coated Flexible Galvanized Steel (liquid-tight) Conduit (FLEX-LT):

1. Core formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.
2. Extruded PVC outer jacket positively locked to the steel core.
3. Liquid and vaportight.
4. Standard: NFPA 70 Type LFMC, UL 360.

2.5 WIREWAY

A. General:

1. Suitable for lay-in conductors.
2. Designed for continuous grounding.
3. Covers:
   a. Hinged or removable in accessible areas.

b. Non-removable when passing through partitions.

4. Finish: Rust inhibiting primer and manufacturer's standard paint inside and out except for stainless steel type.
5. Standards: UL 870, NEMA 250.

B. Watertight (NEMA 4X rated) Wireway:

1. 14 GA Type 304 or 316 stainless steel bodies and covers without knockouts and 10 GA stainless steel flanges.
2. Cover: Fully gasketed and held in place with captive clamp type latches.
3. Flanges: Fully gasketed and bolted.

2.6 CONDUIT FITTINGS AND ACCESSORIES

A. Fittings for Use with RAC:

1. General:
   a. In hazardous locations listed for use in Class I, Groups C and D locations.
2. Locknuts:
   a. Threaded steel or malleable iron.
   b. Gasketed or non-gasketed.
   c. Grounding or non-grounding type.
3. Bushings:
   a. Threaded, insulated metallic.
   b. Grounding or non-grounding type.
4. Hubs: Threaded, insulated and gasketed metallic for raintight connection.
5. Couplings:
   a. Threaded straight type: Same material and finish as the conduit with which they are used on.
   b. Threadless type: Gland compression or self-threading type, concrete tight.
6. Unions: Threaded galvanized steel or zinc plated malleable iron.
7. Conduit bodies (ells and tees):
   a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
   b. Standard and mogul size.
   c. Cover:
      1) Clip-on type with stainless steel screws.
      2) Gasketed or non-gasketed galvanized steel, zinc plated cast iron or cast copper free aluminum.
8. Conduit bodies (round):
   a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
   b. Cover: Threaded screw on type, gasketed, galvanized steel, zinc plated cast iron or cast copper free aluminum.

9. Sealing fittings:
   a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
   b. Standard and mogul size.
   c. With or without drain and breather.
   d. Fiber and sealing compound: UL listed for use with the sealing fitting.
   e. Corrosive areas:
      1) Stainless steel braided covering over flexible stainless steel core.
      2) Stainless steel end fittings.
      3) Aluminum unions and nipples.
10. Standards: UL 467, UL 514B, UL 1203.

B. Fittings for Use with PVC-RGS:

1. The same material and construction as those fittings listed under paragraph "Fittings for Use with RAC" and coated as defined under paragraph "PVC Coated Rigid Steel Conduit (PVC-RGS)."

C. Fittings for Use with FLEX-LT:

1. Connector:
   a. Straight or angle type.
   b. Metal construction, insulated and gasketed.
   c. Composed of locknut, grounding ferrule and gland compression nut.
   d. Liquid tight.
2. Standards: UL 467, UL 514B.

D. Fittings for Use with Rigid Nonmetallic PVC Conduit:

1. Coupling, adapters and conduit bodies:
   a. Same material, thickness, and construction as the conduits with which they are used.
   b. Homogeneous plastic free from visible cracks, holes or foreign inclusions.
   c. Bore smooth and free of blisters, nicks or other imperfections which could damage the conductor.
2. Solvent cement for welding fittings shall be supplied by the same manufacturer as the conduit and fittings.
3. Standards: ASTM D2564, NEMA TC 3, UL 651, UL 514B.

2.7 ALL RACEWAY AND FITTINGS

A. Mark Products:

1. Identify the nominal trade size on the product.
2. Stamp with the name or trademark of the manufacturer.

2.8 OUTLET BOXES

A. Cast Outlet Boxes:

1. Zinc plated cast iron or die-cast copper free aluminum with manufacturer's standard finish.
2. Threaded hubs and grounding screw.
3. Styles:
   a. "FS" or "FD".
   b. "Bell".
   c. Single or multiple gang and tandem.
   d. "EDS" or "EFS" for hazardous locations.
4. Accessories: 40 mil PVC exterior coating and 2 mil urethane interior coating.
5. Standards: UL 514A, UL 1203.

B. See Specification Section 262726 for wiring devices, wallplates and coverplates.

2.9 PULL AND JUNCTION BOXES

A. NEMA 4X Rated (metallic):

1. Body and cover: 14 GA Type 304 or 316 stainless steel.
2. Seams continuously welded and ground smooth.
3. No knockouts.
4. External mounting flanges.
5. Hinged door and stainless steel screws and clamps.
6. Door with oil-resistant gasket.

B. Miscellaneous Accessories:

1. Rigid handles for covers larger than 9 square feet or heavier than 25 pounds.
2. Split covers when heavier than 25 pounds.
3. Weldnuts for mounting optional panels and terminal kits.

C. Terminal blocks: Screw-post barrier-type, rated 600 volt and 20 ampere minimum.Standards: NEMA 250, UL 50.

2.10 SUPPORT SYSTEMS

A. Single Conduit and Outlet Box Support Fasteners:

1. Material requirements:
   a. Stainless steel.

PART 3 -EXECUTION

3.1 RACEWAY INSTALLATION - GENERAL

A. Shall be in accordance with the requirements of:

1. NFPA 70.
2. Manufacturer instructions.

B. Size of Raceways:

1. Raceway sizes are shown on the Drawings, if not shown on the Drawings, then size in accordance with NFPA 70.

2. Unless specifically indicated otherwise, the minimum raceway size shall be:
   a. Conduit: 3/4 inches.
   b. Wireway: 2-1/2 inches x 2-1/2 inches.

C. Field Bending and Cutting of Conduits:
   1. Utilize tools and equipment recommended by the manufacturer of the conduit, designed for the purpose and the conduit material to make all field bends and cuts.
   2. Do not reduce the internal diameter of the conduit when making conduit bends.
   3. Prepare tools and equipment to prevent damage to the PVC coating.
   4. Degrease threads after threading and apply a zinc rich paint.
   5. Debur interior and exterior after cutting.

D. Male threads of conduit systems shall be coated with an electrically conductive anti-seize compound.

E. The protective coating integrity of conduits, fittings, outlet, pull and junction boxes and accessories shall be maintained.
   1. Repair galvanized components utilizing a zinc rich paint.
   2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
   3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the conduit; or a self-adhesive, highly conformable, cross-linked silicone composition strip, followed by a protective coating of vinyl tape.
      a. Total nominal thickness: 40 mil.
   4. Repair surfaces which will be inaccessible after installation prior to installation.

F. Remove moisture and debris from conduit before wire is pulled into place.
   1. Pull mandrel with diameter nominally 1/4 inches smaller than the interior of the conduit, to remove obstructions.
   2. Swab conduit by pulling a clean, tight-fitting rag through the conduit.
   3. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.

G. Only nylon or polyethylene rope shall be used to pull wire and cable in conduit systems.

3.2 RACEWAY ROUTING

A. Raceways shall be routed in the field unless otherwise indicated.
   1. Conduit and fittings shall be installed, as required, for a complete system that has a neat appearance and is in compliance with all applicable codes.

2. Conduit shall not interfere with, or prevent access to, piping, valves, or other equipment for operation, maintenance and repair.
3. Provide pull boxes or conduit bodies as needed so that there is a maximum of 360 degrees of bends in the conduit run or in long straight runs to limit pulling tensions.

B. Maintain minimum spacing between parallel conduit and piping runs in accordance with the following, or as indicated on the Drawings, when the runs are greater than 30 feet:

1. Between process, gas, air and water pipes: 6 inches.

C. Conduits shall be installed to eliminate moisture pockets.

1. Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.

D. Conduit shall not be routed on the exterior of structures except as specifically indicated on the Drawings.

3.3 RACEWAY APPLICATIONS

A. Permitted Raceway Types Per Wire or Cable Types:

1. Power wire or cables: All raceway types.
2. Control wire or cables: All raceway types.
3. Instrumentation cables: Metallic raceway except nonmetallic may be used underground.

B. Permitted Raceway Types Per Area Designations:

1. Wet and/or corrosive areas:
   a. RAC.

C. Permitted Raceway Types Per Routing Locations:

1. In concrete block or brick walls:
   a. PVC-80.
2. Embedded in poured concrete walls and floors:
   a. PVC-80.
   b. PVC-RGS when emerging from concrete into areas designated as wet and/or corrosive.
3. Direct buried conduits:
   a. PVC-80.
   b. 90 degrees elbows for transitions to above grade:
      1) PVC-RGS.
   c. Long sweeping bends greater than 15 degrees:
      1) PVC-RGS.

D. FLEX-LT conduits shall be installed as the final conduit connection to electrically operated valves and instrumentation primary elements.

1. The maximum length shall not exceed:
   a. 3 feet to motors.

E. NEMA 4X Rated Wireway:

1. Surface mounted in areas designated as wet and or corrosive.

F. Underground Conduit: See Specification Section 26 05 43.

3.4 CONDUIT FITTINGS AND ACCESSORIES

A. Rigid nonmetallic conduit and fittings shall be joined utilizing solvent cement.

1. Immediately after installation of conduit and fitting, the fitting or conduit shall be rotated 1/4 turn to provide uniform contact.

B. Threaded connections shall be made wrench-tight.

C. Conduit joints shall be watertight:

1. Where subjected to possible submersion.
2. In areas classified as wet.
3. Underground.

D. Terminate Conduits:

1. In NEMA 4X rated enclosures:
   a. Watertight, insulated and gasketed hub and locknut.

E. Threadless couplings shall only be used to join new conduit to existing conduit when the existing conduit end is not threaded and it is not practical or possible to cut threads on the existing conduit with a pipe threader.

3.5 CONDUIT SUPPORT

A. Permitted single conduit support fasteners per area designations and conduit types:

1. Wet and/or corrosive areas:
   a. Material: Stainless steel.
   b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
2. Conduit type shall be compatible with the support fastener material.
   a. Stainless steel system may be used with RAC.

B. Conduit Support General Requirements:

1. Maximum spacing between conduit supports per NFPA 70.
2. Do not support conduit from process, gas, air or water piping; or from other conduits.
   a. Comply with the requirements of Division 3 for fasteners in precast-prestressed concrete construction.
   b. Comply with the requirements of Division 3 for fasteners in cast-in-place concrete construction.

3.6 OUTLET, PULL AND JUNCTION BOX INSTALLATION

A. General:

1. Install products in accordance with manufacturer's instructions.

2. See Section 260500 and the Drawings for area classifications.
3. Fill unused punched-out, tapped, or threaded hub openings with insert plugs.
4. Size boxes to accommodate quantity of conductors enclosed and quantity of conduits connected to the box.

B. Outlet Boxes:

1. Permitted uses of cast outlet boxes:
   a. Housing of wiring devices surface mounted in non-architecturally finished wet and/or corrosive areas.
   b. Pull and junction box surface mounted in wet and/or corrosive areas.
2. Set device outlet boxes plumb and vertical to the floor.

C. Pull and Junction Boxes:

1. Install pull or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.
   a. Make covers of boxes accessible.
2. Permitted uses of NEMA 3R enclosure:
   a. Pull or junction box surface mounted in exterior locations.
3. Permitted uses of NEMA 4X metallic enclosure:
   a. Pull or junction box surface mounted in areas designated as wet and/or corrosive.

END OF SECTION

SECTION 260543
UNDERGROUND WORK FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for:
   a. Handholes.
   b. Underground conduits.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 260526 - Grounding.
2. Section 260533 - Raceways and Boxes for Electrical Systems.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):
   a. HB-17, Standard Specifications for Highway Bridges.
2. ASTM International (ASTM):
   a. A536, Standard Specification for Ductile Iron Castings.
3. Society of Cable Telecommunications Engineers (SCTE):
   a. 77, Specifications for Underground Enclosure Integrity.

1.3 DEFINITIONS

A. Direct-Buried Conduit(s):

1. Individual (single) underground conduit.
2. Multiple underground conduits, arranged in one or more planes, in a common trench.

1.4 SUBMITTALS

A. Shop Drawings:

1. Provide dimensional drawings of each handhole indicating all specified accessories and conduit entry locations.

B. Product Data:

   a. Provide submittal data for all products specified in PART 2 of this Specification Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Prefabricated composite handholes:
   a. Armorcast Products Company.

b. Quazite by Hubbell.

c. Synertech by Oldcastle Enclosure Solutions.

2. Precast manholes and handholes:

a. Lister Industries Ltd.

b. Oldcastle Enclosure Solutions.

c. Jensen Precast and Utility Concrete Products.

3. Handhole and underground conduit accessories:

a. Cantex, Inc.

b. Condux International, Inc.

c. Neenah Enterprises, Inc.

d. Prime Conduit.

e. Thomas and Betts.

f. Underground Devices, Inc.

g. Unistrut by Atkore International, Inc.

2.2 HANDHOLES

A. Prefabricated Composite Material Handholes:

1. Handhole body and cover: Fiberglass reinforced polymer concrete conforming to all test provisions of SCTE 77.
2. Minimum load ratings: SCTE 77 Tier 5.
3. Open bottom.
4. Stackable design as required for specified depth.
5. Cover:
   a. Engraved legend of "ELECTRIC".
   b. Non-gasketed bolt down with stainless steel penta head bolts.
   c. Lay-in non-bolt down, when cover is over 100 pounds.
   d. One or multiple sections so the maximum weight of a section is 125 pounds.
6. Cover lifting hook: 24 inches minimum in length.

B. Precast Manholes and Handholes:

1. Fiberglass reinforced polymer concrete or steel reinforced cement concrete structures:
2. AASHTO live load rating: H-20 for full deliberate vehicle traffic.
3. Mating edges: Tongue and groove type.
4. Solid bottom with a 12 inches x 12 inches or 12 inches diameter french drain in the bottom of each manhole.
5. Cable pulling eyes:
   a. Coordinate exact location with installation contractor.

2.3 CONCRETE HANDHOLE ACCESSORIES

A. Cover and Frame:

1. Cast ductile iron: ASTM A536.
2. AASHTO live load rating: H-20.

3. Diameter: 30 inches.
4. Cast the legend "ELECTRICAL" into handhole covers.

B. Cable Racks and Hooks:

1. Material: Heavy-duty nonmetallic (glass reinforced nylon).
2. Hook loading capacity: 400 pounds minimum.
3. Rack loading capacity: Four hooks maximum.
4. Hook deflection: 0.25 inches maximum.
5. Hooks: Length, as required, with positive locking device to prevent upward movement.
6. Mounding hardware: Stainless steel.

C. Cable Pulling Irons:

1. 7/8 inches diameter hot-dipped galvanized steel.
2. 6000 pound minimum pulling load.

D. Ground Rods and Grounding Equipment: See Specification Section 260526.

2.4 UNDERGROUND CONDUIT AND ACCESSORIES

A. Conduit: See Specification Section 260533.

B. Duct Spacers/Supports:

1. High density polyethylene or high impact polystyrene.
2. Interlocking web or mesh design.
3. Provide 3 inches minimum spacing between conduits.
4. Accessories, as required:
   a. Hold down bars.
   b. Ductbank strapping.

PART 3 - EXECUTION

3.1 INSTALLATION OF UNDERGROUND ELECTRICAL SYSTEMS - GENERAL

A. Drawings indicate the intended location of handholes and routing of and direct buried conduit.

1. Field conditions may affect actual routing.

B. Handhole Locations:

1. Approximately where shown on the Drawings.
2. As required for pulling distances.
3. As required to keep pulling tensions under allowable cable tensions.
4. As required for number of bends in ductbank routing.
5. Shall not be installed in a swale or ditch.
6. Determine the exact locations after careful consideration has been given to the location of other utilities, grading, and paving.
7. Locations are to be approved by the Engineer prior to excavation and placement of handholes.

C. Install products in accordance with manufacturer's instructions.

D. Install handholes in conduit runs where indicated or as required to facilitate pulling of wires or making connections.

3.2 HANDHOLES

A. Prefabricated Composite Material Handholes:

1. Provide handhole on six-inch compacted layer of fill material and six inches larger than handholes footprint on all sides.
2. Provide concrete encasement ring around handhole per manufacturers installation instructions (minimum of 10 inches wide x 12 inches deep).
3. Size: As required for the number and size of conduits.

B. Precast Handholes:

1. Use for the handhole that houses the valve control panel, located next to the flow control structure.
2. Construction:
   a. Grout or seal all joints, per manufacturer's instructions.
   b. Support cables on walls by cable racks:
      1) Equip cable racks with adjustable hooks: Quantity of cable hooks as required by the number of conductors to be supported.
   c. In each handhole, drive 3/4 inches x 10 feet long copper clad ground rod into the earth with approximately 6 inches exposed above finished floor.
      1) Drill opening in floor for ground rod.
      2) Connect all metallic components to ground rod by means of #8 AWG minimum copper wire and approved grounding clamps.
3. Provide handholes on six-inch compacted layer of fill material and six inches larger than manholes and handholes footprint on all sides.
4. Install so that the top of cover is 1 inch above finished grade.
   a. Where existing grades are higher than finished grades, install sufficient number of courses of curved segmented concrete block between top of handhole and manhole frame to temporarily elevate manhole cover to existing grade level.
5. After installation is complete, provide and compact required fill materials around manholes and handholes.
6. Handhole size:
   a. As indicated on the Drawings or as required for the number and size of conduits entering or as indicated on the Drawings.
   b. Minimum floor dimension of 4 feet x 4 feet and minimum depth of 4 feet.

3.3 UNDERGROUND CONDUITS

A. General Installation Requirements:

1. Do not place concrete or other required fill materials until conduits have been observed by Engineer.
2. During construction and after conduit installation is complete, plug the ends of all conduits.
3. Provide conduit supports and spacers.
   a. Place supports and spacers for rigid nonmetallic conduit on maximum centers as indicated for the following trade sizes:
      1) 1 inches and less: 3 feet.
      2) 1-1/4 to 3 inches: 5 feet.
      3) 3-1/2 to 6 inches: 7 feet.
   b. Place supports and spacers for rigid steel conduit on maximum centers as indicated for the following trade sizes:
      1) 1 inches and less: 10 feet.
      2) 1-1/4 to 2-1/2 inches: 14 feet.
      3) 3 inches and larger: 20 feet.
   c. Securely anchor conduits to supports and spacers to prevent movement during placement of concrete or other required fill materials.
4. Stagger conduit joints at intervals of 6 inches vertically.
5. Make conduit joints watertight and in accordance with manufacturer's recommendations.
6. Accomplish underground changes in direction of runs exceeding a total of 15 degrees by long sweep bends having a minimum radius of 10 feet.
   a. Sweep bends may be made up of one or more curved or straight sections or combinations thereof.
7. Furnish manufactured elbows at end of runs as the conduit transitions to above grade.
   a. Minimum radius of 18 inches for conduits less than 3 inches trade size and 36 inches for conduits 3 inches trade size and larger.
8. Field cuts requiring tapers shall be made with the proper tools and shall match factory tapers.
9. After the conduit run has been completed:
   a. Prove joint integrity and test for out-of-round duct by pulling a test mandrel through each conduit.
      1) Test mandrel:
         a) Length: Not less than 12 inches.
         b) Diameter: Approximately 1/4 inches less than the inside diameter of the conduit.

b. Clean the conduit by pulling a heavy duty wire brush mandrel followed by a rubber duct swab through each conduit.

10. Pneumatic rodding may be used to draw in lead wire.

a. Install a heavy nylon cord free of kinks and splices in all unused new ducts.

b. Extend cord 3 feet beyond ends of conduit.

11. Transition from rigid nonmetallic conduit to rigid metallic conduit, per Specification Section 260533, prior to entering a structure or going above ground.

a. Except rigid nonmetallic conduit may be extended directly to handholes.

b. Terminate rigid metallic conduits with insulated bushings.

12. Place warning tape in trench directly over direct-buried conduit.

13. Placement of conduits stubbing into handholes shall be located to allow for proper bending radiuses of the cables.

B. Direct-Buried Conduit(s):

1. Install so that the top of the uppermost conduit, at any point:

a. Is not less than 30 inches below grade.

b. Is below pavement sub-grading.

2. Provide a uniform minimum clearance of 3 inches between conduits or as required in Specification Section 26 05 33 for different cabling types.

a. Maintain the separation of multiple planes of conduits by one of the following methods:

1) Install multilevel conduits one level at a time.

a) Each level shall be backfilled with required materials and compacted while maintaining required separations.

END OF SECTION

SECTION 260916
ELECTRICAL CONTROL COMPONENTS

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:

1. Operator control devices (selector switches, pushbuttons, indicator lights, etc.).
2. Control devices (timers, relays, contactors, etc.).
3. Industrial Control Panels.

B. Related Sections include but are not necessarily limited to:

1. Section 260500 - Common Work Results for Electrical.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. National Electrical Manufacturers Association (NEMA):
   a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
2. Underwriters Laboratories, Inc. (UL).

1.3 SYSTEM DESCRIPTION

A. This Specification is used to specify the components and construction of following Industrial Control Panels.

1. Lighting Control Panel, with control logic per description in Part 3.

1.4 SUBMITTALS

A. Shop Drawings:

1. Industrial Control Panel:
   a. Interior and exterior layout.
   b. Wiring/connection diagrams.

B. Product technical data:

1. Provide submittal data for all products specified in PART 2 of this Specification:
2. Industrial Control Panel bill of material.
3. See Section 260500 for additional requirements.

C. Contract Closeout Information:

1. Operation and Maintenance Data:
   a. See Section 01782 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
   b. Content of Operation and Maintenance Manual:

1) Product technical data of components used within Industrial Control Panels.
2) As-constructed wiring/connection diagrams for Industrial Control Panels.
3) Operating instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Pilot devices, contactors, photocells, and enclosures:
   a. Eaton.
   b. ABB.
   c. Schneider Electric.
   d. Siemens Corporation.

2.2 PILOT DEVICES

A. General Requirements:

1. Standards: UL Listed.
2. Heavy-duty NEMA 4/13 watertight/oiltight.
3. Heavy-duty NEMA 4/4X corrosion resistant.
4. Heavy-duty factory sealed, explosion-proof and dust ignition-proof (Class I and II).
5. Mounting hole: 30.5 mm.
6. Contact blocks: 10 amp, NEMA A600 rated, number as required to fulfill functions shown or specified.
7. Legend plate marked as indicated on Drawings or specified.

B. Selector Switches:

1. Two, three- or four-position rotary switch as required to fulfill functions shown or specified.
2. Maintained contact type.
3. Knob or lever type operators.

2.3 CONTACTORS

A. General Requirements:

1. Standards: NEMA ICS 2, UL 508.

B. Lighting:

1. Electrically operated, electrically held.
2. Coil voltage: 120 VAC or as required.
3. Contacts: Totally enclosed, double-break silver-cadmium-oxide.
4. Rated for ballasted lighting, tungsten and general use loads.
5. Number of poles, continuous ampere rating and voltage, as indicated on Drawings or as specified.

6. Auxiliary control relays, as indicated on Drawings or as specified.
7. Auxiliary contacts, as indicated on Drawings or as specified.

2.4 PHOTOCELLS

A. Photocells:

1. Weatherproof enclosure.
2. Adjustable turn-on range, initially set at 1.0 foot-candles.
   a. Turn-off level approximately three times turn-on.
3. Provide time delay device to eliminate nuisance switching.
4. Voltage, amperage and/or wattage ratings as required for the application.

2.5 TERMINATION EQUIPMENT

A. General Requirements:

1. Modular type with screw compression clamp.
2. Screws: Stainless steel.
3. Current bar: Nickel-plated copper alloy.
4. Thermoplastic insulation rated for -40 to +90 degrees C.
5. Wire insertion area: Funnel-shaped to guide all conductor strands into terminal.
6. End sections and end stops at each end of terminal strip.
7. Machine-printed terminal markers on both sides of block.
8. Spacing: 6 mm.
9. Wire size: 22-12 AWG.
10. Rated voltage: 600 V.
11. DIN rail mounting.

2.6 ENCLOSURES

A. Industrial Control Panels:

1. NEMA 4X rated:
   a. Body and cover: 14 GA Type 304 or 316 stainless steel.
   b. Seams continuously welded and ground smooth.
   c. No knockouts.
   d. External mounting flanges.
   e. Hinged door and stainless steel screws and clamps.
   f. Door with oil-resistant gasket.
   g.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Install as indicated and in accordance with manufacturer's recommendations and instructions.

B. Control Panels:

1. Size as required to mount the equipment.
2. Permitted uses of NEMA 4X enclosure:
   a. Surface mounted in areas designated as wet and/or corrosive.

3.2 CONTROL LOGIC FOR INDUSTRIAL CONTROL PANELS

A. Lighting Control Panel:

1. Control of exterior luminaires.
2. Major equipment:
   a. Electrically held lighting contactor.
      1) Mounted in control panel.
      2) Quantity of contactors and number of poles as required.
      3) Auxiliary contact.
   b. Photocell mounted on electrical equipment rack.
   c. Three-position (HOA) switch mounted inside the panel.
3. Sequence of operation:
   a. When the HOA switch is in the HAND position:
      1) Contactor is energized and the exterior lights are ON.
      2) Contactor auxiliary contact is energized.
   b. When the HOA switch is in the OFF position:
      1) Contactor is de-energized and the exterior lights are OFF.
      2) Contactor auxiliary contact is de-energized.
   c. When the HOA switch is in the AUTO position:
      1) Contactor is energized and de-energized according to the light level as seen by the photocell.
      2) Contactor auxiliary contact is energized and de-energized according to the light level as seen by the photocell.

3.3 FIELD QUALITY CONTROL

A. See Section 260500.

B. Industrial Control Panel(s) Functional Test:

1. The test is to prove the correct interaction of all sensing, processing and action devices.
2. Perform the following tests:
   a. Verify functionality of all control states.

3.4 TRAINING

A. A qualified supplier representative shall provide the Owner with on-site training in the operation and maintenance of the Industrial Control Panel(s) and its components.

END OF SECTION

SECTION 262416
PANELBOARDS

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:

1. Branch circuit panelboards.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 260500 - Common Work Results for Electrical.
2. Section 262801 - Low-Voltage Circuit Protective Devices.
3. Section 264313 - Low Voltage Surge Protective Devices (SPD).

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. National Electrical Manufacturers Association (NEMA):
   a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
   b. PB 1, Panelboards.
2. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
3. Underwriters Laboratories, Inc. (UL):
   a. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
   b. 67, Standard for Panelboards.

1.3 DEFINITIONS

A. Branch Circuit Panelboard: Bus rating of 400A and less or where labeled as Branch Circuit Panelboard on the Drawings.

1.4 SUBMITTALS

A. Shop Drawings:

1. Panelboard layout with alphanumeric designation, branch circuit breakers size and type, as indicated in the panelboard schedules.

B. Product Data:

a. Provide submittal data for all products specified in PART 2 of this Specification Section.
b. See Section 260500 for additional requirements.

C. Contract Closeout Information:

1. Operation and Maintenance Data:
   a. See Specification Section 01782 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

2. Panelboard schedules with as-built conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Eaton.
2. GE by ABB.
3. Square D by Schneider Electric.
4. Siemens Corporation.

2.2 MANUFACTURED UNITS

A. Standards: NEMA PB 1, NFPA 70, UL 50, UL 67.

B. Ratings:

1. Current, voltage, number of phases, number of wires as indicated on the Drawings.
2. Short Circuit Current Rating (SCCR) and/or Ampere Interrupting Current (AIC) ratings equal to or greater than the interrupting rating indicated on the Drawings or in the schedule.
   a. Series rating is not acceptable.
   b. When fault current or minimum interrupting rating is not indicated, use rating of upstream equipment or infinite bus calculation of transformer secondary.
3. Panelboards rated 125 VDC or greater: 10,000 amp minimum short circuit rating or as indicated in the schedule.
4. Service Entrance Equipment rated when indicated on the Drawings or when shown to be fed from a utility source.

C. Construction:

1. Interiors factory assembled and designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.
2. Multi-section panelboards: Feed-through or sub-feed lugs.
3. Main lugs: Solderless type approved for copper and aluminum wire.

D. Bus Bars:

1. Main bus bars:
   a. Tin plated aluminum or tin-plated copper sized to limit temperature rise to a maximum of 65 degrees C above an ambient of 40 degrees C.
   b. Drilled and tapped and arranged for sequence phasing of the branch circuit devices.
2. Ground bus and isolated ground bus, when indicated on the Drawings: Solderless mechanical type connectors.

3. Neutral bus bars: Insulated 100% rated or 200% rated, when indicated on the Drawings and with solderless mechanical type connectors.

E. Overcurrent and Short Circuit Protective Devices:

1. Main overcurrent protective device:
   a. Molded case circuit breaker.
2. Branch overcurrent protective devices:
   a. Molded case circuit breaker.
3. See Specification Section 262801 for overcurrent and short circuit protective device requirements.
4. Factory installed.

F. Integral surge protective device:

1. Provide for panelboards where indicated on the Drawings
2. See Specification Section 264313.

G. Enclosure:

1. Boxes: Code gage galvanized steel, furnish without knockouts.
2. Trim assembly: Code gage steel finished with rust inhibited primer and manufacturers standard paint inside and out.
3. Branch circuit panelboard:
   a. Trims supplied with hinged door-in-door construction.
      1) Outer door:
         a) Allows access to the interior of the enclosure.
         b) Hinged to the enclosure.
         c) Opened by removal of screws or by operating a mechanical latch located behind the inner door.
      2) Inner door:
         a) Allows access to breakers (non-live parts).
         b) Hinged to outer door.
         c) Opened by operation of a keyed corrosion resistant chrome-plated combination lock and catch. Locks for all branch circuit panelboards keyed alike.
   b. Trims for surface mounted panelboards, same size as box.
   c. Trims for flush mounted panelboards, overlap the box by 3/4 inches on all sides.
   d. Nominal 20 inches wide and 5-3/4 inches deep with gutter space in accordance with NFPA 70.
   e. Clear plastic cover for directory card mounted on the inside of each door.
   f. Where NEMA 4X is indicated: Stainless Steel.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Install as indicated on the Drawings, in accordance with the NFPA 70, and in accordance with manufacturer's instructions.

B. Support panelboard enclosures from wall studs or modular channels support structure, per Section 260500.

C. Provide NEMA rated enclosure as indicated on the Drawings. Where enclosure type is not indicated, provide enclosure rating suitable for the atmosphere where equipment is installed.

D. Equipment Marking and Documentation:

1. Provide labeling per NFPA 70 and other applicable codes.
2. Service equipment:
   a. Arc-flash hazard warning label. (Ref. NFPA 70 Article 110.16(A) and (B))
   b. Available fault current label and documentation of the calculations made for compliance with marking requirements. (Ref. NFPA 70 Article 110.24)
3. Other than service equipment:
   a. Arc-flash hazard warning label. (Ref. NFPA 70 Article 110.16(A))
   b. Available fault current label. (Ref. NFPA 70 Article 408.6)
4. Identify (tag) all equipment and equipment components.
5. Provide manufacturer’s standard labels and tags.

E. Provide each panelboard with a typed directory:

1. Identify all circuit locations in each panelboard with the load type and location served.
2. Use Owner-furnished mechanical equipment designation if different than designation indicated on the Drawings.
3. Use final building room names and numbers as identified by the Owner if different than designation indicated on the Drawings.
4. Identify spare overcurrent devices.

END OF SECTION

SECTION 262726
WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for:
   a. Receptacles.
   b. Device wallplates and coverplates.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 260500 - Common Work Results for Electrical.
2. Section 260533 - Raceways and Boxes for Electrical Systems.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. National Electrical Manufacturers Association (NEMA):
   a. WD 1, General Color Requirements for Wiring Devices.
   b. WD 6, Wiring Devices - Dimensional Requirements.
2. Underwriters Laboratories, Inc. (UL):
   a. 498, Standard for Attachment Plugs and Receptacles.
   b. 514A, Metallic Outlet Boxes.
   c. 943, Ground-Fault Circuit-Interrupters.

1.3 SUBMITTALS

A. Product Data:

1. Provide submittal data for all products specified in PART 2 of this Specification Section.
2. See Section 260500 for additional requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Receptacles:
   a. Bryant Electric.
   b. Cooper Wiring Devices by Eaton.
   c. Hubbell Incorporated Wiring Device-Kellems.
   d. Leviton Manufacturing Company.
   e. Legrand/Pass & Seymour.
   f. Eaton Crouse-Hinds.
   g. Appleton Electric Co.
   h. Hubbell Killark.

2.2 RECEPTACLES

A. Basic requirements unless modified in specific requirements paragraph of receptacles and per designated areas:
   1. Industrial Specification Grade.
   2. Straight blade.
   3. Brass triple wipe line contacts.
   4. One-piece grounding system with double wipe brass grounding contacts and self-grounding strap with grounding terminal.
   5. Back and side wired.
   6. Rating: 20 A, 125 VAC.
   7. High impact nylon body.
   8. Duplex or simplex as indicated on the Drawings.
   9. Configuration: NEMA 5-20R.
   10. Standards: UL 498, UL 514A, NEMA WD 1, NEMA WD 6.

B. Receptacle Type Specific Requirements:
   1. Basic receptacles:
      a. Weather-resistant when located in exterior locations or interior damp or wet areas as indicated on the Drawings.
         1) Identification: Letters “WR” on face of receptacle.
   2. Ground Fault Circuit Interrupter (GFCI):
      a. Specification Grade.
      b. Class A protection.
      c. Feed through type.
      d. Test and reset buttons.
      e. Self-testing.
      f. Visual indicator light.
      g. Weather-resistant when located in exterior locations or interior damp or wet areas as indicated on the Drawings.
         1) Identification: Letters “WR” on face of receptacle.
      h. Additional standards: UL 943.

C. Wet and/or corrosive Area Specific Requirements:
   1. Corrosion resistant nickel plated metal parts.
   2. Weather-resistant.
      a. Identification: Letters “WR” on face of receptacle.
   3. Coverplate for use on metallic outlet boxes:
      a. Extra-duty rated, weatherproof (NEMA 3R) while in use, gasketed, stainless steel hardware, copper-free aluminum, 3.2 inches minimum cover depth for #12 AWG cord.

PART 3 - EXECUTION

3.1 INSTALLATION

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

B. Mount devices where indicated on the Drawings.

C. See Specification Section 260533 for device outlet box requirements.

END OF SECTION

SECTION 262801
LOW-VOLTAGE CIRCUIT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Low voltage circuit breakers.
2. Low voltage fuses.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 260500 - Common Work Results for Electrical.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
2. Underwriters Laboratories, Inc. (UL):
   a. 248-1, Low-Voltage Fuses - Part 1: General Requirements.
   b. 248-12, Low-Voltage Fuses - Part 12: Class R Fuses.
   c. 489, Standard for Safety Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

1.3 SUBMITTALS

A. Product Data:

1. Provide submittal data for all products specified in PART 2 of this Specification Section.
2. See Section 260500 for additional requirements.

B. Contract Closeout Information:

1. Operation and Maintenance Data:
   a. See Specification Section 01782 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Circuit breakers:
   a. Eaton.
   b. GE by ABB.
   c. Square D Company.
   d. Siemens.
2. Fuses:

a. Eaton Bussmann, Inc.
b. Littelfuse, Inc.
c. Mersen

2.2 CIRCUIT BREAKERS

A. Molded Case Type:

1. General:
   a. Standards: UL 489.
   b. Unit construction.
   c. Over-center, toggle handle operated.
   d. Quick-make, quick-break, independent of toggle handle operation.
   e. Manual and automatic operation.
   f. All poles open and close simultaneously.
   g. Three position handle: On, off and tripped.
   h. Molded-in ON and OFF markings on breaker cover.
   i. One-, two- or three-pole as indicated on the Drawings.
   j. Current and interrupting ratings as indicated on the Drawings.
2. Thermal magnetic type:
   a. Inverse time overload and instantaneous short circuit protection by means of a thermal magnetic element.
   b. Frame size 225 amp and below:
      1) Non-interchangeable, non-adjustable thermal magnetic trip units.

2.3 FUSES

A. UL Class RK-1 fuses:

1. Standard: UL 248-1 and UL 248-12.
2. Single-element fast-acting and current limiting rejection type.
3. Dual-element time-delay and current limiting rejection type.
4. Ratings: 250 and 600 V, 1/10-600 amps and 200,000 RMS AIC symmetrical.

B. UL Class RK-5 fuses:

1. Standard: UL 248-1 and UL 248-12.
2. Dual-element time-delay and current limiting rejection type.
3. Ratings: 250 and 600 V, 1/10-600 amps and 200,000 RMS AIC symmetrical.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Current and interrupting ratings as indicated on the Drawings.

B. Series rated systems not acceptable.

C. Devices shall be ambient temperature compensated.

D. Fuses:

1. UL Class RK-1 (dual element): Use for motor feeder and branch circuit devices.
2. UL Class RK-5: Use for motor feeder and branch circuit devices.

3.2 FIELD QUALITY CONTROL

END OF SECTION

SECTION 262816.16
ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Safety switches.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 260500 - Common Work Results for Electrical.
2. Section 262801 - Low-Voltage Circuit Protective Devices.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. National Electrical Manufacturers Association (NEMA):
   a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
   b. KS 1, Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum).
2. Underwriters Laboratories, Inc. (UL):
   a. 98, Enclosed and Dead-Front Switches.

1.3 SUBMITTALS

A. Product Data:

1. Provide submittal data for all products specified in PART 2 of this Specification Section.
2. See Section 260500 for additional requirements.

B. Contract Closeout Information:

1. Operation and Maintenance Data:
   a. See Specification Section 01782 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following safety switch manufacturers are acceptable:

1. Eaton.
2. GE by ABB.
3. Square D by Schneider Electric.
4. Siemens Corporation.

2.2 SAFETY SWITCHES

A. General:

1. Non-fusible or fusible as indicated on the Drawings.
2. Suitable for service entrance when required.
3. NEMA Type HD heavy-duty construction.
4. Switch blades will be fully visible in the OFF position with the enclosure door open.
5. Quick-make/quick-break operating mechanism.
6. Deionizating arc chutes.
7. Manufacture double-break rotary action shaft and switchblade as one common component.
8. Clear line shields to prevent accidental contact with line terminals.
9. Operating handle:
   a. Red and easily recognizable.
   b. Padlockable in the OFF position.
   c. Interlocked to prevent door from opening when the switch is in the ON position with a defeater mechanism.

B. Ratings:

1. Horsepower rated of connected motor.
2. Voltage and amperage: As indicated on the Drawings.
3. Short circuit withstand:
   a. Non-fused: 10,000A.
   b. Fused: 200,000A.

C. Enclosures:

1. NEMA 4X rated (metallic):
   a. Body and cover: Type 304 or 316 stainless steel.
   b. No knockouts, external mounting flanges, hinged and gasketed door.

D. Overcurrent and short circuit protective devices:

1. Fuses.
2. See Specification Section 262801 for overcurrent and short circuit protective device requirements.

E. Standards: NEMA KS 1, UL 98.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Install as indicated and in accordance with manufacturer's instructions and recommendations.

B. Install switches adjacent to the equipment they are intended to serve unless otherwise indicated on the Drawings.

C. Permitted uses of NEMA 4X metallic enclosure:

1. Surface mounted in areas designated as wet and/or corrosive.

END OF SECTION

SECTION 264313
SURGE PROTECTION DEVICES FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:

1. Type PC3 SPD - Medium exposure locations (panelboard), integrally mounted.

B. Related Sections include but are not necessarily limited to:

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   a. C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
   b. C62.41.1, Guide on the Surge Environment in Low-Voltage (1000V and Less) AC Power Circuits.
   c. C62.41.2, Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
   d. C62.45, Recommended Practice on Surge Testing For Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits.
2. Military Standard:
   a. MIL-STD-220B, Method of Insertion Loss Measurement.
3. National Electrical Manufacturers Association (NEMA):
   a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
4. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
5. Underwriters Laboratories, Inc. (UL):
   a. 1283, Standard for Electromagnetic Interference Filters.
   b. 1449, Standard for Surge Protective Devices.

B. Qualifications:

1. Provide devices from a manufacturer who has been regularly engaged in the development, design, testing, listing and manufacturing of SPDs of the types and ratings required for a period of 10 years or more and whose products have been in satisfactory use in similar service.
   a. Upon request, suppliers or manufacturers shall provide a list of not less than three customer references showing satisfactory operation.

1.3 DEFINITIONS

A. Clamping Voltage:

1. The applied surge shall be induced at the 90 degrees phase angle of the applied system frequency voltage.
2. The voltage measured at the end of the 6 inches output leads of the SPD and from the zero voltage reference to the peak of the surge.

B. Let-Through Voltage:

1. The applied surge shall be induced at the 90 degrees phase angle of the applied system frequency voltage.
2. The voltage measured at the end of the 6 inches output leads of the SPD and from the system peak voltage to the peak of the surge.

C. Maximum Continuous Operating Voltage (MCOV): The maximum steady state voltage at which the SPD device can operate and meet its specification within its rated temperature.

D. Maximum Surge Current:

1. The maximum 8 x 20 microsecond surge current pulse the SPD device is capable of surviving on a single-impulse basis without suffering either performance degradation or more than 10% deviation of clamping voltage at a specified surge current.
2. Listed by mode, since number and type of components in any SPD may very by mode.

E. Protection Modes: This parameter identifies the modes for which the SPD has directly connected protection elements, i.e., line-to-neutral (L-N), line-to-line (L-L), line-to-ground (L-G), neutral-to-ground (N-G).

F. Surge Current per Phase:

1. The per phase rating is the total surge current capacity connected to a given phase conductor.
   a. For example, a wye system surge current per phase would equal L-N plus L-G; a delta system surge current per phase would equal L-L plus L-G.
   b. The N-G mode is not included in the per phase calculation.

G. System Peak Voltage: The electrical equipment supply voltage sine wave peak (i.e., for a 480/277 V system the L-L peak voltage is 679V and the L-N peak voltage is 392 V).

1.4 SUBMITTALS

A. Product Data:

1. Manufacturer's qualifications.
2. Standard catalog cut sheet.
3. Electrical and mechanical drawing showing unit dimensions, weights, mounting provisions, connection details and layout diagram of the unit.
4. Testing procedures and testing equipment data.

B. Operation and Maintenance Manuals:

1. See Specification Section 01782 for requirements for:
   a. The mechanics and administration of submittal process.
   b. The content of the Operation and Maintenance Manuals.
2. Warranty.

1.5 WARRANTY

A. Minimum of a five year Warranty from date of shipment against failure when installed in compliance with applicable national/local electrical codes and the manufacturer's installation, operation and maintenance instructions.

PART 2 - PRODUCTS

2.1 GENERAL

A. Standards: IEEE C62.41.1, IEEE C62.41.2, IEEE C62.45, MIL-STD 220B, UL 1283, UL 1449.

2.2 TYPE PC3 SPD

A. Product:
   1. Integrally mounted in panelboard.
   2. Hybrid solid state high performance suppression system.
      a. Do not use gas tubes, spark gaps or other components in suppression system which might short or crowbar the line resulting in interruption of normal power flow to connected loads.
   3. Do not connect multiple SPD modules in series to achieve the specified performance.
   4. Designed for parallel connection.
   5. Field connection: Use mechanical or compression lugs for each phase, neutral and ground that will accept bus bar or #10 through #1/0 conductors.
   6. Device monitor:
      a. Long-life, solid state, externally visible indicators and Form C contact(s) that monitor the on-line status of each mode of the units suppression filter system or power loss in any of the phases.
      b. A fuse status only monitor system is not acceptable.

B. Operating Voltage: The nominal unit operating voltage and configuration as indicated on the Drawings.

C. Modes of Protection: All modes.
   1. Three phase (delta): L-L, L-G.
   2. Three phase (wye): L-N, L-L, L-G and N-G.
   3. Single phase (2 pole): L-L, L-N, L-G and N-G.
   4. Single phase: L-N, L-G and N-G.

D. Maximum Continuous Operating Voltage: Less than 130% of system peak voltage.

E. Operating Frequency: 45 to 65 Hz.

F. Short Circuit Rating: Equal to or greater than rating of equipment SPD is connected to.

G. Maximum Surge Current: 120,000 A per phase, 60,000 A per mode minimum.

H. Minimum Repetitive Surge Current Capacity: 4000 IEEE C High or B combination waveform impulses with no degradation of more than 10% deviation of the clamping voltage.

I. SPD Protection:

1. Integral unit level and/or component level overcurrent fuses and sustained overvoltage thermal cutout device.
2. An IEEE B combination wave shall not cause the fuse to open and render the SPD inoperable.

J. Maximum Clamping Voltages: Dynamic test at the 90 degrees phase angle including 6 inches lead length and measured from the zero voltage reference:

System Voltage	Test Mode	IEEE C62.41		UL 1449
		B Comb. Wave	B3 Ring Wave	
L-L < 250 V L-N < 150 V	L-L	1000 V	700 V	800 V
	L-N	600 V	400 V	500 V
	L-G	800 V	550 V	600 V
	N-G	800 V	550 V	600 V
L-L > 250 V L-N > 150 V	L-L	2000 V	1400 V	1800 V
	L-N	1150 V	800 V	1000 V
	L-G	1550 V	1000 V	1200 V
	N-G	1550 V	1000 V	1200 V

K. EMI-RFI Noise Rejection: Attenuation greater than 30 dB for frequencies between 100 kHz and 100 MHz.

2.3 SOURCE QUALITY CONTROL

A. SPD approvals and ratings shall be obtained by manufacturers from nationally recognized testing laboratories.

B. The SPD are to be tested as a complete SPD system including:

1. Integral unit level and/or component level fusing.
2. Neutral and ground shall not be bonded during testing.

3. 6 inches lead lengths.
4. Integral disconnect switch when provided.

C. The "as installed" SPD system including the manufacturers recommended circuit breaker, the SPD is connected to, will not open when tested with a IEEE C3 combination waveform.

D. Tests to be performed in accordance with IEEE C62.45:

1. Clamping voltage performance testing using IEEE C62.41 Category waveforms.
2. Single pulse surge current capacity test.
3. Repetitive surge current capacity testing.
4. Spectrum analysis for EMI-RFI noise rejection.

PART 3 -EXECUTION

3.1 INSTALLATION

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

B. Type PC3 SPD:

1. Connected in parallel to the equipment.
2. Install in panelboard box at the factory before shipment.
3. Provide leads that are as short and straight as possible.
4. Maximum lead length: 12 inches.
5. Minimum lead size: #2 stranded AWG or bus bar.
6. Connect leads to the equipment to be protected by one of the following means:
   a. Through a circuit breaker or molded case switch mounted in the equipment.
   b. Use manufacturer recommended circuit breaker size.
   c. Circuit breaker or switch to be operable from the equipment exterior or from behind a hinged door.

END OF SECTION

SECTION 265000
EXTERIOR LIGHTING

PART 1 -GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for:
   a. Exterior and site luminaires.
   b. LEDs.
   c. Drivers.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 3 - Concrete.
2. Section 260500 - Common Work Results for Electrical.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American National Standards Institute (ANSI):
   a. C78.377, Specification for the Chromaticity of Solid State Lighting Products.
2. Federal Communications Commission (FCC):
   a. Code of Federal Regulations (CFR), 47 CFR 18, Industrial, Scientific and Medical Equipment.
3. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   a. C62.41, Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
4. Illuminating Engineering Society of North America (IESNA):
   a. LM-79, Electrical and Photometric Measurements of Solid-State Lighting Products.
   b. LM-80, Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules.
5. National Electrical Manufacturers Association (NEMA):
6. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
   a. SSL 1, Electronic Drivers for LED Devices, Arrays or Systems.
7. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
8. Underwriters Laboratories, Inc. (UL):
   a. 1012, Power Units Other Than Class 2.
   b. 1310, Standard for Class 2 Power Units.
   c. 1598, Luminaires.

d. 8750, Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products.

1.3 DEFINITIONS

A. Useful Life for LED luminaire light sources:

1. The operating hours before reaching 70% of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions.
2. This is also known as 70% "Rated Lumen Maintenance Life" as defined in IESNA LM-80.

1.4 SUBMITTALS

A. Product Data:

1. Provide submittal data for all products specified in PART 2 of this Specification Section.
2. Luminaire data sheet:
   a. Name of manufacturer.
   b. Complete order information (catalog number).
   c. Description of construction and optics.
   d. Total input wattage.
   e. Luminous efficacy (lumens/Watt).
   f. Photometric performance data including candlepower distribution and coefficient of utilization (CU) table.
   g. Dimensional size.
   h. Weight.
3. Solid state Luminaire additional data:
   a. Voltage.
   b. Initial and IES L70 lumens.
   c. Luminous efficacy (lumens/Watt).
   d. Correlated Color Temperature (CCT).
   e. Color Rendering Index (CRI).
   f. Total Harmonic Distortion (THD).
   g. Lamp life.
   h. Driver manufacturer and model number.
   i. Driver life.
   j. Driver type (0-10V, constant voltage, constant current).
   k. Toxicity Characteristic Leaching Procedure (TCLP) compliance.
   l. Warranty information.
4. Pole data sheet:
   a. Name of manufacturer.
   b. Complete order information (catalog number).
   c. Description of construction.
   d. Length, shaft size and thickness.
   e. Wind loading (available luminaire EPA per wind speed).

f. Anchor bolt template.

g. Bolt size and material.

5. See Section 260500 for additional requirements.

B. Test Reports:

1. IESNA LM-79 Test Report for Solid-State Luminaire.

2. IESNA LM-80 Test Report Solid-State Light Source.

C. Certificates:

1. Solid-state Luminaire Useful Life Certificate.

D. Contract Closeout Information:

1. Operation and Maintenance Data:

a. See Section 01782 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

b. Submittal data for each component covered by warranty.

c. Warranty.

1.5 WARRANTY

A. Minimum of a five year Warranty from date of manufacture against failure for solid-state luminaire including LED arrays, LED drivers and integral control devices. The solid-state product is considered defective if more than 15% of the individual light emitting diodes fail to illuminate.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Luminaires: Per the Drawings.

2. Solid State Light Sources:

a. Luminaire manufacturer’s standard.

3. LED Driver: Luminaire manufacturer's standard.

4. Poles: Luminaire manufacturer's standard.

2.2 GENERAL REQUIREMENTS

A. Luminaires complete with LED modules and drivers.

B. No live parts normally exposed to contact.

C. When intended for use in wet areas: Mark luminaire "Suitable for wet locations."

2.3 LUMINAIRES

A. Standards and Listings:

1. UL 1598.

B. Wiring:

1. Factory-wired to be compatible with the project electrical and controls systems.

C. Mounting Accessories:

1. Provide appropriate mounting accessories for each luminaire, compatible with various structural conditions encountered.

2.4 SOLID-STATE LUMINAIRES - ADDITIONAL REQUIREMENTS

A. Standards:

1. IESNA LM-79, IESNA LM-80.
2. NEMA SSL 1.
3. UL 1012, 1310, and 8750.

B. Solid state modules and driver to be provided and warrantied by luminaire manufacturer.

C. Solid-State Modules:

1. Uniform color temperature of 4000K unless otherwise noted on the Drawings.
   a. Color temperature measurement shall have a maximum 3 SDCM on the MacAdam Ellipse for frosted lensed luminaires, and 2 SDCM for other luminaire types (ANSI C78.377).
2. Minimum color rendering index (CRI) of 70.
3. LED module light output and efficacy: Measured in accordance with IESNA LM-79 standards.
4. LED useful life and lumen maintenance: Measured in accordance with IESNA LM-80 standards.
5. Driver and LED module: Minimum useful life of 50,000 hours (L70).
6. Individual LEDs connected such that a failure of one LED will not result in a light output loss of the entire luminaire.

D. Driver:

1. Compatible with solid-state modules and control devices specified.
2. Operate from 60 Hz input source of 120V with sustained variations of ±10% (voltage and frequency).
3. Input current Total Harmonic Distortion (THD): Less than 20% when operated at nominal line voltage.
4. Power Factor: Greater than 0.90.
5. Avoid interference with infrared devices and eliminate visible flicker.
6. Comply with ANSI C62.41 Category A for Transient protection.
7. Comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).
8. Operating temperature range must be suitable for site temperature conditions.

E. Luminaire properly heat-sinked to assure LED junction temperature ratings are not exceeded.

1. Provide ambient operating temperature range for which product is warrantied.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Install lighting equipment in accordance with the manufacturer's instructions.

B. Install exterior luminaires so that water cannot enter or accumulate in the wiring compartment.

C. Ground luminaire.

3.2 POLE INSTALLATION

A. Drawings Indicate the Intended Location of Light Pole:

1. Field conditions may affect actual location.
2. Coordinate location with all existing or new utilities and pavement.

B. Anchor Base Plated Poles:

1. Mounted on cast-in-place foundations, as detailed on the Drawings.
   a. Concrete and reinforcing steel, in accordance with Division 3 Specification Sections.
2. Protect pole finish during installation.
   a. Repair damage to pole finish with manufacturer approved repair kit.

C. Ground poles as indicated on the Drawings.

END OF SECTION

SECTION 321218 (32 12 18)

RUBBERIZED RUNNING PATH

PART 1 – GENERAL

1.1 DESCRIPTION

A. Single layer, multi-purpose, monolithic, flexible, poured in place synthetic rubber surfacing system for the running path.

1.2 SECTION INCLUDES:

A. The complete installation of a poured in place, single layer, monolithic, resilient, polyurethane-bound synthetic rubber surface, uniformly paved by hand, and ADA compliant.

B. The system is a specially formulated single layer multi-component rubber and resin composite system, formed by mixing, pouring and leveling. The single surface layer is composed of polyurethane binder and synthetic virgin EPDM rubber granules. Specific work consists of furnishing all the required labor, materials, equipment, parts, and supplies necessary for the installation of this synthetic rubber surface. Layout required and specified by current owner or architect. The work here under shall be done and conform to:

C. Color: Black

1.3 SUBMITTALS:

A. Samples:

1. Submit (1) specified sample of multi-purpose, project specific, 4” x 4” square in full thickness of color selected.
2. Submit (1) Copy of Manufacturers Technical Data sheets on each product to be used.
3. Submit (1) Multi-purpose Installation Overview
4. Submit (1) Color Chart representing manufacturers color options

B. Contractor’s Project References:

1. Submit a list of successfully completed projects. Include project name and location, type and of surfacing installed.

C. Submittals. Close Out:

1. Submit (1) Manufacturer standard product warranty/ Signed by company officer with company corporate seal
2. Submit (1) Standard labor warranty.
3. Submit (1) Project specific surface care and maintenance guide.

1.4 QUALITY ASSURANCE

A. The Manufacturers Qualifications: Manufacturer must have a minimum of 15 years manufacturing with the products specified.

B. The Contractor’s Qualifications: The contractors installing foreman must be certified by the poured in place rubber manufacturer as an installer or AN authorized agent of the certified installer and have

specialized or similar experience installing and performing the work of this section that is required for this project.

C. The rubberized surfacing system shall be installed by manufacturer Certified authorized factory trained technicians only.

1.5 DELIVERY AND STORAGE

A. Delivery of Materials: Materials should be delivered to jobsite in unopened container, with labels clearly identifying the product name and manufacturer. Maintain clean and dry conditions. See manufacturer's guidelines for temperature requirements for the locale of the installation.

B. Storage of Materials: The Trade Contractor shall provide a secure, clean, dry location for storage of materials at temperatures above 50°F. Under no circumstances should materials be stored outside unless fully protected from moisture with 10 mil polyethylene barrier and tarpaulin. All materials stored outside shall be inspected by dealer for moisture contamination before application.

1.6 PROJECT SITE CONDITIONS

A. Rubber surfacing must not be applied until other trades are completely finished in the area and surrounding area. Environmental site conditions must be between 50- and 85-degrees F. When curing, the temperature may not fall below 45-degrees F. Do not install surfacing when subbase is wet or ground is frozen. Do not expose polyurethane to freezing temperature. Protect polyurethane from freezing.

B. Base shall be free of any materials and released to the applicator clean and in good condition.

C. Upon completion of installation, installer shall remove all unused materials, tools, equipment, and rubbish.

D. No smoking, open flames, or sparks from electrical equipment shall be permitted during the application of materials.

1.7 GUARANTEE

A. The rubber pavement surface shall be guaranteed against defects in materials for (10) ten years.

PART 2 – PRODUCTS

2.1 MANFACTURER

A. Acceptable Manufacturer:

Rubberway, Inc or distributor USSA, Inc.
Telephone: 877-288-0045

US Headquarters: West Coast: 4000 Barranca Parkway Suite 250, Irvine,CA. 92604:

email: info@rubberway.com ; web www.rubberway.com

1. All materials shall be made in the USA.
2. All materials must be obtained through and acceptable to manufacturer.

B. Substitutions: Requests for substitutions will be in accordance with provisions provided by owner.

2.2 MATERIAL TESTING AND CHARACTERISTICS REQUIREMENTS:

	Test Results	**DIN Standard**
Standard Deformation:		
At 0 degrees C	0.85mm	0.6mm – 1.8mm
At 23 degrees C	1.09mm	(temp range 0 degrees –
At 40 degrees C	1.36mm	40 degrees C
Tensile Strength:	0.58N/mm	min 0.5N/mm2
	78%	min 40%
COF ASTM C1028-07:	Dry 0.94	dry < 1.1
	Wet 0.76	wet < 0.5
Penetration Characteristics:	0.71mm	max 1.00mm
Burning Characteristics:	Class 1 to DIN 51960.	
Wearing Behavior:	1.1 min	1.0

Ageing:

QZ no value < 0.75 tensile strength min 0.75
QB no value < 0.75 ultimate strain min 0.75
QE no value < 0.75 QE min 0.75
QE no value > 1.25 QE max 1.25
No color value color transfer min 3 degrees < 3 degrees

A. All Materials shall have documented independent test results by an accredited IAAF testing house to the requirements of the IAAF Performance Specifications for Synthetic Surface (Outdoor) dated January 1990.

B. The following details have been taken from the Centre of Sports Technology, London, Laboratory Report L-0306 dated 16th March 1992 and shall be used as minimum standard for this project:

	TEST RESULT	**MINIMUM SPEC**
Sample thickness: (mm)	14.6mm	>12
Force Reduction (percentage)	39.1%	35.50%
Modified vertical deformation (mm)	1.13	0.6-1.8
Friction – TRRL	58	>47
Tensile Strength: (Mpa)	0.52	>0.5
Elongation at break (Percentage)	69	>40
Flammability	Passes	D 2859
Flammability	Passes	UL 94
ADA Compliant	Yes	Yes
Solar Reflectance Index Value(Grey)	31	ASTM E 1980-11

C. Environmental Compatibility – This system shall provide independent testing results confirming the requirements relating to the environmental compatibility are fulfilled in all points by the Synthetic Surface.

D. Requests for substitutions will be considered in accordance with provisions of Section 01 00 00 –Product requirements.

2.3 SYSTEM CHARACTERISTIC MINIMUM REQUIREMENTS

1. ADA Compliant
2. FM5-565 COF of Permeability .29 CM/2
3. ASTM D638 Tensile Strength 78% minimum 40%
4. Tensile Strength of Binder 5000 PSI
5. Elongation at mean 450%
6. Freeze Thaw Change –25 cycles(+) .44% No Change in visual
7. ASTM 2047 –96 COF 94 dry and 76 wet
8. ASTM F970 Static Load Limit –Results 99% recovery
9. EPA-TCLP-Method 6010B- Heavy Metal Leachate –Pass
10. Water Extractable 0% Organic Extractable –Free of Volatile Organic Compounds
11. ASTM E84-01 Flame Spread Result 65 Smoke Density <450
12. ASTM D2859 Flammability –Pass
13. UL 94 Flammability – Pass
14. ASTM E303 Skid Resistance 45
15. ASTM F970 Static Load 99% recovery
16. GMAX-F-355 Force Reduction 143

2.4 MATERIALS:

A. BONDING AGENT: Must have the capacity to bind with: Rubber, wood, steel, concrete, aluminum, asphalt, or waterproofing membrane. Binder: Delivered in 5 gallon pails, Drums or totes and clearly labeled

B. RUBBER GRANULE: EPDM Rubber Hydrocarbon – Delivered in 55 lb bags. Color and size as selected by owner.

PART 3 – SUB-BASE

3.1 RELATED WORK FOR SUB-BASE OPTIONS

A. Examination

1. Do not begin installation until substrates have been properly laid and fully cured and inspected by an authority approved by the owner. Make sure a systems check has been conducted for compatibility with the surface beneath the multipurpose surfacing system is to be installed.

3.2 ASPHALT SUB-BASE

A. When surfacing on new asphalt pavement, the asphalt must meet the specifications and standards set forth by the Engineer. The contractor shall be responsible for performing an elevation survey of the asphalt prior to application of the rubber surface.

B. The asphalt or pavement shall be sufficiently cured 20-28 days and cleaned prior to Work of this section to be performed. The entire surface shall provide positive drainage to the inside edge of the rubber surface. The maximum allowable planarity deviation within an asphalt pass should be 1/8 inch in 10 feet when measured in any direction with a straight edge. Deficient areas in the leveling course should be corrected as approved by the Engineer. After any corrections, the surface shall not allow water to stand greater than 1/16 inch deep one (1) hour after rain has ended. Surface must be totally dry for rubber placement.

C. All edges shall be clear of vegetation prior to installation.

3.3 EXECUTION

A. Inspection

1. The asphalt base shall be allowed to cure for a minimum of 21 days prior to work of this section being performed. Prior to installation of the polyurethane base mat, the entire asphalt base shall be checked for planarity and surface tolerance. Any areas that vary more than 1/8 inch in any direction when measured with a 10-foot straight edge shall be patched with a compound compatible with the base material and approved by the synthetic surface manufacturer and the Engineer.
2. Contractor should perform tests for moisture and adhesion prior to application and report adverse conditions to the installation contractor in writing.

B. Limitations

1. Installation of the synthetic surface material shall take place only when conditions are dry and the temperature is 50 degrees F and rising. If, in the installer's opinion, weather or climate conditions are harmful for proper synthetic surface installation, work shall be delayed until conditions are agreeable.

3.4 INSTALLATION OVER ASPHALT

A. The entire area to be surfaced shall receive an application of polyurethane primer applied uniformly at a rate between 0.20-0.30 lbs. per sq. yd.

PART 4 - INSTALLATION

4.1 MULTI PURPOSE SURFACE

A. The EPDM granules shall be integrated into a poured-in-place polyurethane binder to achieve the full depth thickness of the specified wear surface layer. The resilient finish shall be a matrix of exposed EPDM granules mixing ratio of rubber to binder shall not be

less than 5 parts rubber to 1 part binder as determined by the weight of the products. The materials shall be prepared in a mechanical mixer until a homogenous mix is obtained.

B. The mixed materials making up the synthetic surface shall be applied by a mechanically operated finishing machine which shall have an electrically heated screed or poured in place and hand toweled. The surface shall be in situ installed in one single layer to the specified depth.

C. The cured edge of each joint shall be primed with the synthetic surface binding agent prior to the adjacent base mat. All joint work shall be toweled flush with the adjacent mat.

D. All seams shall be toweled smooth within the pot life of the material. All edges shall be straight and rounded by turning the trowel. All cold dry seams shall be cut straight at an inward 45 degree angle and primed prior to commencing with subsequent work.

4.2 PROTECTION

A. Cure Time: No traffic or other trades shall be allowed on the surface for a period of 48 hours following completion for ample cure time.

B. Other Trades: It shall be the responsibility of the general contractor to protect the surface from damage by other trades before acceptance by the Owner or his agent.

4.3 MATERIAL GUARANTEE

A. The surface materials shall be guaranteed against defects for a period of ten (10) years, per the warranty, from the date of completion. This ten year guarantee shall be provided directly to the owner by approved manufacturer.

END OF SECTION

SECTION 40 69 00

CONTINUOUS MONITORING AND ADAPTIVE CONTROL (CMAC)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. This Section covers the Continuous Monitoring and Adaptive Control (CMAC) implementation which includes furnishing of materials, equipment, labor, transportation, supervision, software and licensing required to deploy forecast-based actuated stormwater controls.

1.2 DEFINITIONS

A. Continuous Monitoring and Adaptive Control (CMAC): Monitoring weather forecast and stormwater data in real-time at a site and using that monitoring data to automatically control the site discharge with the intent of minimizing negative impacts locally and downstream during present and future conditions.

B. CMAC Provider: A product company employed by the Contractor that is experienced in design, configuration, and deployment of CMAC Equipment and Software on a cloud-based platform.

C. CMAC Equipment: Equipment manufactured by third parties that interoperates with the CMAC Software.

D. CMAC Software: CMAC applications that are configured to achieve site-specific objectives and provide user access to real-time site conditions and remote control of CMAC Equipment. CMAC Software shall be hosted on the CMAC Platform, and provided as a subscription.

E. CMAC Platform: Computing environments where the CMAC Software is deployed.

F. CMAC Support: CMAC Software and Platform support services provided by the CMAC Provider.

G. CMAC Package: A technology system comprised of CMAC Equipment, Software, Platform, and Support.

H. Site: A stormwater detention and/or retention basin, capable of capturing, storing, and releasing stormwater, where CMAC Package will be installed.

I. Real-time: Applications that process updates as soon as they are available and without significant delay relative to their objectives.

1.3 ROLES AND RESPONSIBILITIES

A. The CMAC Provider shall:

1. Provide CMAC Equipment specially designed to work with the CMAC Software (Section 2.1 CMAC equipment).

2. Coordinate with and support the Contractor to facilitate proper installation of the CMAC Equipment per Part 3.

3. Provide the Contractor with remote-based commissioning support and guidance of the CMAC Equipment to ensure proper connectivity to the CMAC Platform.

4. Configure and deploy the CMAC Software to meet site requirements and performance objectives (Section 2.3 CMAC Software).

5. Provide a CMAC Software configuration summary to the Contractor for review and approval by the Owner.

6. Provide an CMAC Software subscription license to the Contractor or specified Owner (Section 2.4 CMAC).

B. The Contractor shall:

1. Provide site access and formal permits required for construction/installation of the CMAC Equipment.

2. Prepare, obtain, and submit all required submittals for review and approval by the Owner.

3. Provide all labor, material, and equipment required to install the CMAC Package as shown in the Drawings and as specified herein.

1.4 SUBMITTALS

A. Submit shop drawings and product information for CMAC Equipment and installation materials to the Owner for all products detailed in Part 2.

B. Submit a CMAC Software configuration summary for review and approval by the Owner per requirements listed in Part 2. The CMAC Software shall meet the performance and regulatory requirements of the site.

C. Submit a construction verification checklist and installation photos for review and approval by the CMAC Provider and Owner.

D. Submit completed CMAC Equipment commissioning checklist with guidance and remote-support from the CMAC Provider to Owner.

E. Submit demonstration of CMAC Provider Qualifications to Owner for review and approval.

1.5 QUALITY ASSURANCE

A. Qualifications: The CMAC Provider shall demonstrate a minimum of five (5) successful system implementations with a minimum of five (5) years of successful operation.

B. Storage and Handling: The Contractor shall exercise care in the storage and handling of the CMAC Equipment and all components throughout duration of the Work. The Contractor shall be responsible for repair and replacement of CMAC equipment at the sole cost of the Contractor. The CMAC Equipment and all components shall always be stored indoors and transported inside the original shipping container until the components are ready to be installed. The CMAC Equipment shall be handled with care and lifted according to OSHA and NIOSH lifting recommendations and/or Contractor’s workplace safety professional recommendations.

C. Shipping: The CMAC Equipment shall be shipped to the Contractor's address or project site, and it is the responsibility of the CONTRACTOR to offload and transport the materials to the site of installation.

PART 2 - PRODUCTS

2.1 CMAC EQUIPMENT

A. The CMAC equipment will be an OptiRTC system including, but not limited to:

1. Control Panel – Control Panel shall include components for hosting on-site CMAC Software applications that provide continuous automated control of discharge from gravity-drained stormwater facilities. The Control Panel shall be powered by line power (120VAC, 60Hz, 1PH), communicate over cellular networks, and be outdoor rated. The Control Panel shall include the following functional requirements:

   a. Cellular microcontroller-based web gateway

   b. 4G GSM cellular connectivity

   c. Vendor-managed over-the-air updates to firmware and device configuration

   d. Failsafe operation under prolonged loss of connectivity, power, and sensor subsystems

   e. Message encryption of all communications with cloud platforms using hardware-backed keys

   f. Capable of reporting continuous monitoring data at ~1 min frequency

   g. Support communications protocol of CMAC Software

   h. Operate for a temperature range of -20 to 60 °C

   i. Accept inputs from: 4-20mA analog level sensor, 4-20mA and Modbus interfaces for actuated valve position and diagnostics, door access security sensor, or line power per electrical diagram and notes in the Drawings

   j. Provide outputs for: continuously modulated 4-20mA butterfly valve

   k. Inherently safe operation of valve (i.e., equipment based on site objectives)

   l. At-panel physical manual override and control

   m. The enclosure shall be a Nema 4X stainless steel sized to accommodate future equipment that the City will install. 36" x 48" x 10" minimum size. Enclosure shall be able to locked with a padlock.

2. Water Level Sensor – Industrial grade pressure transducer capable of operating for a temperature range of -20 to 60 °C. The water level sensor shall be connected to and powered by the Control Panel, and shall communicate site water level using a

4-20mA analog signal. Aneroid bellows will be used to isolate the vent line from the atmosphere. Provide one sensor for each pond.

3. Actuated Flow Control Device – Actuated valve per the Drawings. The actuated flow control device shall be rated for outdoor operations in the local environment and capable of closed-loop control via 4-20mA signal inputs and Modbus RTU-provided feedback with local manual operation (e.g. hand wheel or T-wrench) available at the flow control device.

2.2 CMAC EQUIPMENT INSTALLATION MATERIALS

A. The Contractor shall install all CMAC Equipment in accordance with the Drawings and as specified herein.

B. The Contractor shall procure all installation materials required for a complete and operational CMAC Package, in accordance with the Drawings and as specified herein. Materials include but are not limited to miscellaneous mounting hardware, electrical conduit and conductors, and appurtenances.

2.3 CMAC SOFTWARE

A. The CMAC Provider shall configure the CMAC Software with site-specific control logic. CMAC provider shall demonstrate how CMAC software will meet site objectives. Control logic shall be hosted both locally on the Control Panel and in a cloud computing environment. Control logic shall include:

1. Forecast-based pre-event drawdown

    a. Storm D (1.4 inches): Upper Pond 912’, Lower Pond 902’ feet NAVD88

    b. Storm H (2.9 inches): Upper Pond 909’, Lower Pond 900’

2. Extended post-event retention duration up to 48 hours

3. Modulated release during wet weather to achieve peak flow reduction

4. Dry-weather maximum release rate of 5.6 cfs to minimize downstream combined sewer overflows

5. Dry and wet-weather target water surface elevations (feet, NAVD88) as follows:

    a. Dry-Weather: Normal Water Level Upper Pond 916’, Lower Pond 909’

    b. Maximum Wet-Weather for Storm D (1.4 inches): Upper Pond 916’, Lower Pond 909’

    c. Maximum Wet-Weather for Storm H (2.9 inches): Upper Pond 916’, Lower Pond 909’

6. On loss of power, actuators to remain in last commanded state.

7. On loss of communications, system shall function with last set of instructions (i.e. is modulating to maintain level, continue that operation, etc.)

B. The CMAC Software shall be capable of predictive modeling and using real-time weather forecasting from National Oceanic and Atmospheric Administration (NOAA) weather forecast data (or approved equal), including the use of Quantitative Precipitation Forecast and Probability of Precipitation data to manage water volume and flow rates at the site.

C. The CMAC Software shall support a Manual Control feature to allow for remote override of the automated control via a secure web browser. This feature shall provide a time and identity-based lock-out functionality such that two (2) users accessing the Manual Control feature at the same time cannot simultaneously command the Actuate Flow Control Device to take different positions.

D. The CMAC Software shall be capable of providing user-specific dashboards to display real-time conditions for on-site operating parameters.

E. The CMAC Software shall allow users to view site data in dynamic visualizations in modern browsers without requiring any plugin technology.

F. The CMAC Software shall be able to display site data summarized by individual storm events.

G. The CMAC Software shall be capable of sending automated email alerts to users based on thresholds relating to current and future site conditions.

2.4 CMAC PLATFORM

A. CMAC Provider shall provide the Owner with access and use of CMAC Platform to operate selected CMAC site(s). The CMAC Platform shall meet the following specifications.

1. The CMAC Platform shall employ cloud computing for data persistence.

2. The CMAC Platform shall implement strong encryption for all data transmissions from the site, between components in the cloud, and to users' web browsers.

3. The CMAC Platform shall be capable of supporting Single Sign-On with the Microsoft Active Directory-compatible identity providers.

4. The CMAC Platform shall be capable of implementing multi-factor user authentication for secure login.

5. The CMAC Platform shall provide data management, storage, and ability for users to download historical data.

6. The CMAC Platform shall have a public, anonymous-access status page that administrators can subscribe to alerts from and access messages about incident response.

7. The CMAC Platform shall have a public API that can be used to support external websites and analysis tools access to recent data.

2.5 CMAC SUPPORT

A. CMAC Provider shall provide support to the Owner as part of the CMAC Software and Platform service, including On-call customer support during regular business hours and responses to support inquiries within one (1) business day.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Contractor shall clear and prepare site for installation, including clearing vegetation around outlet structure and other equipment installation locations per the Drawings. Establish access throughout the site, including de-watering as needed.

B. Contractor shall trench for rigid conduit runs as specified in Division 26 and as indicated on the Drawings.

C. Contractor shall install Control Panel per the Drawings and as specified herein.

D. Contractor shall prepare the outlet structure for installation of the Actuated Flow Control Device assembly, as specified herein:

1. Grind concrete wall within outlet structure to prepare for Actuated Flow Control Device and mounting flange installation, as needed.

2. Trim inlet pipe to be flush with the inner wall of outlet structure, as needed.

3. Prepare the ground surface so that the valve rests on one of the following: poured concrete pad (4000 psi), approved concrete blocks, or approved structure capable of bearing 600-lb load, per the Drawings.

E. Install Actuated Flow Control Device (the actuator, valve, and valve stem extension shall be delivered on a palette, pre-assembled) in accordance with manufacturer instructions and Drawings and as specified herein:

1. Actuator handwheel (crank) shall be facing away from the nearest wall for easy access.

2. Attach the flange to the valve with connector bolts tightened to torque specified in manufacturer instructions.

3. Mount the valve over the inlet pipe by attaching the other end of the flange to the wall. Secure with bolts and injectable adhesive anchor.

4. Mount the valve stem extension with the stem extension mounts.

F. Install and mount the stilling well and level sensor per the Drawings.

G. Contractor shall perform electrical work per Division 26 install additional components per the Drawings and as specified herein:

1. Supply power to the Control Panel and actuator.

2. Provide rigid conduit underground from the Control Panel to the actuator. Connect the rigid conduit to the actuator conduit entry ports using flexible conduit; leave an extra three feet of flexible conduit for ease of future maintenance. Provide IP68-rated waterproof connections and seals.

3. Run electrical conductors from the Control Panel to the actuator, and connect to appropriate terminals, following the Electrical Connection Schedule. Redline the conductor labels on the Electrical Connection Schedule and One-Line Diagram.

4. Run pre-wired electrical cable from level sensor to control panel in rigid conduit with IP68 rated connections/seals. Mount pressure reference device (component of level sensor) within the Control Panel as follows:

a. Do not splice level sensor cable.

b. Do not allow moisture to enter the vent tube.

c. Damage to the level sensor cable will necessitate the replacement of the entire sensor, as the cable may not be repaired or spliced.

d. Leave any additional length of cable coiled neatly in the Control Panel.

5. Connect conductors from level sensor and actuator to designated terminals within the Control Panel as shown in Electrical Schedule and Wiring Diagram. Use waterproof cord grips for conduit terminations at the Control Panel.

a. Leave at least 1 ft. of additional cable coiled neatly in the CMAC Control Panel for future repairs.

H. Mount trash rack upstream of Actuated Flow Control Device, per the Drawings.

3.2 CONSTRUCTION VERIFICATION AND COMMISSIONING

A. Contractor shall coordinate with the CMAC Provider to schedule site commissioning after installation is complete per Section 3.1 Installation.

B. Contractor shall complete the CMAC Provider’s construction verification checklist and provide installation photos to the CMAC Provider to ensure proper installation of the

CMAC Equipment. Contractor shall provide signed checklist and photos to the CMAC Provider at least 14 calendar days prior to commissioning.

C. Contractor shall commission the site, which includes testing communications and performance of the equipment, and communications to/from the CMAC Software and Platform (electrician is not required to be present). Complete the CMAC Equipment commissioning checklist with guidance and remote-support from the CMAC Provider.

3.3 FINAL ACCEPTANCE

A. Contractor shall provide a signed copy of the CMAC Software configuration summary (signature must be from the Owner) to the CMAC Provider.

REPORT OF SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION

GREEN INFRASTRUCTURE PROJECT:
MILL CREEK PARK
KANSAS CITY, MISSOURI
TSI PROJECT NUMBER 20212037.00

HDR ENGINEERING, INC.
10450 Holmes Road, Suite 600
Kansas City, Missouri 64131

TSi geotechnical, inc.

8248 NW 101st Terrace #5
Kansas City, Missouri 64153

August 25, 2023

August 25, 2023

Mr. Charlie Sievert, PE
HDR ENGINEERING, INC.
10450 Holmes Road, Suite 600
Kansas City, Missouri 64131

Re: Report of Subsurface Exploration and
Geotechnical Engineering Evaluation
Green Infrastructure Project: Mill Creek Park
Kansas City, Missouri
TSi Project No. 20212037.00

Dear Mr. Sievert:

TSi Geotechnical, Inc. (TSi) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the referenced project and is pleased to submit this report of our findings to HDR Engineering, Inc. (HDR). The purpose of our work was to determine subsurface conditions at specific exploration locations and to gather data on which to prepare geotechnical recommendations for the proposed Green Infrastructure project in Mill Creek Park in Kansas City, Missouri. This report describes the exploration procedures used, documents the data obtained, and presents our evaluations and recommendations relative to the geotechnical engineering aspects of the project.

We appreciate the opportunity to assist you with this project. If you have any questions, or if we may be of further service to you, please call us.

Respectfully submitted,
TSI GEOTECHNICAL, INC.

Fred H. Held III
Project Manager

Andrew Declue, PE
Director of Operations

STATE OF MISSOURI
ANDREW DECLUE
8-25-23
NUMBER PE-2022001621
PROFESSIONAL ENGINEER

Denise B. Hervey, PE
Principal

PROFESSIONAL SERVICE SINCE 1989

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SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATION GREEN INFRASTRUCTURE PROJECT: MILL CREEK PARK KANSAS CITY, MISSOURI

1.0 SCOPE OF SERVICES

This report summarizes the results of a geotechnical study performed for the proposed Green Infrastructure project in Mill Creek Park in Kansas City, Missouri. The study was performed in general accordance with TSi's contract with HDR dated May 13, 2021 and contract amendment dated July 14, 2021. Based on TSi's understanding of the project, the following items have been identified for inclusion in this study report:

- Subsurface conditions at the boring locations;
- Laboratory test results;
- Depth to bedrock;
- Influence of groundwater on the project;
- Technical opinion of soils and groundwater conditions on construction performance of green infrastructure;
- Foundation recommendations;
- Lateral earth pressures for below-grade structures;
- Seismic site classifications;
- Recommendations for fill and backfill materials, placement, and compaction.

2.0 SITE AND PROJECT DESCRIPTIONS

The following project understanding is based on discussions with HDR, and a site reconnaissance by a geotechnical engineer from TSi. The project will consist of installing new green infrastructure systems in the general area of Mill Creek Park in Kansas City, Missouri. The green infrastructure includes a series of detention ponds and basins separated by clay dikes to maintain different water levels. The hydraulic design includes the upper basin flowing into each consecutive basin in series to the lowest basin along the park alignment. Groundwater storage and ground infiltration will be designed into the series of green infrastructure features. Storm water sewers and assorted drainage structures are planned for this project in various areas. In addition, there are a number of physical and park features planned including elevated walkways between the detention ponds and basins, retaining walls, bench areas, new pavement walkways, and elevated platforms around the perimeter of the detention ponds and basins. The general location of the project site is shown in the Site Vicinity Map, Figure 1 in Appendix A. The Site and Boring Location Plans, Figures 2.1, 2.2, & 2.3 in Appendix A, outlines preliminary plans of the Phase 1 project area and the location of the monitoring well borings in the Phase 2 area.

We understand the detention ponds and basins will have storage media consisting of clean gravel underwater that could be 3 to 4 feet deep above the soil subgrade. Retaining walls at the pond and basin perimeters are planned to be supported on this granular layer without impeding groundwater storage under the retaining wall foundations. Other retaining walls with integral benches and seats are planned concentrically around the irregularly shaped ponds and basins. Paved walkways will separate these features and are planned around the project area including steps and elevated walkways on the clay dikes separating the ponds and basins.

The site is generally a grass covered park with some trees, benches, sculptures, paved walkways, and a ramp up to the east. Sewers are present in the project area including a 5-foot diameter brick sewer that flows under the park from north to south. Several other underground sewers and utilities are also in the project area. We understand a spring-like feature is present on the site on the northeast part of the park. The south end of the park has an existing fountain.

The shape of the site is generally a long rectangle parallel to Mill Creek Parkway that measures up to about 300 feet wide and about 2,550 feet long from W. 43rd Street to W. 47th Street. The Phase 1 area of exploration includes the northern part of the park about 1,150 feet long where the ponds, basins, retaining walls, and benches are planned. The Phase 2 area to the south was explored for preliminary hydrogeologic purposes. Mill Creek Park generally slopes down gradually toward the south about 40 feet through Phase 1 and 2 sections of the park. From east to west the park has a shallow bowl shape that slopes down about 5 feet from Mill Creek Pkwy, a relatively flat area in the middle, then up to the west more sharply about 15 feet. From north to south the site falls about 25 feet through the Phase 1 section and another 15 feet through the Phase 2 section.

3.0 Field Exploration and Laboratory Testing

3.1 Field Exploration

TSi conducted an exploration program at the project site in two phases. The first phase was performed in October 2021 consisting of 6 soil borings and 2 test pits, designated as Borings B-1 to B-3, MW-1 to MW-3, Pit-1, and Pit-2. TSi also installed 3 monitoring wells within the project site location. Phase 1 was focused on the series of detention ponds and basins from a hydrogeologic perspective. The second phase of the project took place between April 27 to May 3, 2022 and included an additional eight (8) borings and three monitoring wells, designated as Borings B-4 through B-11 and MW-4 through MW-6. This phase expanded the hydrogeologic exploration to the south part of the park and performed some widely spread borings on the north part of the park to help characterize the site for foundation recommendations. The logs from this exploration are included in Appendix B of this report. The boring and test pit locations were selected by HDR and located in the field by a survey crew. The ground surface elevations at the as-drilled boring locations were surveyed and provided to TSi by HDR.

The borings were drilled using a CME 550 ATV-mounted drill rig to advance flight auger drilling tools. Split-spoon and Shelby tube samples were recovered from the borings. Split-spoon samples were recovered using a 2-inch outside-diameter, split-barrel sampler, driven by an automatic hammer, in accordance with ASTM D 1586. Three-inch Shelby tube samples were obtained in accordance with ASTM D 1587. The Shelby tube samples were preserved by sealing the entire sample in the tube. The split-spoon samples were placed in plastic bags for later testing in the laboratory. Borings B-4, -6, -9, and -11 were advanced below auger refusal depths and additional 5 to 10 feet using NQ-size diamond-bit rock coring methods. Limestone and shale bedrock was cored to depths of 15.5 to 22 feet. The rock cores recovered were placed in cardboard boxes and taken to the laboratory for examination and testing.

The test pits were excavated using hyrdro-vac equipment, under the observation of a TSi geotechnical specialist. Grab bag samples were obtained from the test pits and sealed in plastic bags. Piezometers were installed in the test pits to measure future groundwater readings.

The results of the field tests and measurements were recorded on field logs and appropriate data sheets by TSi's geotechnical specialist. Those data sheets and logs contain information concerning the exploration methods, samples attempted and recovered, indications of the presence of various subsurface materials, and the observation of groundwater. The field logs and data sheets contain the specialist's interpretations of the conditions between samples, based on the performance of the exploration equipment and the cuttings brought to the surface. The final logs included in this report were based on the field logs, modified as appropriate based on the results of laboratory testing of soil samples.

3.2 LABORATORY TESTING

A laboratory testing program was conducted by TSi to determine selected engineering properties of the obtained soil samples. The following laboratory tests were performed on select samples recovered from the borings and test pits in accordance with applicable ASTM standards:

- Visual descriptions by color and texture;
- Natural moisture content;
- Grain size analysis including hydrometer testing;
- Atterberg limits;
- Unconfined compressive strength test on selected cohesive samples; and
- Compressive strength test on selected rock core samples.

The results of the laboratory tests are summarized on the boring logs and in Appendix C. The analysis and conclusions contained in this report are based on field and laboratory test results and on the interpretations of the subsurface conditions as reported on the logs. Only data pertinent to the objectives of this report have been included on the logs; therefore, these logs should not be used for other purposes.

4.0 Subsurface Conditions

Details of the subsurface conditions encountered at the boring locations are shown on the logs in Appendix B. The general subsurface conditions encountered, and their pertinent engineering characteristics are described in the following paragraphs. Conditions represented by the borings should be considered applicable only at these locations on the date shown; the reported conditions may be different at other locations or at other times.

4.1 General Geology

Based on the United States Geological Survey (USGS) and Missouri Department of Natural Resources (GeoSTRAT) database, the bedrock at this site lies in Kansas City Group of the Missourian Series of the Pennsylvanian Subsystem. The Kansas City Group generally consists of alternating layers of limestone and shale with some sandstone and minor coal. Most of the project appears to be in Quaternary Alluvium consisting of recently deposited surface soils underlain by bedrock of the Upper Linn Subgroup of the Kansas City Group. This subgroup contains Chanute Shale which is a layer about 10 to 15 feet thick in the Kansas City area. A thin coal bed is present in some locations in the upper part of Chanute Shale. This shale can be silty or sandy with claystone in the lower part of the bed. The Drum Limestone layer underlies this shale and is generally 5 to 10 feet thick. The Quivira Shale member underlies this limestone and varies from about 1 to 15 feet in thickness.

4.2 Generalized Subsurface Profile

Based on geologic research and information from HDR, we believe the majority of the surficial material across the site is made up of various types and consistency of fill materials. These fill materials may not be specifically detailed on the boring logs due to the difficulty of identifying fill that is aged and may be comprised of similar materials as the native materials. In addition, several existing sewers are present in the project area that has associated backfill that may not have been placed and compacted as structure fill. The following paragraphs describes the soils and rock encountered in the borings.

The surficial materials at Borings B-1 through B-7, MW-2 and MW-3, are identified as existing fills which generally consist of soft to stiff, lean clay with various amounts of sand, gravel, to depths ranging from 3 to 7.5 feet. As previously stated, other fill soils may not be identified on the boring logs due to their age, materials, and lack of deleterious matter. Standard penetration tests (N-value) and moisture contents in these fill materials range from 3 to 27 blows per foot (bpf) and 13% to 43%, respectively. Atterberg limits tests in these fill materials result in liquid limits (LL) ranging from 41 to 64 and plasticity indices (PI) ranging from 23 to 42.

The fill soils identified and from the ground surface of other borings, were generally underlain by soft to stiff, lean, fat, and organic clays (CL, CH, and OH in accordance with the USCS) to sampler refusal depths of about 3 to 20 feet. A thin layer of medium dense, clayey gravel (GC) was encountered in Borings B-1 and B-2. The upper clays transition into very stiff to hard shaley clays, clayey shales, and weathered shale. Soil augers and samplers penetrated the upper weathered shale to auger refusal depths of about 4 to 20 feet.

N-values and moisture contents in the lean clays (CL) range from 3 to 18 bpf and 15% to 37%, respectively. Atterberg limits tests in the lean clays result in liquid limits (LL) ranging from 41 to 49 and plasticity indices (PI) ranging from 19 to 32. N-values and moisture contents in the fat clays (CH) range from 4 to 24 bpf of penetration and 18% to 51%, respectively. Atterberg limits tests in the fat clays result in liquid limits (LL) ranging from 50 to 80 and plasticity indices (PI) ranging from 30 to 52. N-values and moisture contents in the organic clays (OH) encountered in Borings B-1 and B-3 are 4 and 7 bpf, and 25% and 29%, respectively. Atterberg limits tests in the organic clays resulted in liquid limits (LL) of 52 and 56 and plasticity indices (PI) of 33 and 37 when air dried. Oven-dried liquid limits are 36 which is more than 25% lower than air dried values which deem them organic clays.

The identified fills and native clays are underlain by relatively hard, shaley clay, and clayey shale, transitioning into soft shale bedrock. These materials generally have N-values over 40 or refused with 50 blows for 6 inches or less. A layer of coal was encountered in Boring B-1at depths of about 9 to 11 feet prior to shale. The upper shale bedrock is generally gray, soft, and weathered. N-values and moisture contents in the shales ranged from 71 bpf to 50 blows for 1 inch and 9% to 16%, respectively.

The borings for this exploration were extended to auger refusal at variable depths, and the underlying bedrock was cored to penetrate approximately 5 to 10 feet into rock in four borings in the Phase 1 area. Limestone and shale was encountered in the cores. The bedrock cored consists of gray, hard, moderately weathered, aphanitic to finely crystalline limestone that is thin to medium bedded with some chert nodules and shale seams. About 0.5 to 2 feet of gray, soft, moderately to highly weathered shale was recovered from three of the cores. The rock core recoveries range from 95 to 100%. The Rock Quality Designation (RQD) values generally range from 51 to 100, except for the upper 6 inches of core in Boring B-11 at a depth of 5.5 feet. The RQD is a modified recovery ratio, calculated as the cumulative length of core pieces that have individual lengths greater than 4 inches, divided by the length of the core run. This value provides an index of the quality of the rock. Uniaxial compression tests were performed on three (3) rock core samples in three (3) borings. These tests yield uniaxial compressive strength values ranging from 14,640 to 16,715 pounds per square inch (psi). The densities of these samples range from 164.8 to 167.6 pounds per cubic foot (pcf).

4.3 GROUNDWATER

Groundwater was encountered in Borings B-2, MW-2 and MW-3 at depths ranging from 4.0 to 8.5 ft. during drilling. Groundwater was not encountered at other boring locations during drilling; however, subsequent readings from piezometers yielded groundwater. The presence or absence of groundwater at a particular location does not necessarily mean that groundwater will be present or absent at that location at other times. Seasonal variations and other unknown considerations could cause fluctuations in water levels and the presence of water in the soils.

TSi’s scope of work included performing weekly groundwater readings at the piezometers installed within the borings. The weekly readings were taken within 24 hours of a rain event greater than 0.25 inches of rain within a 24-hour period. If there was no rain event in the week, a

general weekly reading was taken. For the Phase 1 scope of work, there were a total of 13 weekly readings taken in Borings MW-1 through MW-3 and in Pit-1 and Pit-2. During Phase 2 of the project, another set of weekly readings were taking in the new piezometers, MW-4 through MW-6 as well as the existing piezometers MW-1 through MW-3 and the test pits. Tables of weekly well readings are provided in Appendix D of this report.

5.0 Engineering Assessments and Recommendations

5.1 Existing Fill and Utilities

Undocumented existing fill material was identified in 11 out of 19 boring, monitoring well, and pit locations and may be present in other locations. Additionally, based on information provided by the client and TSi's observation of the site, we believe the majority of the park area has undocumented fill as the surficial material to various depths. The character of the existing fill is discussed in Section 4.1 of this report. It is not known how this fill was placed and how much deleterious material may be in the fill between the locations sampled during this exploration. Based on the data obtained from the borings, the existing fill appears to be variable in type and consistency. As a result, the engineering properties of the fill cannot be predicted with certainty, and there is a risk for excessive total or differential settlement or other performance problems if the new structures are supported on the existing fill.

Several options are available for mitigating the risks associated with the existing fill material, the most common of which are described below. It will ultimately be the decision of the owner to decide which course of action to take, based on a comparison of risks that result from the presence of the existing fill with the costs associated with reducing or eliminating the risks.

Complete Removal and Replacement – The risks associated with building upon the existing fill may not be acceptable to owner and designers. In order to eliminate the risk to the structures, the existing fill could be removed entirely from the planned footing and pavement areas and replaced with compacted, suitable fill. Old fill that proves to be relatively uniform in composition, free of deleterious materials may be reused as new fill meeting the requirements in Section 6.4 of this report. As stated previously, the existing fill extended to depths of approximately 7.5 feet below grades. In our opinion, complete removal and replacement of existing fill of this magnitude may not be practical or cost-effective due to the size of the project area and identifying existing fill soils.

Partial Removal and Replacement – Since complete removal may not be practical due to the depth and extent of existing fill, partial removal and replacement options could be considered for shallow foundations and pavements. TSi recommends that the existing fill beneath proposed structures be removed and replaced with properly compacted new fill meeting the requirements in Section 6.4 of this report to a depth of at least 2 feet below pavement and foundation subgrades. Additional fill removal could be required if soft soils are encountered. Fill removal under pavements and foundations should extend at least two feet wider on all sides of structures to allow for proper compaction.

The excavated existing fill soils should be replaced with a low-plasticity lean clay or a well-graded crushed limestone. Depending on the consistency of any remaining fill, the planned loading and settlement tolerances, additional fill removal could be required for acceptable performance. The replacement material should be placed and compacted in accordance with the recommendations provided in Section 6 of this report.

Additional Options – Other options for mitigating the risks associated with the presence of existing fill include deep foundations and ground improvement. Deep foundations could include drilled shafts, driven piles, helical piers, micropiles, or others. Ground improvements, such as geogrid and geotextile reinforced layers, are also possibilities. These technologies would be effective at mitigating the uncertainties associated with the existing fill and reduce the potential for total and differential settlements.

Existing Utilities – Sewer pipes and associated backfill are present in the project area under planned detention basins, ponds, retaining walls, and walkways. Structures to remain under planned features can complicate foundation design and construction. Sewer pipes and appurtenances may not have been backfilled with structural fill since they were originally placed in landscape areas. Shallow foundation support may be compromised over existing structures and backfill.

Existing structures to be abandoned should be removed including the associated backfill. Structures planned over utilities should be checked for potentially soft clay or loose gravel backfill that can cause uneven settlement of retaining wall footings, benches, and walkway slabs. Footings planned over utilities may require deep foundation support and grade beams to span across the utility and backfill to prevent footing settlement and potential damage to the utility.

5.2 Swelling Clay and Shale Considerations

Fat clays (CH), shaley clays, clayey shale, and shale bedrock were encountered at several of the boring locations within the subsurface profile. It is possible the these potentially expansive materials could be encountered at shallow footing or pavement subgrade elevations. Fat clays and shales tend to swell when water is absorbed and shrink as the material dries. Potential detrimental effects include heaving, settlement, and differential movements of shallow foundations and pavements. This concern applies to these materials whether in their natural condition or used as fill material.

We recommend that fat clay soils and shales be overexcavated to a depth of at least 2 feet below shallow footings and pavements for shrink and swell considerations. This also applies to organic clays whether they are lean or fat (OL and OH). The overexcavated clay soils and shales should be replaced with a volume-stable material, such as a low-plasticity silty or lean clay or a well-graded crushed limestone. Fat clays could be reused for structural fill if they are chemically treated with lime products to reduce the shrink and swell potential. The new or lime treated material should be placed and compacted in accordance with the recommendations provided in Section 6 of this report.

Some relatively simple design and construction considerations are recommended that will help to maintain the natural moisture content of the shale and fat clay. Avoiding conditions that could result in excessive wetting or drying of the shale and fat clay will reduce their potential for volume change. The following design and construction precautions are recommended:

1. Shale and fat clays should not be used as backfill material within 2.0 feet of a pipeline, other structures, or pavements.

2. Shale and fat clay, if used as fill, should be placed and compacted wet of its optimum moisture content, as discussed in Section 6.4 of this report.

3. Positive surface drainage should be provided during and after construction to prevent ponding of water in and around any excavations or the exposed subgrade.

5.3 Clay Dikes

We understand that clay dikes consisting of clay embankments between basins and ponds will be constructed to control water levels between the separated bodies of water. To prevent seepage under the embankments, any granular material such as sand, gravel, and clayey sand or gravel should be removed from under the embankments prior to filling. Soft soils should be removed from under these embankments prior to embankment construction. Where these clay embankments will support walkways they should be constructed no steeper than inclinations of 2 horizontal to 1 vertical (2H:1V) or flatter for structural stability. Concrete slabs or riprap facing underlain by a geotextile may be required to armor the embankments from erosion. These clay embankments should be compacted within 0 to 4% above the optimum moisture content to reduce seepage and potential piping. Lean clays should be used in embankment areas where walkways will be constructed on top and use the embankment for support. Fat clays could be used for these embankments if no additional load will be applied.

5.4 Shallow Foundations

The proposed structures may be supported by shallow footing foundations bearing on native lean clays soils, bedrock, or on new structural fill compacted in accordance with the recommendations provided in Section 6 of this report. Support of footings on the existing fill or fat clays is not recommended. The bearing material should be either all bedrock, firm native lean clay soils, or new structural fill at least two feet deep as to limit potential differential settlement. Additional rock excavation could be required to result in at least one foot of structural fill below foundation elements. Shallow footings wholly on either native lean clay soils, structural fill, or bedrock may be designed for a net allowable bearing pressure (pressure in excess of adjacent overburden pressure) of up to 1,500 pounds per square foot (psf) for structural dead load plus maximum live load. This net allowable bearing pressure could be increased to 2,000 psf if new structural fill is placed to a depth of two footing widths below the foundations.

Footings should be constructed at least 30 inches below the exterior finish grade to provide protection against the detrimental effects of seasonal moisture variations and frost penetration. Strip-type footings should be at least 2 feet wide regardless of the applied structural load, in order to provide a bearing area that will account for minor variations in the supporting soil.

The loads imposed by the foundations are expected to result in some compression of the supporting materials. Based on the conditions encountered at the boring locations, and the expected structural loads, maximum settlements are not expected to exceed about 1 inch, with differential settlements of up to approximately half the total. To reduce total settlements to less than one half inch or one quarter inch, the allowable bearing capacity could be reduced to 1,000 or 500 psf, respectively. The majority of the settlement should take place during construction, as

the loads are applied to the subgrade. If it is decided to leave the existing fill in place, and undetected zones of looser, softer material, or degradable organics are present, then settlements in excess of those stated above could occur.

5.5 Alternative Foundation Support Options

The retaining wall or other structure foundations may be subject to lower settlement tolerances than one inch to further limit the potential for differential settlement between adjacent wall and bench segments. In addition, the retaining walls at the perimeter of the detention basins and ponds may have storage media consisting of relatively uniform clean stone about three feet thick or more that is not as stable as well-graded, crushed limestone aggregate under footings. To further limit the settlements or rotations of these walls, they may be supported geogrid and geotextile layers in the drainage media, or on deep foundation elements founded in the underlying shale or limestone bedrock. Deep foundations could include drilled shafts, driven piles, helical piers, micropiles, or others that support both the toe and heal of reinforced concrete retaining walls.

Geogrids and geotextile layers can be added to the storage media layers below the location of the basin and pond perimeter retaining walls to confine and reinforce the clean stone to provide increased support and reduced settlements of these retaining walls. The geogrids and geotextiles should be wider below the footings based on 45-degree angle projections away from the edge of the footings up to three feet deep in the clean stone. The geogrid layers should be the same width beyond the footing edges. Three layers of bi-axial or tri-axial geogrid spaced apart about 1 foot horizontally could provide adequate support for the compacted, clean stone aggregate layers. Geotextiles could wrap each layer to further confine the clean stone aggregate without greatly impacting the water storage capacity. Different geogrid and geotextile combinations could be used to increase the capacity and reduce the settlements under shallow footings.
Micropiles are a deep foundation system that appears to be a possible option for the site, due to clean rock storage media under footings. In general, micropiles are small diameter, 4 to 8 inches, high-strength steel pipe piles, fitted with a rock-cutting bit, that are drilled several feet into bedrock, with the rock cuttings removed. The annular space between the exterior pipe wall and the rock is grouted under pressure with high-strength grout to secure the pipe in the rock and create friction between the pipe and rock. The pipe is then filled with grout.

Helical piers are galvanized steel shafts with helical plates that are screwed into the ground and should easily penetrate the clean rock storage media. They are installed to a specific torque that is related to the vertical capacity in both compression and tension. These helical piers should be installed to refusal on the underlying bedrock to reduce any potential settlement. For increased lateral capacity, helical piers with tubular shafts may be used with or without grouting. After installation, the top of the shafts are structurally cast into concrete footings.

Driven piles and drilled shafts could be utilized to reduce the settlements of foundations. We anticipate smaller sized H-piles could be driven through the clean rock media down to the bedrock and cast into footing foundations. Drilled shafts could help limit the settlement of foundations, but would not likely be suitable for installation through the clean rock storage media. However, they would be viable in other areas installed in cohesive soils down to bedrock.

5.6 Micropile and Helical Pile Foundations

As previously discussed, micropiles and helical piles could be considered to support the foundations to limit settlement. The installation of micropiles and helical piles is proprietary, where a specialty contractor designs and installs the foundations and is the engineer-of-record for the foundation system. The specialty contractors should be contacted for the design details regarding micropiles and helical piles. We suggest the deep foundation systems be designed to a performance criterion applicable to the project requirements. We anticipate a grid of deep foundation elements would be installed into bedrock and structural cast into the planned concrete foundation pad.

Based on the boring information obtained for this study, we recommend a preliminary allowable axial side resistance (grout-to-rock bond resistance) value of 3,000 or 9,000 psf for the intact shale or limestone bedrock, respectively. The 28-day compressive strength of the grout should be at least 4,000 psi. Uplift resistance for individual piles may be taken as half of the allowable axial side resistance. These values include a Factor of Safety of 2.5. The success of the micropile installation is dependent on the experience and skill of the contractor. As such, the specialty contractor should determine the appropriate skin friction value, spacing, diameter, configuration and length of pile to achieve the required capacity.

Helical piles that are used for foundation support should be turned into the ground until they achieve the required design capacity for each element generally associated to the required installation torque. The elements required for this project could likely be pipe piles turned into the shales underlying soils and then possibly grouted for additional lateral load capacity and longevity.

One potential issue with single element micropiles or helical piles is that they can have limited lateral capacity, due to the threads in micropile or helical pile extension sections. If that is the case, then battered micropiles or helical piles can be utilized to accommodate the lateral capacity. A single section micropile or helical pile without threads between the sections could also provide lateral capacity. TSi recommends that at least two micropiles be performance-tested to verify the grout-to-ground bond strength. Only the design bond length of the bar should be grouted for testing of the micropile. At least two helical piles should also be tested to confirm the design capacities.

5.7 Drilled Pier Foundations

Foundations may be supported on drilled piers that extend through the existing fill, native soils, upper weathered bedrock, and penetrate at least one pier diameter into the underlying bedrock. Drilled piers bearing on the underlying bedrock may be designed for a net allowable end-bearing pressure (pressure in excess of the adjacent overburden pressure) of 20,000 psf, as well as an allowable friction capacity of 3,000 psf. A Factor of Safety (FS) of 2.5 has been applied to the side resistance values and a FS of 3.0 has been applied for end-bearing. The side resistance values should be reduced by one half to apply for uplift loading. The length of each pier should be at least four times the diameter and be imbedded one pier diameter into the bearing material to use the full end-bearing value stated.

The base of the piers should be formed entirely in bedrock. Sound bedrock should be exposed over the entire base of the pier, and the base should be free of clay seams. Excessively weathered or highly fractured rock encountered at the bearing surface is not suitable for support of the pier and should be removed.

Drilled piers should be designed at a spacing no closer than three pier diameters, center-to-center, so that stress overlap at the bearing level can be avoided and so that possible installation problems associated with one structural member do not impact the integrity of the adjacent member. A reduction in the recommended side friction value is not required for groups of piers spaced three diameters or more apart. Assuming that the drilled piers are properly installed as discussed herein, total pier settlement should be no greater than 0.25 inch.

The base of each pier should be observed by a geotechnical representative from the ground surface to verify the condition of the bedrock bearing surface. The pier base should be augered clean, and any loose or softened material should be removed from the bearing surface.

Each pier should be cast the same day it is completed and approved. The pier base should continually be pumped as necessary to prevent the accumulation of water. No more than 2 inches of water accumulation should be allowed at the time of concrete placement. Temporary casing will likely be required to advance the drill hole to prevent the inflow of water, along with conventional pumps during concrete placement. The contractor should be prepared to utilize a tremie pipe for concrete placement if groundwater in excess of 2 inches of accumulation occurs with pumping.

5.8 Driven Pile Foundations

Foundations may be supported on steel H-piles driven to practical refusal in the underlying bedrock to reduce settlements. In order to estimate the preliminary pile capacities, for piles driven to refusal in bedrock, structural nominal resistance of steel H-pile should govern depending upon pile sections. Based on piles bearing on sound bedrock the Structural Resistance Factor of 0.35 should be used to assess the design capacity of the piles.

When hard rock is encountered during pile driving, the pile should be driven no more than 3 blows when the hammer is operating at maximum rated energy and the penetration per blow is equivalent to or less than 10 blows per 0.5 inch. This is considered “practical refusal” and driving shall stop immediately to avoid damaging the pile and to reduce the risk of injury.

A spacing of at least three pile diameters, center to center, is recommended so that the load on the bearing material from one pile, along with the potential installation difficulties, do not affect an adjacent pile. The settlement of pile groups will be equal to the elastic compression of the pile, plus the potential compression of the supporting material. It is expected that the settlement of a pile resulting from compression of the bearing material below the pile tip would be up to approximately one quarter inch.

5.9 Lateral Earth Pressures

Lateral earth pressure parameters are provided for the design of the buried structures, such as manholes or reinforced concrete retaining walls, that may be included in the project. It is assumed that the walls of some of these structures will be restricted from movement at the top and therefore should be designed to resist at-rest earth pressures. Retaining structures that are allowed to move at the top or rotate may use active earth pressures for design. A horizontal deflection at the top of the wall of approximately 1% of the freestanding wall height is typically required to permit active pressure to develop. However, differential movement between adjacent retaining wall panels can result in uneven walls, benches, and seat lines that may be aesthetically disturbing even if they are structurally sound. To reduce potential for this differential wall and bench movement, at rest earth pressures should be used for design.

Earth pressures are a function of the excavation configuration and the backfill materials. To use the listed values the excavation should be backfilled with the listed materials from at least the base of the structure to above a 45-degree angle projection. Lateral earth pressure parameters are provided in Table 2 for the design of these subsurface structures. Hydrostatic forces should be added to the analyses below the design groundwater level unless the structure is designed with a permanent underdrain and pump system to prevent buildup of hydrostatic forces on the structure.

TABLE 2
LATERAL EARTH PRESSURE PARAMETERS FOR SUBSURFACE STRUCTURES*

Parameter		Crushed Limestone Backfill	Cohesionless Soil Backfill	Cohesive Soil Backfill
At-Rest Equivalent Fluid Pressure	Drained	55 pcf	63 pcf	72 pcf
	Undrained	91 pcf	94 pcf	99 pcf
Active Equivalent Fluid Pressure	Drained	35 pcf	42 pcf	51 pcf
	Undrained	81 pcf	83 pcf	88 pcf
Passive Equivalent Fluid Pressure	Drained	480 pcf	375 pcf	308 pcf
	Undrained	310 pcf	250 pcf	217 pcf
Soil Unit Weight		130 pcf	125 pcf	125 pcf
Angle of Internal Friction for Backfill		35°	30°	25°
Assumed Surcharge Condition		None	None	None
Slope Profile Behind Structure		Horizontal	Horizontal	Horizontal

* No factor of safety has been applied to the above values.

Significant wall movements would generally be necessary to develop the full values of passive pressures given; typically, the passive values stated are reduced by up to one-half for design.

To prevent the accumulation of water behind new subsurface walls and resulting hydrostatic pressure, a free-draining granular backfill material is recommended for the walls. The drainage backfill material should be encased in a nonwoven geotextile having a minimum weight of 8 ounces per square yard. A perforated pipe should be placed at the base of the wall to collect the water and carry it to daylight, to a storm sewer, or to a sump. These retaining walls may use the drained earth pressures for design. Retaining walls, such as the walls at the perimeter of the basins and ponds, will not be drained and should use undrained earth pressures for design.

The effects of vertical surcharge loads or sloping ground behind the wall are not included for the stated fluid pressures. The effect of surface loading may be included as a uniform horizontal load against the wall equal to one-half the vertical load intensity.

5.10 Pavement Subgrade

TSi anticipates the fat clays underlying the pavements will be removed and replaced with a volume stable material to a depth of at least 2 feet. Support of pavements on existing fill is not recommended. TSi suggests that pavements be underlain by at least 4 inches of compacted granular material in order to achieve more uniform support for foot traffic areas. We suggest 6 inches of granular material be used where heavier loads such as vehicles will use the pavements. A maximum particle size of 1 inch is recommended for the granular base material.

On some projects, there is a significant time lag between the initial grading and the time when the contractor is ready to place concrete for the pavements. Even though the bearing material may have been placed and compacted adequately during the initial grading, exposure to weather and construction activity can damage the condition of the subgrade soils. Prior to the construction of the pavement and placement of base rock, the subgrade should be thoroughly recompacted to the required density.

A modulus-of-subgrade reaction value of 75 pounds per cubic inch (pci) can be used for the design of the slab on the soils. A value of 150 pci may be used if 1.5 feet of well-graded crushed limestone is used to replace swelling clays. These values are based on the assumption that the subgrade is prepared in accordance with the recommendations provided in the Site Preparation and Excavation Considerations section of this report.

5.11 Soil Excavation Considerations

Soils with N-values of 4 or less or pocket penetrometer readings of 0.5 tsf or less were encountered in Borings B-1, -3, -4, -5, -6, -11, and MW-5 and -6 may be considered soft soils. Care should be taken to ensure soft soils encountered during excavations do not create a quick condition near the pipe flowline elevations or allow excessive settlements of pavements or structures. These soils could cause sluffing during excavation and may require shoring.

5.12 Bedrock Excavation Considerations

Most of the borings in this exploration encountered shale or limestone bedrock or auger refusal in hard materials at depths of about 3 to 20 feet. Construction budgets and schedules should

anticipate rock excavation in areas where these hard materials are planned to be excavated. The weathered upper portion of the bedrock can likley be excavated using conventional excavators. As shale or limestone typically gets harder with depth, it may not be able to be excavated using conventional excavation machinery equipped with rock bucket teeth. Limestone excavations may require the utilization of jackhammers or hoe-rams. If the bedrock encountered is too hard for these machines, other methods including blasting may have to be employed, where allowable. The most suitable means to excavate the bedrock materials should be determined by the contractor in the field within local limitations.

5.13 Pipe Support

TSi recommends that the pipelines be supported by 6 inches of crushed aggregate base placed over a properly prepared soil subgrade. The aggregate will provide a uniform base for support of the pipe and a stable working surface during construction. The aggregate base should be compacted according to Section 6.4 of this report.

Excavations for the pipe subgrades should be done carefully to not excessively disturb the soil base. If soft subgrade soils are encountered in the bottom of the trench, the soft soils should be overexcavated, up to 2 feet below the pipe, and replaced with crushed aggregate base wrapped in filter fabric.

Where the pipeline trench is to be excavated into bedrock, an additional 9 inches of bedrock should be excavated to allow for the placement of 9 inches of crushed stone below the pipe. This base will prevent the pipe from bearing on a non-yielding hard surface.

The City of Kansas City Missouri and APWA Division II Specification requirements should be followed in the selection of pipe bedding materials and embedment depths.

To prevent the pipe bedding and backfill from acting as a conduit for the flow of groundwater along the pipe, clay or flowable fill plugs could be installed at 100-foot intervals along the alignment. The clay plugs should be compacted in accordance with the cohesive fill specification in Section 6.4.

5.14 Pipe Settlement and Loading

A portion of the proposed new pipeline elevations may be in bedrock. If bedrock is directly supporting the crushed granular bedding material, settlement of the pipe should be insignificant. Pipe that is supported by stiff in-situ soils should experience less than 1-inch of settlement.

Pipe loading at the site will vary with the embedment depth of the pipe. In general, the depth of pipe embedment in feet should be multiplied by 125 pcf (moist unit weight in pounds per cubic foot) to calculate the total overburden pressure on the pipe in pounds per square foot.

5.15 Thrust Block Foundations

Thrust blocks may be supported by shallow spread footing foundations bearing in stiffer regions of native lean clay or fill materials adhering to requirements given in Sections 6.3 and 6.4 of this report and may be designed for a net allowable bearing pressure (pressure in excess of adjacent overburden pressure) of up to 1,500 pounds per square foot (psf) for structural dead load plus maximum live load.

5.16 Seismicity

Based on the general soil characteristics as determined by field and laboratory tests and the estimated depth to bedrock, the project area is designated as Site Class C, in accordance with the the International Building Code (IBC). The N-values suggest that the soil has adequate density and cohesion to resist liquefaction in consideration of the distance to known seismic sources. Thus, the site soil is not considered to be susceptible to liquefaction, or to substantial settlement or loss in strength when subject to the design earthquake loading.

6.0 Site Preparation and Excavation Considerations

6.1 General Excavations

Construction areas should be stripped of organic soil and any deleterious materials along the structure alignments prior to excavations. Tree stumps and root balls should also be removed in construction areas.

Trenching, excavating, and bracing should be performed by the contractor in accordance with OSHA (Occupational Safety and Health Administration) regulations and other applicable regulatory agencies. In accordance with the OSHA excavation standards, the soil at the site is considered Type C, which requires a side slope for excavations of no steeper than 1.5 horizontal to 1.0 vertical (1.5H:1V) for short term periods of 24 hours or less. Excavations open for longer periods of time may require flatter slopes for stability and safety concerns. Worker safety and classification of the excavation soil is the responsibility of the contractor. Also, according to OSHA requirements, any excavation extending to a depth of more than 20 feet requires sheeting, shoring, and bracing, or other means of extra support designed by a registered professional engineer. An excavation retention system, such as soldier piles and lagging or sheet piling, may be used as an alternate to sloping back the sides of trench excavations.

6.2 Shallow Foundation Excavations

Foundations in soil should be excavated with a smooth-edged, clawless excavating bucket to reduce disturbance of the bearing surface. Appropriate equipment should be used for excavations in bedrock and intermediate geomaterials. The excavations should be kept dry, and foot traffic should be kept to a minimum to limit disturbance. Any loose or soft material that accumulates or develops at the footing subgrade should be removed prior to the placement of concrete. If zones of soft soils are encountered at the foundation support level, they should be removed and replaced with properly compacted fill, or the footings should be deepened to bear on stiffer soil.

Concrete should be placed as soon as practical after the excavation has been completed to avoid deterioration of the bearing surface due to excessive drying, or excessive wetting caused by precipitation. Alternately, a thin layer of lean concrete could be placed over the excavation floor to protect the bearing surface.

6.3 Subgrade Protection

Construction areas should be properly graded in order to reduce or prevent surface runoff from collecting on the exposed subgrade in trench excavations. Any ponded water on the exposed subgrade or trench bottom should be removed immediately. Temporary storm water swales and collection areas may be required to control surface water flow into low areas of the site or into trench excavations.

To prevent unnecessary disturbance of the subgrade soils in the bottom of the trench and other excavations, foot and equipment traffic should be minimized to prevent disturbance of the subgrade. If areas of disturbed subgrade develop, they should be properly repaired by removing

and replacing the disturbed subgrade with properly compacted fill. Another option for improving a weak subgrade is overexcavation of the soft material to a depth of not more than 2 feet then use of a geogrid or geotextile placed at the bottom of the excavation, and backfilling with a properly compacted crushed limestone. Additional layers of geogrid sandwiched with layers of at least 6 inches of crushed limestone can provide additional support.

6.4 Fill and Backfill Materials

In general, trench backfill or engineered fill placed over pipes and under structures should consist of lean clay or well-graded granular soils with a maximum particle size of 2 inches. Fill materials from off-site sources should be approved prior to their use. Soil with decayable material such as wood, trash, metal, or vegetation is not acceptable.

Rock fragments, such as limestone and shale, can be used in the trench backfill and engineered fills that are more than 2 feet below final grade and not within 2 feet of the pipes or other structures. Rock fragments should be less than 4 inches in maximum overall dimension. The rock fill should contain a sufficient amount of clay and smaller rock fragment sizes to fill voids between fragments. The fill should be placed in a manner that will achieve compaction of the clay around and between the limestone fragments. Placement and compaction of rock fill should be closely observed on a full-time basis by an experienced engineering technician, since testing the density of the rock fill may not be possible or may not provide meaningful results.

Some of the soil on the site will require the addition of moisture prior to compaction. This should be performed in a controlled manner, and the moistened soil should be thoroughly blended to produce a uniform moisture content. Fat clays and shale should be compacted wet of their optimum moisture content. If fill is placed during the winter season, fill materials should be carefully observed to see that no ice or frozen soils are placed as fill or remain in the base materials upon which fill is placed.

Some of the on-site soil may require moisture reduction prior to compaction. During warm weather, moisture reduction can generally be accomplished by disking, or otherwise aerating the soil. When air-drying is not possible, a moisture-reducing chemical additive, such as lime or Class C fly ash, could be used as a drying agent with thorough mixing that forms a homogeneous mixture.

6.5 Fill and Backfill Placement

Cohesive fill should be compacted to a dry density of at least 95% of the standard Proctor maximum dry density (ASTM D 698) of the soil. Granular material, such as crushed stone, used should be compacted to at least 100% of the standard Proctor maximum dry density. The moisture content of lean clay at the time of compaction should generally be within ±3% of the optimum moisture content of the material as determined by the standard Proctor compaction test. Fat clay or shale material should be placed and maintained at a moisture content ranging from 0 to 4% wet of the optimum. Fill should be placed in loose lifts not in excess of 8 inches thick, and compacted to the aforementioned criterion. However, it may be necessary to place fill in thinner lifts to achieve the recommended compaction when using small hand-operated equipment.

6.6 Open-Graded "Clean" Crushed Rock

Crushed limestone available from local quarries is a common construction material in the general region. There is a misconception among some contractors that open-graded (also known as "clean") limestone does not require compaction when placed as fill or backfill. Settlement of open-graded crushed rock that had not been compacted when placed is a common cause of damage to foundations and concrete slabs, including the development of substantial gaps beneath the concrete caused by the settlement.

Any crushed rock placed as structural fill or backfill that will underlie future foundations, pavements must be placed in lifts (layers) of controlled loose thickness and compacted in accordance with the recommendations that appear in this report. Both open-graded and well-graded stone should be compacted with a vibratory compactor; with either a self-propelled roller, a backhoe-mounted plate, or a walk-behind sled.

6.7 Drilled Pier Construction

The design capacity of drilled piers is intimately tied to installation procedures and observations during construction. A geotechnical engineer should be retained to review the plans and specifications related to drilled pier construction. It is considered essential that a geotechnical representative be present on-site during all phases of drilled pier construction.

The drilled pier construction should be performed by an experienced, knowledgeable contractor, familiar with the subsurface conditions in the area of the project site. The contractor should be prepared to handle groundwater seepage into the pier excavation and the potential for sloughing or caving of the pier sidewalls.

6.8 Groundwater Considerations

Groundwater was encountered in some of the borings during drilling, and at relatively shallow depths of in subsequent well readings. It is anticipated that groundwater encountered in excavations through cohesive soils could be handled by shallow swales and a sump and pump arrangement. Groundwater flowing from granular soils or from artesian and subterranean springs may require additional dewatering efforts. Cutoff walls such as sheet piles or slurry walls could be required in isolated areas to dewater some excavations.

Groundwater flow into drilled pier excavations should be able to be handled using a conventional pump at the base of the pier, provided the temporary steel casing is used. The contractor should be prepared to utilize a tremie pipe for concrete placement if groundwater control becomes an issue.

7.0 CONSTRUCTION OBSERVATION AND TESTING

It is recommended that TSi be retained during construction to perform testing and observation services for the following items:

- Observation of shallow foundation and pavement subgrades;
- Observation of shallow and deep foundation construction;
- Observation of the trench bottom prior to backfilling and installation of pipes;
- Placement and compaction of backfill materials; and
- Testing of asphalt and concrete materials used for structures and paving.

These Quality Assurance services should help to verify the design assumptions and maintain construction procedures in accordance with the project plans, specifications, and good engineering practice.

8.0 REPORT LIMITATIONS

This geotechnical report has been prepared for the exclusive use of **HDR ENGINEERING, INC.** for the specific application to the subject project. The information and recommendations contained in this report have been made in accordance with generally accepted geotechnical and foundation engineering practices; no other warranties are implied or expressed.

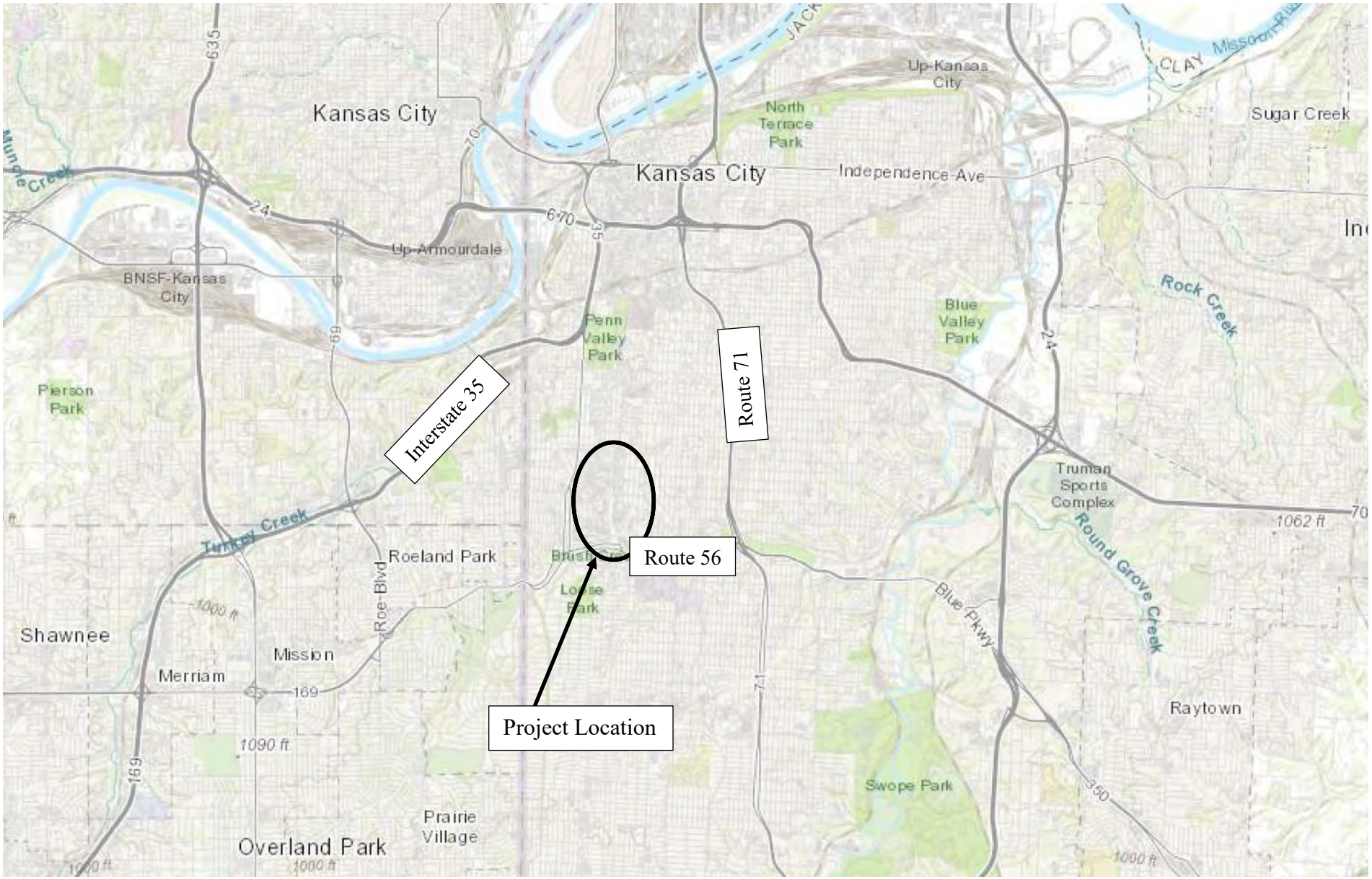
The assessments and recommendations submitted in this report are based in part upon the data obtained from the borings. The nature and extent of variations between the borings may not be evident at this time. If variations appear evident at a later date, it may be necessary to re-evaluate the recommendations of this report.

We emphasize that this report was prepared for design purposes only and may not be sufficient to prepare an accurate construction bid. Contractors reviewing this report should acknowledge that the information and recommendations contained herein are for design purposes.

If conditions at the site have changed due to natural causes or other operations, this report should be reviewed by TSi to determine the applicability of the analyses and recommendations considering the changed conditions. The report should also be reviewed by TSi if changes occur in the location, size, and type, in the planned loads, elevations, grading and site development plans or the project concepts.

TSi recommends we be afforded the opportunity to review the final plans and specifications for the project prior to construction to verify that the recommendations in this report are properly interpreted and incorporated in the design and construction documents. If TSi is not accorded the opportunity to make this recommended review, we can assume no responsibility for the misinterpretation of our recommendations.

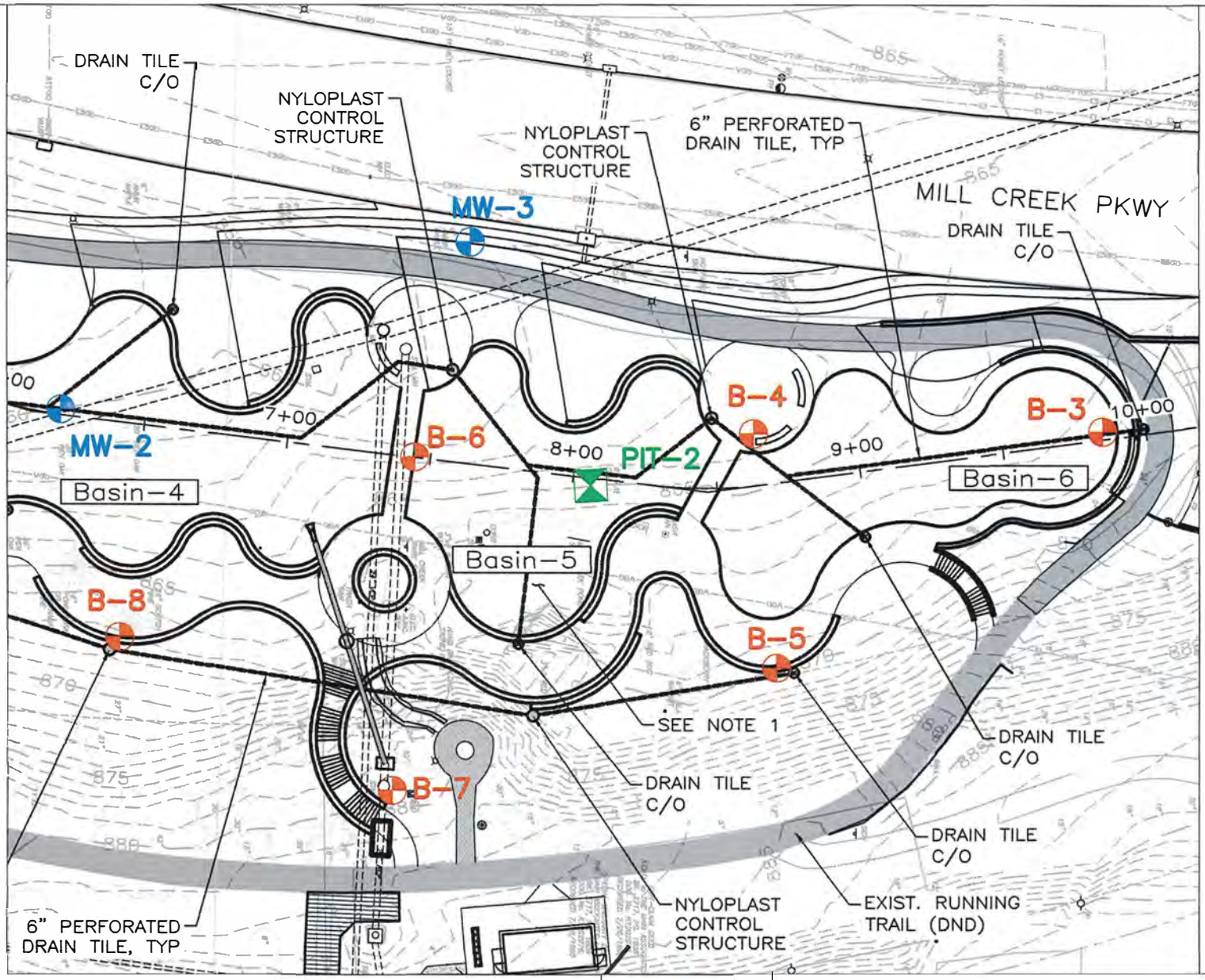
APPENDIX A



This plan was prepared from an image retrieved from USGS on 8/01/2023

N W E S

Figure 1, Site Vicinity Map		Project No. 20212037.00
Mill Creek Park Green Infrastructure Project Kansas City, Missouri		TSi geotechnical, inc.
Not to Scale	Approved by: ACE	



LEGEND

MW-1 APPROXIMATE MONITORING WELL LOCATION AND NUMBER

B-1 APPROXIMATE BORING LOCATION AND NUMBER

PIT-1 APPROXIMATE PIT LOCATION AND NUMBER

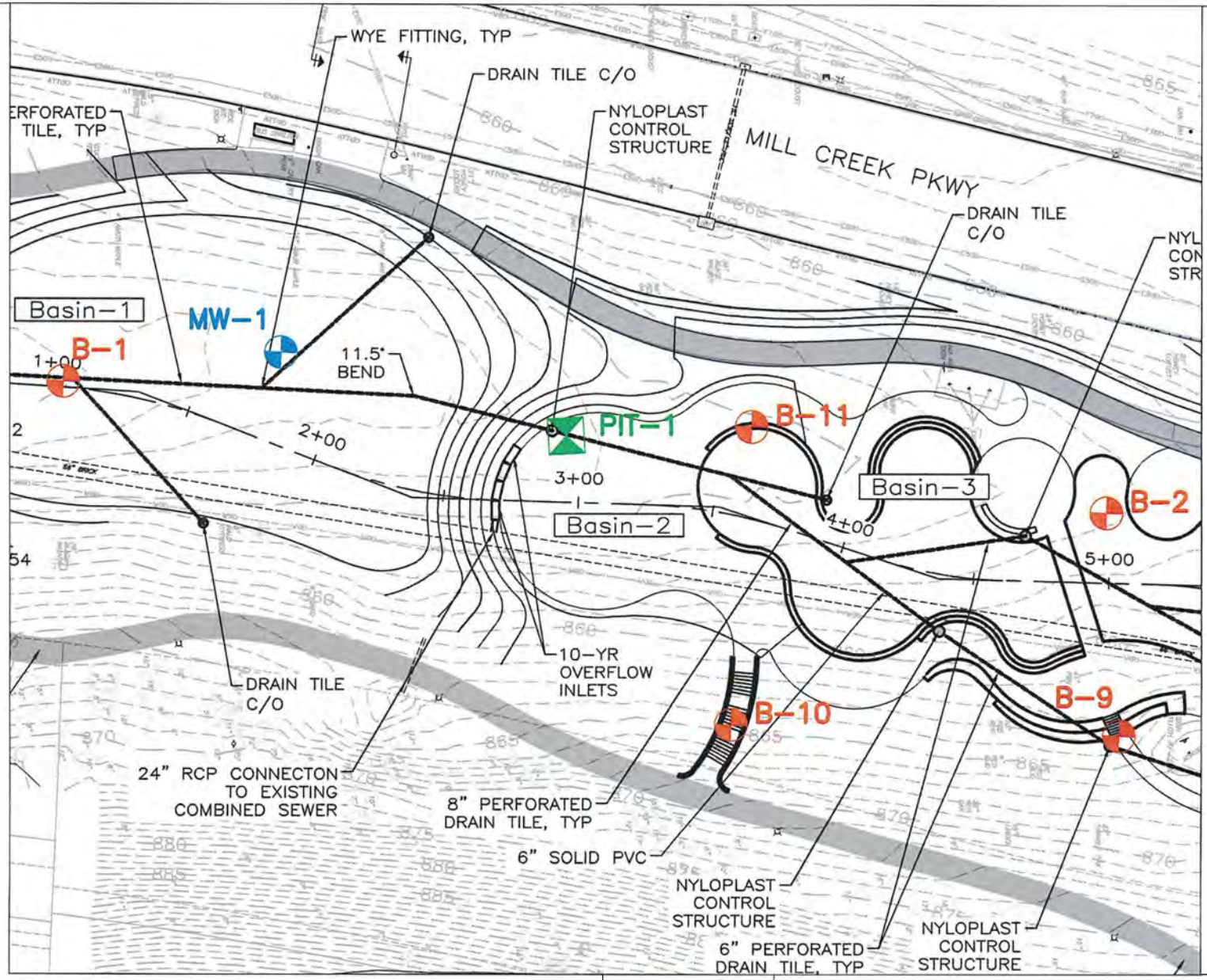
NOTE: THIS PLAN WAS PREPARED FROM A DRAWING OBTAINED FROM HDR ON 09/28/2021.

TSi geotechnical, inc.
1340 NORTH PRICE ROAD
ST. LOUIS, MISSOURI 63132

SITE AND BORING LOCATION PLAN – PHASE 1 AND 2

MILL CREEK PARK
GREEN INFRASTRUCTURE PROJECT
KANSAS CITY, MISSOURI

Drawn By: PCS	Checked By: ACE	
Project No. 20212037.00	Date: 01/19/22	Figure 2.1



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NOT TO SCALE

LEGEND

MW–1 APPROXIMATE MONITORING WELL LOCATION AND NUMBER

B–1 APPROXIMATE BORING LOCATION AND NUMBER

PIT–1 APPROXIMATE PIT LOCATION AND NUMBER

NOTE: THIS PLAN WAS PREPARED FROM A DRAWING OBTAINED FROM HDR ON 9/23/2021.

TSI geotechnical, inc
1340 NORTH PRICE ROAD
ST. LOUIS, MISSOURI 63132

SITE AND BORING LOCATION PLAN – PHASE 1 AND 2
MILL CREEK PARK
GREEN INFRASTRUCTURE PROJECT
KANSAS CITY, MISSOURI

Drawn By: PCS	Checked By: ACE
Project No. 20212037.00	Date: 01/19/22

Figure 2.2

Legend

MW-4 Approximate Boring Location and Number

This figure was prepared from a drawing obtained from HDR on 7/28/2023.

Figure 2.3, Site and Boring Location Plan– Phase 2	Project No. 20212037.00
Mill Creek Park Green Infrastructure Project Kansas City, Missouri	
Not to Scale	Approved by: FH

TSI geotechnical, inc.

APPENDIX B

LOG OF BORING NO. B-01

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **851.1**
Location: **See Site and Boring Location Map**

Depth, feet	Sample #	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
	SS-1	FILL: Brown, sandy lean CLAY (CL), trace gravel - trace roots from 0.0 to 1.5 ft. - trace sand below 1.5 ft.	33		4 7 4	2.50			26			
	SS-2	- with gravel below 1.5 ft.	28		2 1 2	1.50			27			
	SS-3	Brown, sandy organic CLAY (OH), with gravel (oven dried LL=36)	39		3 3 4	1.00			25	56	19	37
5	SS-4	Brown, clayey GRAVEL (GC)	50		2 5 4	1.00			24			
	SS-5	Brown and gray, lean CLAY (CL), trace sand and gravel	100		2 12	3.00			19			
	SS-6	Gray, shaley CLAY (CL)	100		40 27 50/3"	3.00			13			
	SS-7	Dark gray, COAL	100		50/4.5"	3.00			14			
10		Gray, SHALE										
	SS-8		100		50/5"	>4.5			12			
15	SS-9		0		50/0"							
		Boring terminated at 15.5 ft.										
20												
25												

Completion Depth: 15.5
Date Boring Started: 10/8/21
Date Boring Completed: 10/8/21
Engineer/Geologist: C. K.
Project No.: 20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT.
Groundwater not encountered during drilling.
Auger refusal encountered at 15.5 ft.

LOG WITH LAB MILL CREEK_RESTORE.GPJ 8/25/23

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. B-02

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **857.0**
Location: **See Site and Boring Location Map**

Depth, feet	Sample #	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index	MATERIAL DESCRIPTION
0	SS-1	22		5 6 5	>4.5			15				FILL: Brown, lean CLAY (CL) - with sand from 0.0 to 1.5 ft. - trace gravel from 0.0 to 3.0 ft. - trace sand below 1.5 ft.
	SS-2	33		5 4 5	>4.5			17				
	SS-3	33		5 5 4	>4.5			14				
5	SS-4	17		3 4 4	>4.5			17				
	SS-5	50		12 11 8	>4.5			11				Brown and gray, clayey GRAVEL (GC), with sand
	SS-6	83		5 8 10 18	3.00			30	41	22	19	Brown and gray, lean CLAY (CL), trace gravel
10	SS-7	100		30 50/3"	>4.5			12	45	18	27	Gray, clayey SHALE, trace gravel
	AUGER											Boring terminated at 10.5 ft.
15												
20												
25												

Completion Depth: 10.5
Date Boring Started: 10/6/21
Date Boring Completed: 10/6/21
Engineer/Geologist: C. K.
Project No.: 20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT. Groundwater encountered at 7.0 ft. during drilling, delayed groundwater observed at 6.5 ft. after 30 minutes. Auger refusal encountered at 10.5 ft.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG WITH LAB MILL CREEK_RESTORE.GPJ 8/25/23

LOG OF BORING NO. B-03

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **867.5**
Location: **See Site and Boring Location Map**

Depth, feet	Sample #	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
	SS-1	FILL: Brown, lean CLAY (CL), trace sand	39		5 6 5	> 4.5			19			
	SS-2	- trace gravel below 1.5 ft.	44		3 4 4	> 4.5			15			
	SS-3	Brown, lean CLAY (CL), with gravel	17		4 3 3				15			
5	SS-4		8		2 3 5				18			
	SS-5		8		1 1 2				19			
	SS-6	Brown, organic CLAY (OH) (oven dried LL=36) ▽	100		1 2 2	0.50			29	52	19	33
10	SS-7	Brown and gray, shaley CLAY (CL) - 2.0" sandy clay seam at 10.0 ft.	89		6 9 50	2.50			20			
		Gray, SHALE										
	SS-8		100		50/1"	> 4.5			13			
15												
	SS-9		71		38 50/1"	> 4.5			15			
		Boring terminated at 19.1 ft.										
20												
25												

Completion Depth: 19.1
Date Boring Started: 10/6/21
Date Boring Completed: 10/6/21
Engineer/Geologist: C. K.
Project No.: 20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT. Groundwater encountered at 8.5 ft. during drilling

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. B-04

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **864.0**
Location: **See Site and Boring Location Map**

Depth, feet	Sample #	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index	MATERIAL DESCRIPTION
	ST-1	58			1.50	1.27	98	21				FILL: Brown, lean CLAY (CL)
	SS-2	89		3 3 1	1.00			29				
												FILL: Light brown, fat CLAY (CH)
	SS-3	56		2 3 3	0.50			21				FILL: Brown, lean CLAY (CL), with sand and gravel
5	SS-4	100		2 2 3	<0.25			29	52	17	35	Brown, fat CLAY (CH), with sand, trace gravel
	SS-5	100		2 10 11	<0.25			23				
	SS-6	100		7 12	<0.25			17				
	SS-7	100		50/5" 50/3"	>4.5			9				Gray, SHALE, highly weathered
10												
15	SS-8	91		30 50/5"	>4.5			13				
	SS-9	60		50/5"	>4.5			11				
20												SHALE, gray, soft, moderately to highly weathered
	RUN-1	100	68									LIMESTONE, light gray, hard, moderately weathered - (3.0") shale seam at 22.8 ft. - (2.0") shale seam at 24.3 ft. - (1.0") shale seam at 24.8 ft. Boring terminated at 25.0 ft.
25												

Completion Depth:	25.0
Date Boring Started:	4/27/22
Date Boring Completed:	4/28/22
Engineer/Geologist:	J. M.
Project No.:	20212037.00

Remarks: Boring drilled with CME 550 using HSA and Auto SPT.
Groundwater not encountered during drilling.
Auger refusal encountered at 20.0 ft.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. B-05

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **870.0**
Location: **See Site and Boring Location Map**

Depth, feet	Sample #	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
	SS-1	FILL: Brown, fat CLAY (CH)	100		3 4 5	1.00			27			
	SS-2		22		3 4 4	1.50			26			
	SS-3	Brown, lean CLAY (CL)	100		3 4 5	0.50			28			
5	ST-4	Brown, fat CLAY (CH)	100			1.50	0.55	94	29	52	17	35
	SS-5		100		3 3 7	1.00			29			
	SS-6	Brown, shaley fat CLAY (CH)	100		2 4 5	3.25			29			
10	SS-7	Brown, shaley lean CLAY (CL)	89		2 6 10	1.00			26			
	SS-8	Gray, weathered SHALE	100		10 50/4"				12			
15	SS-9		100		50/5"	>4.5			16			
20		Boring terminated at 18.9 ft.										
25												

Completion Depth:	18.9
Date Boring Started:	4/28/22
Date Boring Completed:	4/28/22
Engineer/Geologist:	J. M.
Project No.:	20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT.
Groundwater encountered at 7.0 ft. during drilling.
Groundwater encountered at 1.2 ft. after 2 hrs.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. B-06

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **863.0**
Location: **See Site and Boring Location Map**

Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
		SS-1		FILL: Brown, fat CLAY (CH), possible organics	33		4 5 6	4.50			43	64	22	42
		SS-2		FILL: Brown, lean CLAY (CL)	78		4 4 6	2.00			37			
		SS-3		- with sand and gravel below 3.0 ft.	50		3 2 2	3.50			23			
5		SS-4		Gray, lean CLAY (CL), trace sand and gravel	83		1 3 3	0.50			29			
		SS-5		- with gravel below 6.0 ft.	100		2 3 4	0.50			37	49	17	32
		ST-6			38			>4.5	0.75	101	23			
10		SS-7		Gray, SHALE	56		17 25 30	>4.5			16			
		SS-8			100		15 50/5"	>4.5			15			
15		SS-9			100		50/5"	>4.5			10			
20		RUN-1		LIMESTONE, gray, hard, moderately weathered - (1.0") shale seam at 19.5 ft. - (1.0") shale seam at 20.1 ft. (Comp. str.: 16,715 psi @ 20.7 ft.) - (1.0") shale seam at 21.5 ft.	100	100								
				SHALE, gray, soft, moderatley to highly weathered - (1.0") limestone seam at 23.2 ft. - (1.0") limestone seam at 23.6 ft.										
25				Boring terminated at 24.0 ft.										

Completion Depth:	24.0
Date Boring Started:	4/29/22
Date Boring Completed:	4/29/22
Engineer/Geologist:	J. M.
Project No.:	20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT.
Groundwater not encountered during drilling.
Auger refusal encountered at 19.0 ft.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. B-07

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **879.6**
Location: **See Site and Boring Location Map**

Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
		SS-1		FILL: Brown, lean CLAY (CL), trace gravel	33		6 9 7	>4.5			20			
		ST-2			48			4.00	0.69	98	22			
		SS-3		FILL: Brown, fat CLAY (CH), with gravel	44		4 4 5	1.50			27			
5		SS-4			44		3 6 7	2.00			28	62	21	41
		SS-5		Brown, lean CLAY (CL), with gravel	56		4 6 6	2.50			23			
		SS-6		- trace gravel from 8.0 to 9.5 ft.	56		4 2 3	3.00			26			
10		SS-7		▽	33		7 5 5	2.50			26			
		SS-8		Brown, fat CLAY (CH), trace gravel	61		7 8 16	>4.5			27			
15														
		SS-9			72		5 9 7	>4.5			28			
20				Boring terminated at 20.0 ft.										
25														

Completion Depth:	20.0
Date Boring Started:	4/28/22
Date Boring Completed:	4/28/22
Engineer/Geologist:	J. M.
Project No.:	20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT. Groundwater encountered 11.0 ft. during drilling.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

LOG OF BORING NO. B-08

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **867.4**
Location: **See Site and Boring Location Map**

Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
		SS-1		Brown, lean CLAY (CL)	0		5 3 3							
		SS-2			83		3 3 4	1.50			27			
		ST-3		Brown, fat CLAY (CH)	100			1.50	0.60	93	27	56	20	36
5		SS-4		Brown, lean CLAY (CL)	100		2 3 3	1.00			27			
		SS-5		- trace gravel below 6.5 ft.	100		4 4 4	1.50			27			
		SS-6		Brown, fat CLAY (CH), trace gravel	100		3 4 4	1.50			24			
10		SS-7			61		4 8 4	1.00			31	58	18	40
		SS-8		Gray, weathered SHALE	56		17 25 27	>4.5			17			
15		SS-9			63		23 45 50/4"	>4.5			15			
20				Boring terminated at 19.8 ft.										
25														

Completion Depth:	19.8
Date Boring Started:	4/28/22
Date Boring Completed:	4/28/22
Engineer/Geologist:	J. M.
Project No.:	20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT. Groundwater not encountered during drilling.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

LOG OF BORING NO. B-09

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **862.7**
Location: **See Site and Boring Location Map**

Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
		SS-1		Brown, lean CLAY (CL)	50		3 4 5	2.00			23			
		SS-2			83		2 4 4	1.50			23			
		SS-3		Brown, fat CLAY (CH)	89		2 3 4	1.00			27	70	19	51
5		SS-4			100		4 6 9	2.50			26			
		ST-5			100			>4.5	2.97	103	21			
		SS-6			83		4 5 6	3.00			35	61	20	41
				- redish brown from 9.2 to 9.5 ft.										
10		SS-7			100		7 9 11	>4.5			28			
				Gray, clayey SHALE										
		SS-8			100		11 13 15	4.00			26			
15														
				SHALE, gray, soft, highly weathered, fine grained, fissile										
		RUN-1		LIMESTONE, gray, hard, moderately weathered, finely crystalline to aphanitic, thin to medium bedding, pitted (Comp. str.: 14,640 psi @ 17.5 ft.)	95	51								
20														
				Boring terminated at 22.0 ft.										
25														

Completion Depth:	22.0
Date Boring Started:	5/2/22
Date Boring Completed:	5/2/22
Engineer/Geologist:	J. M.
Project No.:	20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT.
Groundwater not encountered during drilling.
Auger refusal encountered at 17.0 ft.

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG WITH LAB MILL CREEK_RESTORE.GPJ 8/25/23

LOG OF BORING NO. B-10

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **864.2**
Location: **See Site and Boring Location Map**

Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
		SS-1		Brown, lean CLAY (CL)	39		5 4 8	4.50			24			
		SS-2			33		3 4 5	3.50			26			
		ST-3		Brown, fat CLAY (CH)	100			2.50			26	55	19	36
5		SS-4		Brown, lean CLAY (CL)	100		3 3 5	2.50			29			
		SS-5		Brown, shaley lean CLAY (CL)	100		6 8 8	>4.5			24			
		SS-6		Brown, shaley fat CLAY (CH)	89		9 6 8	3.50			26	74	22	52
10		SS-7			100		6 9 11	>4.5			24			
		SS-8			78		8 9 8				18			
15		SS-9			0		50/0"							
				Boring terminated at 18.5 ft.										
20														
25														

Completion Depth:	18.5
Date Boring Started:	4/28/22
Date Boring Completed:	4/28/22
Engineer/Geologist:	J. M.
Project No.:	20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT. Groundwater not encountered during drilling.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

LOG OF BORING NO. B-11

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **854.8**
Location: **See Site and Boring Location Map**

Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
		SS-1		Brown, lean CLAY (CL), with organics	89		3 3 3	0.50			29			
		SS-2		Brown, fat CLAY (CH)	89		1 2 3	0.50			34			
		SS-3		- trace gravel below 3.0 ft.	89		1 2 2	1.50			51	53	19	34
5		SS-4		Tan, shaley lean CLAY (CL)	100		WH 50/6"	>4.5			33			
		RUN-1		LIMESTONE, gray, hard, moderately weathered, finely crystalline, medium to thinly bedded - chert nodules from 5.5 to 6.0 ft.	67	0								
		RUN-2			93	65								
10				(Comp. str.: 14,685 psi @ 11.7 ft.)										
		RUN-3			99	78								
15				Boring terminated at 15.5 ft.										
20														
25														

Completion Depth: 15.5
Date Boring Started: 5/3/22
Date Boring Completed: 5/3/22
Engineer/Geologist: J. M.
Project No.: 20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT.
Groundwater not encountered during drilling.
Auger refusal encountered at 5.5 ft.

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG WITH LAB MILL CREEK_RESTORE.GPJ 8/25/23

LOG OF BORING NO. MW-01

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **852.3**
Location: **See Site and Boring Location Map**

Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
		SS-1		Brown, lean CLAY (CL), with gravel, trace sand	33		4 4 5	2.50			20			
		SS-2		Brown, sandy lean CLAY (CL), with gravel	53		2 1 50/5"	<0.5			31	45	18	27
		SS-3		Boring terminated at 4.0 ft.	0		50/0"							

Completion Depth:	4.0
Date Boring Started:	10/8/21
Date Boring Completed:	10/8/21
Engineer/Geologist:	C. K.
Project No.:	20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT. Groundwater encountered at 4.0 ft. during drilling, delayed groundwater observed at 3.0 ft. after 5 min. during drilling. Auger refusal encountered at 4.0 ft.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. MW-02

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **860.0**
Location: **See Site and Boring Location Map**

Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
		SS-1		FILL: Brown, lean CLAY (CL), trace sand - with gravel from 0.0 to 1.5 ft. - brown and gray from 1.5 to 4.5 ft. - trace gravel below 1.5 ft.	33		3 4 6	>4.5			26			
		SS-2			50		4 5 5	3.00			19			
		SS-3			50		6 5 4	>4.5			21			
5		SS-4			44		3 5 6	>4.5			19			
		SS-5		Brown and gray, fat CLAY (CH), trace sand	89		4 8 12	>4.5			32	65	22	43
		SS-6			100		18 21	>4.5			21			
10		SS-7		Brown and gray, shaley lean CLAY (CL), trace sand	89		18 21 25	>4.5			17			
				Gray, SHALE										
		SS-8			100		50/5"	>4.5			12			
15		AUGER												
				Boring terminated at 15.7 ft.										
20														
25														

Completion Depth:	15.7
Date Boring Started:	10/8/21
Date Boring Completed:	10/8/21
Engineer/Geologist:	C. K.
Project No.:	20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT.
Groundwater not encountered during drilling.
Auger refusal encountered at 15.7 ft.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. MW-03

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **863.1**
Location: **See Site and Boring Location Map**

Depth, feet	Sample #	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index	MATERIAL DESCRIPTION
	SS-1	50		6 9 18	>4.5			15				FILL: Brown, lean CLAY (CL), with sand, trace gravel
	SS-2	39		11 11 9	>4.5			14				FILL: Brown, sandy lean CLAY (CL), trace gravel
	SS-3	50		6 9 7	>4.5			13				FILL: Brown, lean CLAY (CL), trace sand and gravel
5	SS-4	39		6 6 2	>4.5			17				
	SS-5	83		4 6 13	<0.5			27	41	18	23	FILL: Brown, gravelly lean CLAY (CL), trace sand
	SS-6	100		10 21 26	>4.5			18				Brown and gray, shaley lean CLAY (CL), with sand, trace gravel
10	SS-7	100		13 29 33	>4.5			14				Gray, gravelly shaley lean CLAY (CL), trace sand
	SS-8	95		20 50/4.5"	>4.5			15				Gray, shaley lean CLAY (CL), trace sand
15	SS-9	100		34 50/6"	>4.5			12				Gray, SHALE
20												Boring terminated at 19.6 ft.
25												

Completion Depth:	19.6
Date Boring Started:	10/8/21
Date Boring Completed:	10/8/21
Engineer/Geologist:	C. K.
Project No.:	20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT. Groundwater not encountered during drilling.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. MW-04

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **847.8**
Location: **See Site and Boring Location Map**

Depth, feet	Sample #	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index	MATERIAL DESCRIPTION
0	SS-1	50		3 5 5	1.50			39	80	32	48	Brown, fat CLAY (CH), trace sand - possible organics from 0.0 to 1.5 ft.
	SS-2	44		5 5 6	4.00			21				
	SS-3	100		3 3 3	1.50			26				- trace gravel below 3.0 ft.
5	SS-4	67		3 3 4	1.00			28	54	18	36	▽
	SS-5	61		5 5 6	3.75			28				Brown and gray, shaley fat CLAY (CH), with sand, trace gravel
	SS-6	89		3 4 6	1.00			29				- sandy from 7.5 ft. to 9.0 ft. - with gravel from 7.5 ft. to 9.0 ft.
	SS-7	100		4 8 50/1"	3.00			28				- trace sand below 9 ft.
10	AUGER											Boring terminated at 10.5 ft.
15												
20												
25												

Completion Depth: 10.5
Date Boring Started: 5/3/22
Date Boring Completed: 5/3/22
Engineer/Geologist: J.M.
Project No.: 20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT.
Groundwater encountered at 5.0 ft. during drilling.
Auger refusal encountered at 10.5 ft.

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG WITH LAB MILL CREEK_RESTORE.GPJ 8/25/23

LOG OF BORING NO. MW-05

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **841.5**
Location: **See Site and Boring Location Map**

Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
		SS-1		Brown, fat CLAY (CH), trace sand	89		2 3 4	2.50			26			
		SS-2			67		2 2 3	1.00			26	50	20	30
		SS-3			89		1 2 3	1.00			31			
5		SS-4		Brown, lean CLAY (CL), trace sand and gravel	100		2 2 3	0.50			28	49	19	30
		SS-5		- with gravel below 6.0 ft.	100		1 3 5	0.50			23			
		SS-6		Brown, sandy fat CLAY (CH), with gravel	61		7 8 8	>4.5			20	53	21	32
10		SS-7		Brown and gray, shaley fat CLAY (CH) with sand ▽	61		3 5 7	2.50			23			
		SS-8		Gray, weathered SHALE	83		50/6"				11			
15		AUGER		Boring terminated at 15.0 ft.										
20														
25														

Completion Depth: 15.0
Date Boring Started: 5/3/22
Date Boring Completed: 5/3/22
Engineer/Geologist: J.M.
Project No.: 20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT. Groundwater encountered at 11.0 ft. during drilling. Auger refusal encountered at 15.0 ft.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG WITH LAB MILL CREEK_RESTORE.GPJ 8/25/23

LOG OF BORING NO. MW-06

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **837.2**
Location: **See Site and Boring Location Map**

Depth, feet	Sample #	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
	SS-1	Brown, fat CLAY (CH), possible organics	72		3 4 6	2.00			27			
	SS-2	Brown, lean CLAY (CL)	67		3 3 4	1.50			22	43	16	27
	SS-3		100		3 2 3	1.00			25			
5	SS-4		72		2 3 3	0.50			25	46	16	30
	SS-5		100		1 2 2	0.50			29			
	SS-6	▽	100		1 3 3	0.50			29			
	SS-7	- trace sand from 9.0 to 10.5 ft.	100		WH 2 3	1.00			31			
10												
	SS-8	- with sand, trace gravel below 13.5 ft.	100		WH 3 2	0.50			32	43	17	26
15		Dark gray, weathered SHALE										
	SS-9		100		50/2"				16			
		Boring terminated at 18.7 ft.										
20												
25												

Completion Depth: 18.7
Date Boring Started: 5/3/22
Date Boring Completed: 5/3/22
Engineer/Geologist: J.M.
Project No.: 20212037.00

Remarks: Boring drilled with CME 550 using FA and Auto SPT. Groundwater encountered at 8.1 ft. during drilling.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

LOG OF BORING NO. PIT-01

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **854.1**
Location: **See Site and Boring Location Map**

Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
	G	GB-1		FILL: Brown, lean CLAY (CL), trace gravel - trace sand from 1.0 to 1.5 ft.							21			
	G	GB-2		- with sand below 3.0 ft. - with cobbles below 3.5 ft.							31	46	16	30
5				Test Pit terminated at 4.0 ft.										
10														
15														
20														
25														

Completion Depth: 4.0
Date Boring Started: 10/5/21
Date Boring Completed: 10/5/21
Engineer/Geologist: A. B.
Project No.: 20212037.00

Remarks: Test pit excavated using HVAC Truck.
Groundwater not encountered during excavation.
HVAC refusal encountered at 4.0 ft.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. PIT-02

Project Description: **Mill Creek Park**
Kansas City, Missouri

TSi Geotechnical Inc.
1340 North Price Road
St. Louis, Missouri 63132
(314) 373-4000 (314) 227-6622 FAX

Surface El.: **864.5**
Location: **See Site and Boring Location Map**

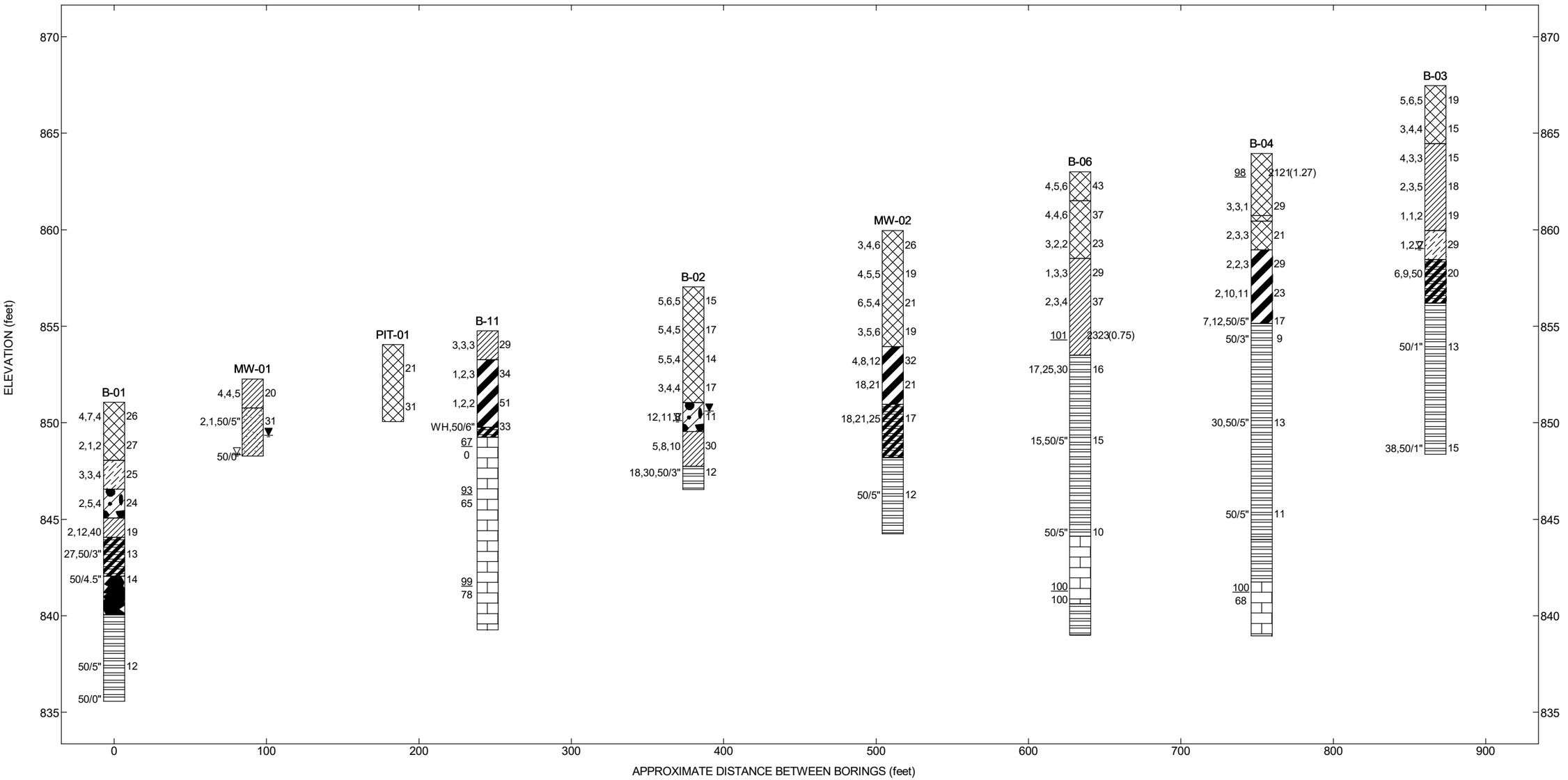
Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer, Qu TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
	G	GB-1		FILL: Brown, lean CLAY (CL), trace sand - trace gravel from 1.0 to 1.5 ft.							22			
	G	GB-2									34	48	17	31
5	G	GB-3		- trace gravel below 5.0 ft.							29	41	20	21
				Test Pit terminated at 6.0 ft.										
10														
15														
20														
25														

Completion Depth: 6.0
Date Boring Started: 10/5/21
Date Boring Completed: 10/5/21
Engineer/Geologist: A. B.
Project No.: 20212037.00

Remarks: Test pit excavated using HVAC Truck.
Groundwater not encountered during excavation.

LOG WITH LAB MILL CREEK RESTORE.GPJ 8/2/23

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.



NOTES: 1. Horizontal scale is approximate.

0 69

Horizontal Scale (feet)

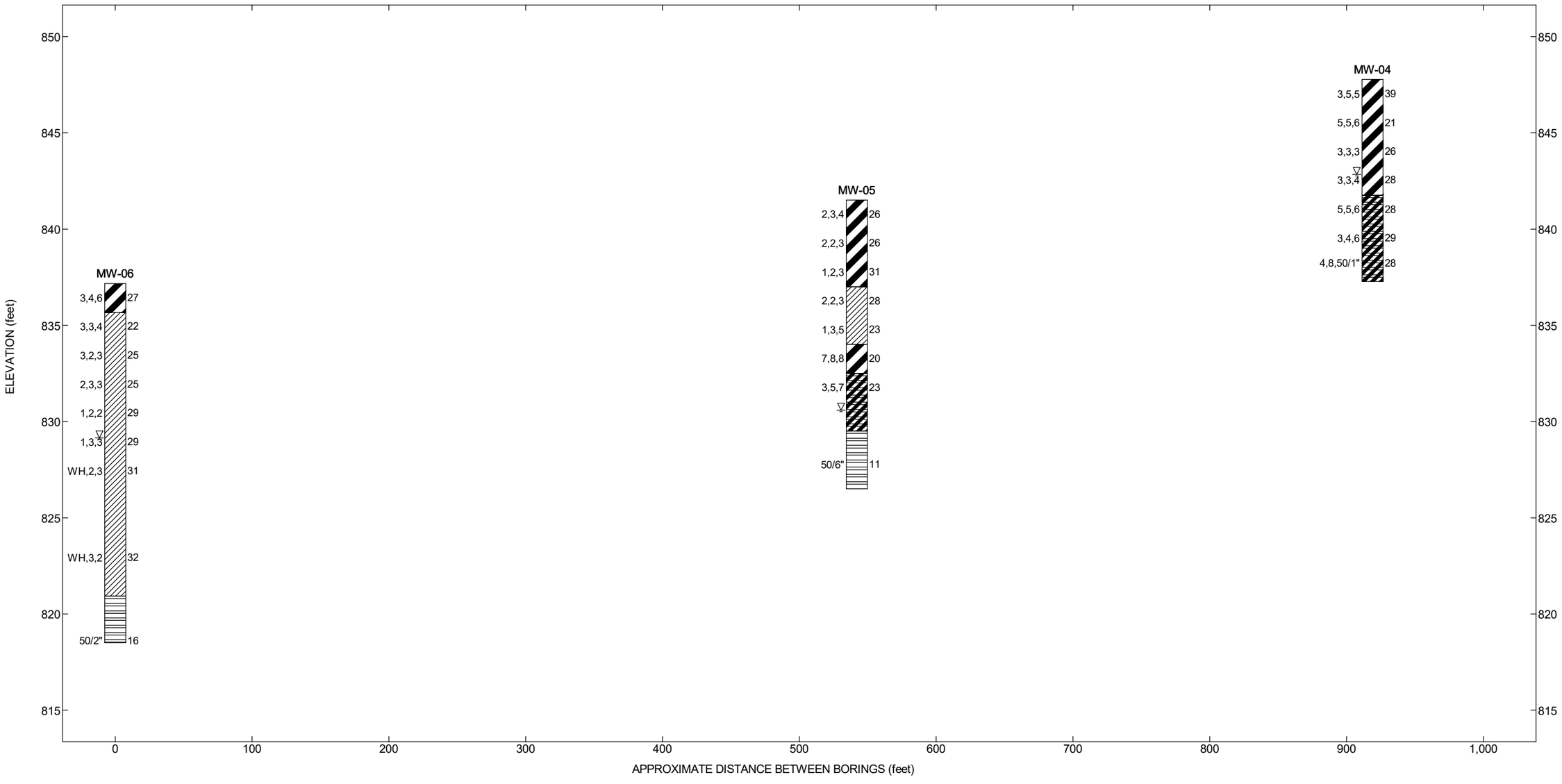
TSI FENCE WITH LAB MILL CREEK_RESTORE.GPJ SOIL_B-1.GDT 8/24/23

TSI geotechnical, inc.
1340 NORTH PRICE ROAD
ST. LOUIS, MISSOURI 63132

SUBSURFACE PROFILE

MILL CREEK PARK GREEN
INFRASTRUCTURE PROJECT
KANSAS CITY, MISSOURI

Prepared By: TB	Checked By: FH	
Project No. 20212037.00	Date:8/24/2023	Figure 3.1



NOTES: 1. Horizontal scale is approximate.

0 77

Horizontal Scale (feet)

TSI geotechnical, inc.

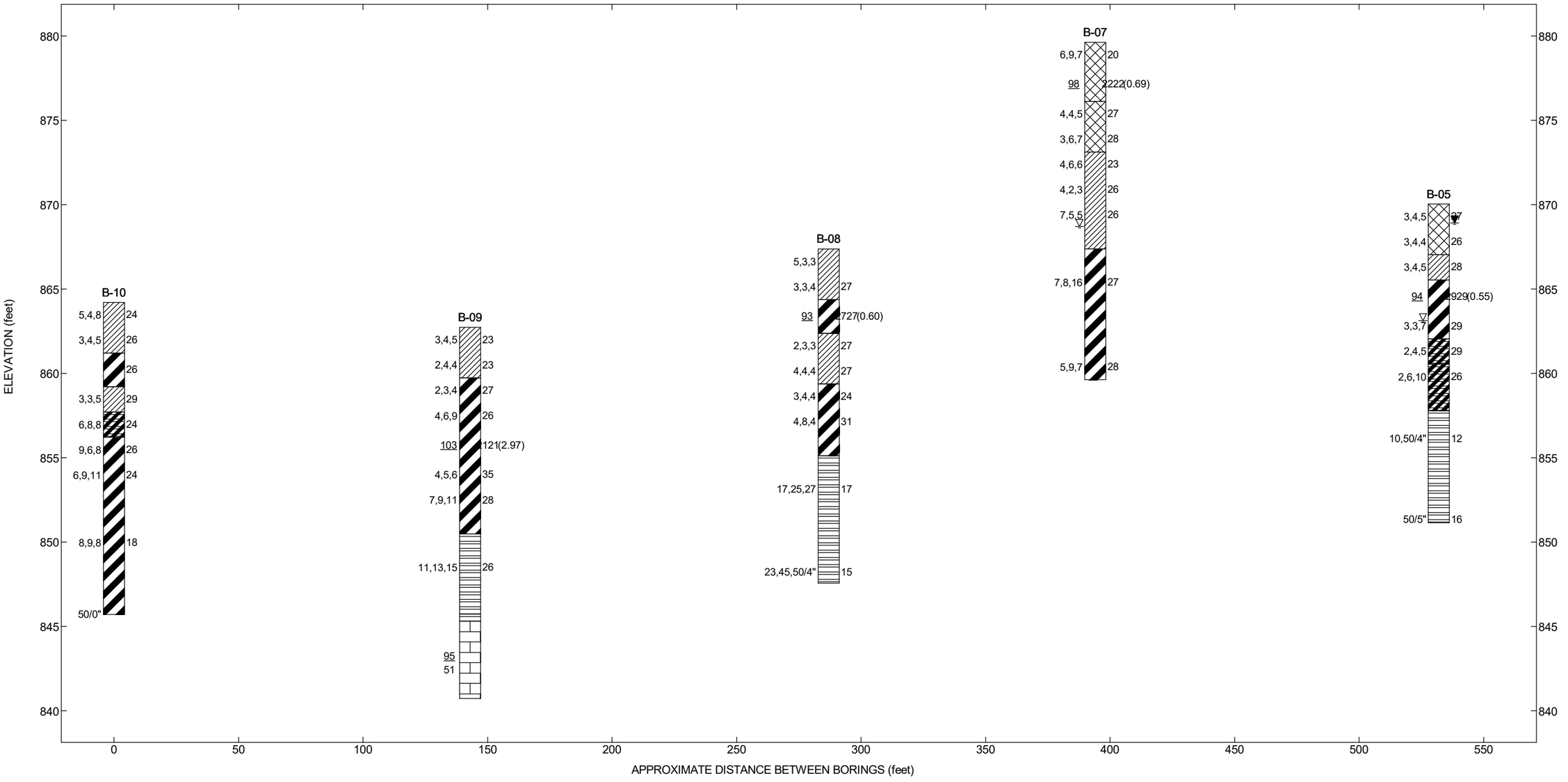
1340 NORTH PRICE ROAD
ST. LOUIS, MISSOURI 63132

SUBSURFACE PROFILE

MILL CREEK PARK GREEN
INFRASTRUCTURE PROJECT
Kansas City, Missouri

Prepared By: TB	Checked By: FH	
Project No. 20212037.00	Date:8/24/2023	Figure 3.2

TSI FENCE WITH LAB MILL CREEK_RESTORE.GPJ SOIL_B-1.GDT 8/25/23



NOTES: 1. Horizontal scale is approximate.

0 42

Horizontal Scale (feet)

TSI geotechnical, inc.
1340 NORTH PRICE ROAD
ST. LOUIS, MISSOURI 63132

SUBSURFACE PROFILE

MILL CREEK PARK GREEN
INFRASTRUCTURE PROJECT
KANSAS CITY, MISSOURI

Prepared By: TB	Checked By: FH	
Project No. 20212037.00	Date:8/24/2023	Figure 3.3

TSI FENCE WITH LAB MILL CREEK_RESTORE.GPJ SOIL_B-1.GDT 8/24/23

GENERAL NOTES

The number of borings is based on: topographic and geologic factors; the magnitude of structure loading; the size, shape, and value of the structure; consequences of failure; and other factors. The type and sequence of sampling are selected to reduce the possibility of undiscovered anomalies and maintain drilling efficiency. Attempts are made to detect and/or identify occurrences during drilling and sampling such as the presence of water, boulders, gas, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation in resistance to driving split-spoon samplers, unusual odors, etc. However, lack of notation regarding these occurrences does not preclude their presence.

Although attempts are made to obtain stabilized groundwater levels, the levels shown on the Logs of Boring may not have stabilized, particularly in more impermeable cohesive soils. Consequently, the indicated groundwater levels may not represent present or future levels. Groundwater levels may vary significantly over time due to the effects of precipitation, infiltration, or other factors not evident at the time indicated.

Unless otherwise noted, soil classifications indicated on the Logs of Boring are based on visual observations and are not the result of classification tests. Although visual classifications are performed by experienced technicians or engineers, classifications so made may not be conclusive.

Generally, variations in texture less than one foot in thickness are described as layers within a stratum, while thicker zones are logged as individual strata. However, minor anomalies and changes of questionable lateral extent may appear only in the verbal description. The lines indicating changes in strata on the Logs of Boring are approximate boundaries only, as the actual material change may be between samples or may be a gradual transition.

Samples chosen for laboratory testing are selected in such a manner as to measure selected physical characteristics of each material encountered. However, as samples are recovered only intermittently and not all samples undergo a complete series of tests, the results of such tests may not conclusively represent the characteristics of all subsurface materials present.

NOTATION USED ON BORING LOGS

APPROXIMATE PROPORTIONS

TRACE	<15%
WITH	15-30%
MODIFIER	>30%

Clay or clayey may be used as major material or modifier, regardless of relative proportions, if the clay content is sufficient to dominate the soil properties.

PARTICLE SIZE

BOULDERS		>12 Inches
COBBLES		12 Inches – 3 Inches
GRAVEL		
	Coarse	3 Inches – ¾ Inch
	Fine	¾ Inch – No. 4 Sieve (4.750 mm)
SAND		
	Coarse	No. 4 – No. 10 Sieve (2.000 mm)
	Medium	No. 10 – No. 40 Sieve (0.420 mm)
	Fine	No. 40 – No. 200 Sieve (0.074 mm)
SILT		No. 200 Sieve - 0.002 mm
CLAY		< 0.002 mm

PENETRATION – BLOWS

Number of impacts of a 140-pound hammer falling a distance of 30 inches to cause a standard split-barrel sampler, 1 3/8 inches I.D., to penetrate a distance of 6 inches. The number of impacts for the first 6 inches of penetration is known as the seating drive. The sum of the impacts for the last 12 inches of penetration is the Standard Penetration Test Resistance or "N" value, blows per foot. For example, if blows = 6-8-9, "N" = 8+9 or 17.

OTHER NOTATIONS

Recovery % – length of recovered soil divided by length of sample attempted.

50/2"	Impacts of hammer to cause sampler to penetrate the indicated number of inches
WR	Sampler penetrated under the static loading of the weight of the drill rods
WH	Sampler penetrated under the static loading the weight of the hammer and drill rods
HSA	Hollow stem auger drilling method
FA	Flight auger drilling method
RW	Rotary wash drilling methods with drilling mud
AH	Automatic hammer used for Standard Penetration Test sample
SH	Safety hammer with rope and cathead used for Standard Penetration Test sample

GRAPHIC SYMBOLS

Depth at which groundwater was encountered during drilling

Depth at which groundwater was measured after drilling

Standard Penetration Test Sample, ASTM D1586

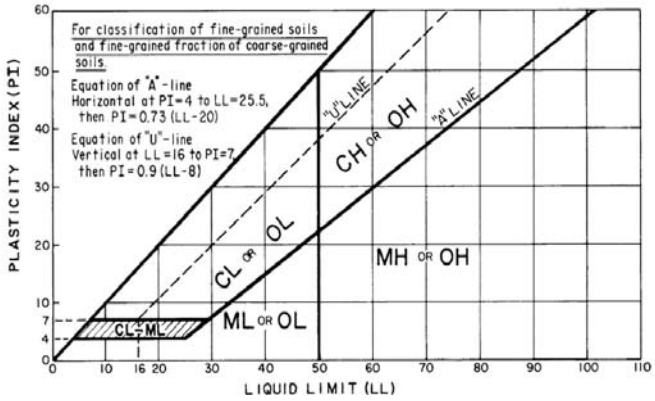
3-inch diameter Shelby Tube Sample, ASTM D1587

Sample grabbed from auger

NX Size rock core sample

UNIFIED SOIL CLASSIFICATION SYSTEM, (ASTM D-2487)

Major Divisions			*Group Symbols*		*Typical Names*	*Laboratory Classification Criteria*		
Coarse-grained soils (More than half of materials is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-Grained soils are classified as follows: Less than 5 per cent GW, GP, SW, SP; More than 12 per cent GM, GC, SM, SC; 5 to 12 per cent Borderline cases requiring dual symbols[b]	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW	
		Gravels with fines (Appreciable amount of fines)	GM[a]	d	Silty gravels, gravel-sand-silt mixtures		Atterberg limits below "A" line or P.1. less than 4	Above "A" line with P.1. between 4 and 7 are *borderline* cases requiring use of dual symbols
				u				
			GC		Clayey gravels, gravel-sand-clay mixtures		Atterberg limits below "A" line with P.1. greater than 7	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines		$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
			SP		Poorly graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for SW	
		Sands with fines (Appreciable amount of fines)	SM[a]	d	Silty sands, sand-mix mixtures		Atterberg limits about "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols
				u				
			SC		Clayey sands, sand-clay mixtures		Atterberg limits about "A" line with P.I. greater than 7	
Fine-grained soils (More than half of materials is smaller than No. 200 sieve size)	Silts and clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity			
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
			OL		Organic silts and organic silty clays of low plasticity			
	Silts and clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
			CH		Inorganic clays of medium to high plasticity, organic silts			
			OH		Organic clays of medium to high plasticity, organic silts			
	Highly organic soils		Pt		Peat and other highly organic soils			



[a]Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 26 or less and the P.1. is 6 or less; the suffix u used when L.L. is greater than 28.

[b]Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

ROCK CORE DESCRIPTIONS AND CRITERIA

Hardness

Very Soft	- Easily indented with the thumb
Soft	- Able to be scratched with a fingernail
Moderately Hard	- Easily scratched with a knife; cannot be scratched with the fingernail
Hard	- Difficult to scratch with a knife
Very Hard	- Cannot be scratched with a knife

Crystallinity (Soluble Rock Only)

Aphanitic	- Crystals cannot be distinguished with the naked eye
Very Finely Crystalline	- Crystals are barely discernable with the naked eye
Finely Crystalline	- Crystals are easily discernable with the naked eye
Medium Crystalline	- Crystals are medium size; up to 1/8" in diameter
Coarsely Crystalline	- Crystals are 1/8" to 1/4" in diameter
Very Coarsely Crystalline	- Crystals are larger than 1/4" in diameter

Grain Size

Very Fine Grained	- Less than or equal to 0.0029" (#200 Sieve)
Fine Grained	- 0.0029" to 0.0165" (#200 to #40 Sieve)
Medium Grained	- 0.0165" to 0.07087" (#40 to #10 Sieve)
Coarse Grained	- Greater than 0.0787" (#10 Sieve)

Mass Bedding

Parting	- Less than 0.02 foot
Band	- 0.02 to 0.2 foot
Thin Bed	- 0.2 to 0.5 foot
Medium Bed	- 0.5 to 1.0 foot
Thick Bed	- 1.0 to 2.0 feet
Massive	- Greater than 2.0 feet

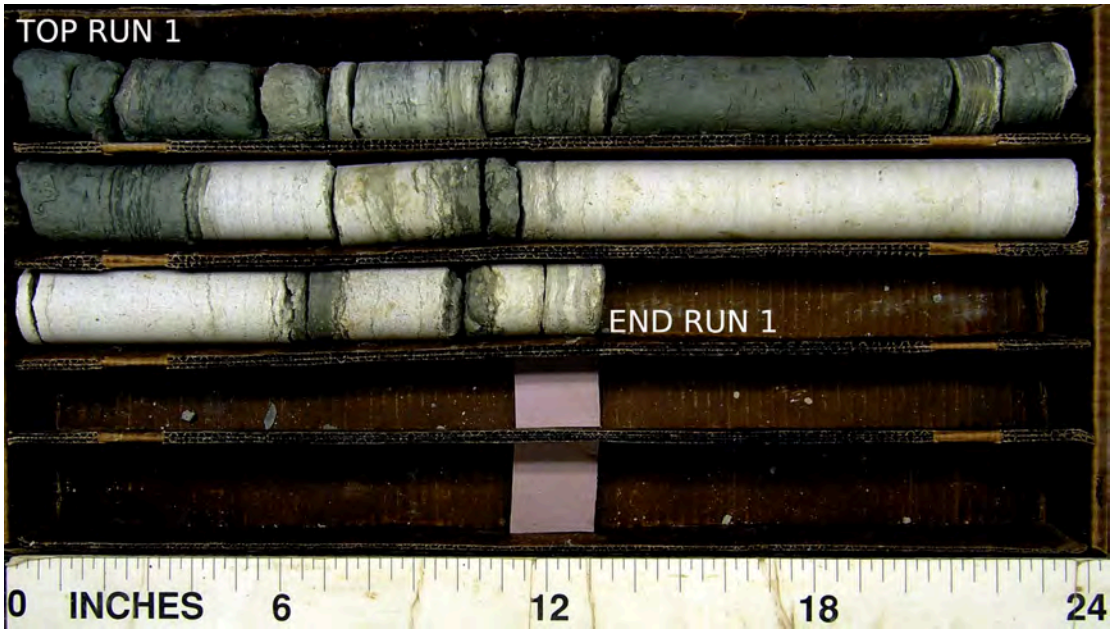
Weathering

Fresh	- No visible signs of decomposition or discoloration
Slightly Weathered	- Slight discoloration inward from open fractures
Moderately Weathered	- Discoloration throughout, slight loss of strength, texture intact
Highly Weathered	- Specimen can be broken by hand, texture indistinct, fabric intact
Completely Weathered	- Specimen easily crumbled, minerals decomposed to soil

Voids

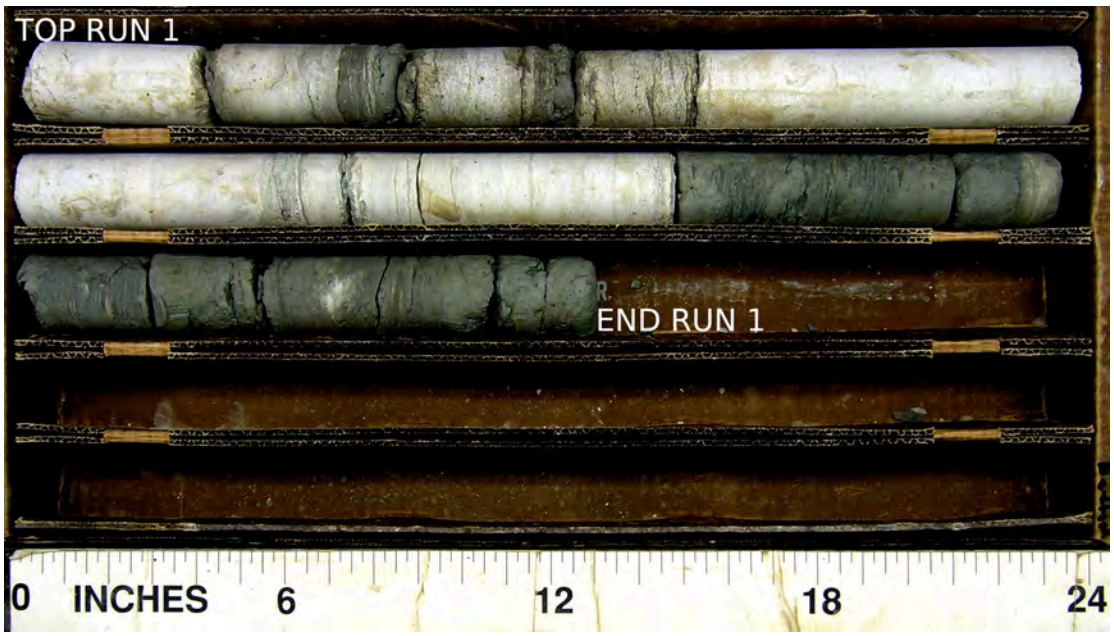
Dense	- Usually not discernable with the naked eye
Pitted	- Discernable to ¼"
Vuggy	- ¼" to diameter of the core
Cavity	- Larger than 6" in diameter

APPENDIX C



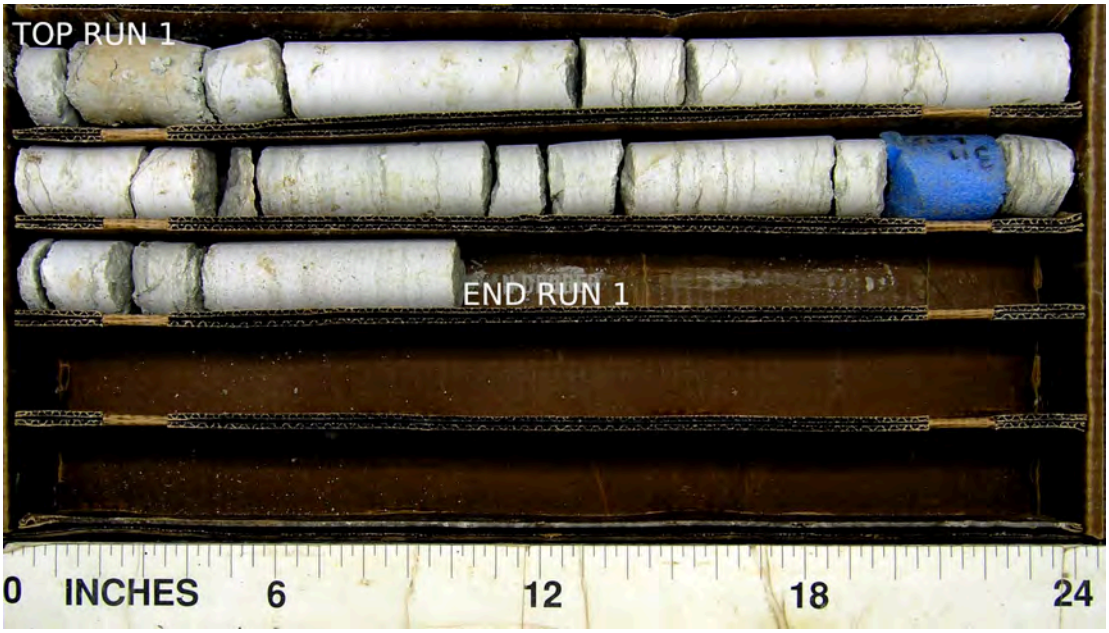
BORING B-4

Run	Depth, Ft.	Recovery, %	RQD, %
1	20.0-25.0	100	68



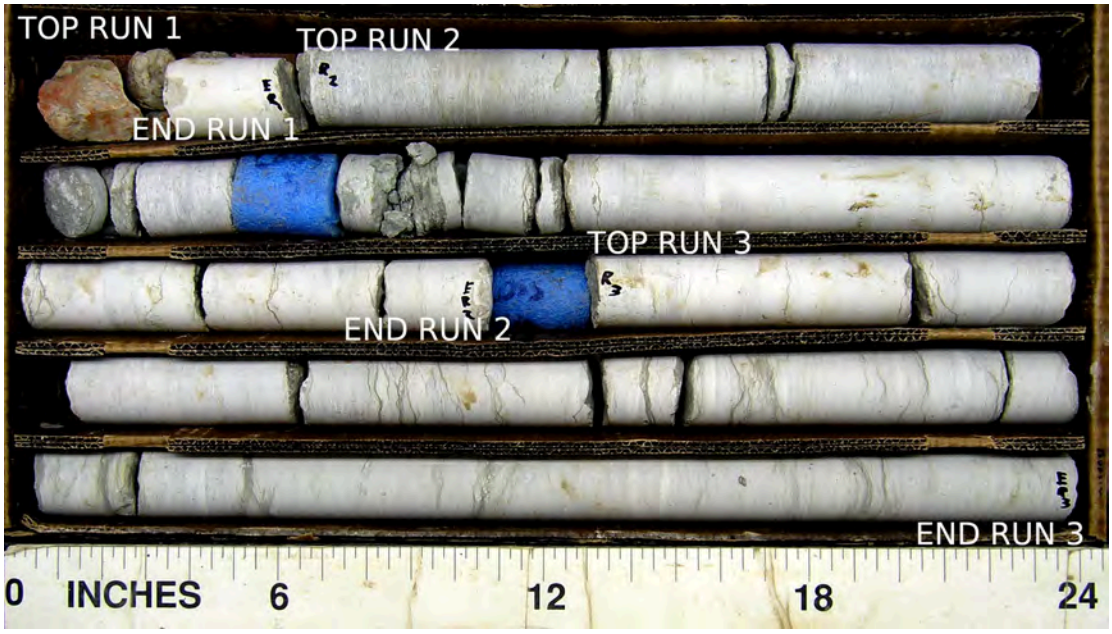
BORING B-6

Run	Depth, Ft.	Recovery, %	RQD, %
1	19.0-24.0	100	100



BORING B-9

Run	Depth, Ft.	Recovery, %	RQD, %
1	17.0-22.0	95	51



BORING B-11

Run	Depth, Ft.	Recovery, %	RQD, %
1	5.5-6.0	67	0
2	6.0-10.5	93	65
3	10.5-15.5	99	78

Uniaxial Compressive Strength Test of Rock Core

(ASTM D7012-14, method C)

Project:	Mill Creek Park	Boring Number:	B-6	Date:	5/10/2022
Project Number:	20212037	Sample Number:	R-1	Depth:	20.7-21.0

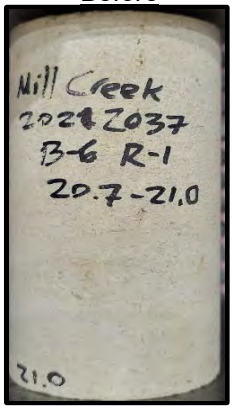
Visual Description: LIMESTONE, gray, hard, finely crystalline

Specimen Weight	509.51	g
Diameter	1.870	inches
Length	4.217	inches
Volume	**0.0067**	ft^3

Wet unit weight	**167.6**	pcf
Length:Diameter Ratio	**2.26**	

Specimen Area (metric)	**1771.904**	mm^2
Specimen Area	**2.746**	in^2
Total Load on Specimen	**45910**	lbs
Unconfined Strength (qu)	**16717**	**psi**
Unconfined Strength (qu)	**1204**	**tsf**
Unconfined Strength (qu)	**115**	**MPa**

Before



After

Tested by:	SLY	Date:	5/10/2022
Calculated by:	SLY	Date:	5/10/2022
Checked by:	ACE	Date:	6/6/2022

Uniaxial Compressive Strength Test of Rock Core

(ASTM D7012-14, method C)

Project:	Mill Creek Park	Boring Number:	B-9	Date:	5/17/2022
Project Number:	20212037	Sample Number:	R-1	Depth:	17.5-17.8

Visual Description: LIMESTONE

Specimen Weight	511.26	g
Diameter	1.868	inches
Length	4.260	inches
Volume	**0.0068**	ft^3

Wet unit weight	**166.8**	pcf
Length:Diameter Ratio	**2.28**	

Specimen Area (metric)	**1768.116**	mm^2
Specimen Area	**2.741**	in^2
Total Load on Specimen	**40130**	lbs
Unconfined Strength (qu)	**14643**	**psi**
Unconfined Strength (qu)	**1054**	**tsf**
Unconfined Strength (qu)	**101**	**MPa**

Before

After

Tested by:	SLY	Date:	5/17/2022
Calculated by:	SLY	Date:	5/17/2022
Checked by:	ACE	Date:	6/6/2022

Uniaxial Compressive Strength Test of Rock Core

(ASTM D7012-14, method C)

Project:	Mill Creek Park	Boring Number:	B-11	Date:	5/17/2022
Project Number:	20212037	Sample Number:	R-3	Depth:	11.7-12.0

Visual Description: LIMESTONE

Specimen Weight	502.93	g
Diameter	1.861	inches
Length	4.273	inches
Volume	**0.0067**	ft^3

Wet unit weight	**164.8**	pcf
Length:Diameter Ratio	**2.30**	

Specimen Area (metric)	**1754.889**	mm^2
Specimen Area	**2.720**	in^2
Total Load on Specimen	**39950**	lbs
Unconfined Strength (qu)	**14687**	**psi**
Unconfined Strength (qu)	**1057**	**tsf**
Unconfined Strength (qu)	**101**	**MPa**

Before

After

Tested by:	SLY	Date:	5/17/2022
Calculated by:	SLY	Date:	5/17/2022
Checked by:	ACE	Date:	6/6/2022

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-1	**Tested by:**	SLY 11/1/2021
Sample Number:	SS-1	**Calculated by:**	SLY 11/3/2021
Sample Depth:	0.0-1.5	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, sandy lean CLAY (CL), trace gravel		

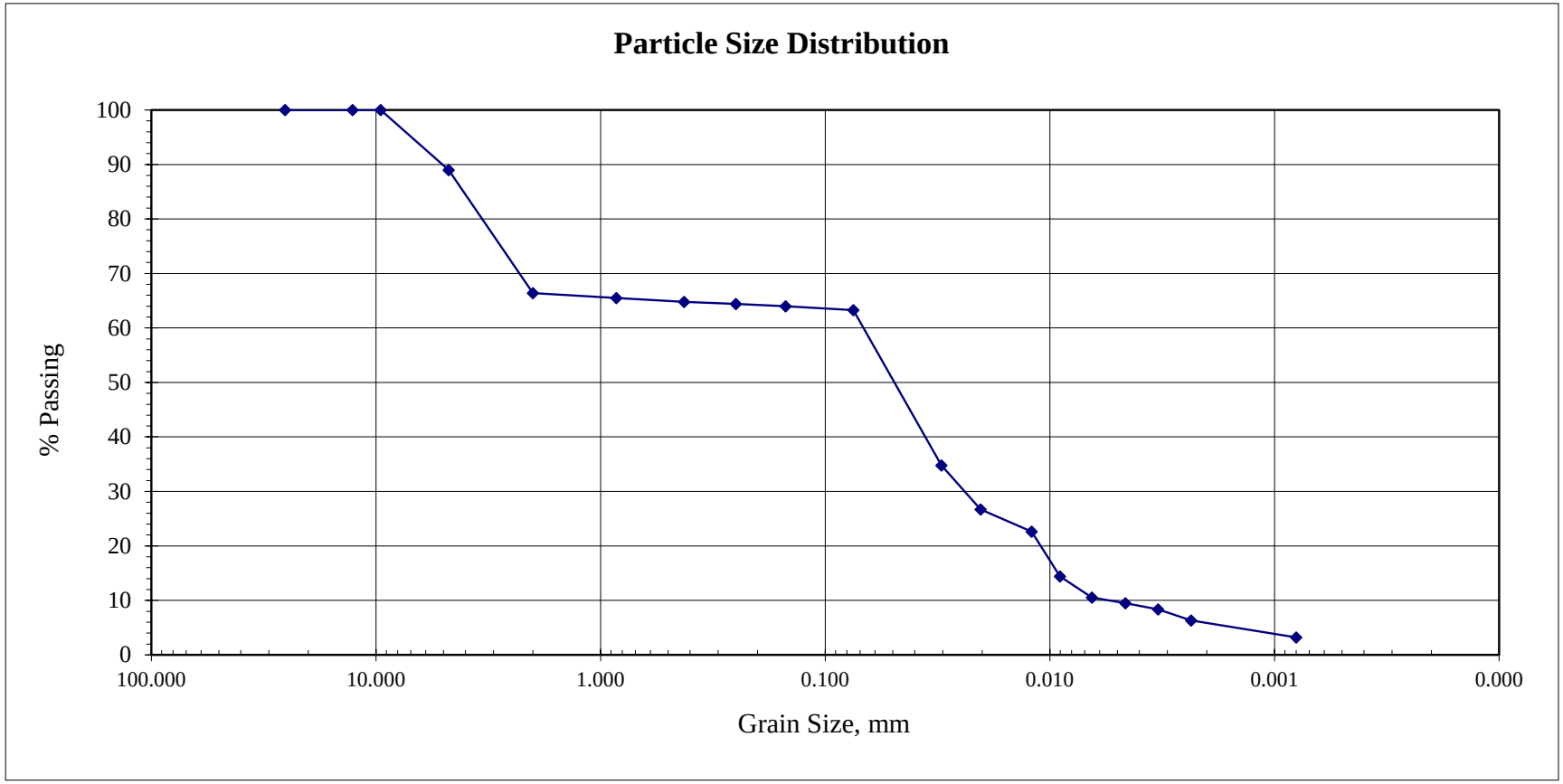
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	89
No.10	2.00	66
No.20	0.85	65
No.40	0.425	65
No.60	0.250	64
No.100	0.150	64
No.200	0.075	63
Hydrometer Analysis	0.0303	35
	0.0203	27
	0.0121	23
	0.0090	14
	0.0065	11
	0.0046	10
	0.0033	8
	0.0024	6
	0.0010	3

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	11
Coarse Sand	2.00 to 4.75	23
Medium Sand	0.43 to 2.00	2
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	54
Clay	<0.005	10

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-1	**Tested by:**	SLY 11/1/2021
Sample Number:	SS-1	**Calculated by:**	SLY 11/3/2021
Sample Depth:	0.0-1.5	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, sandy lean CLAY (CL), trace grave		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-1	**Tested by:**	SLY 11/1/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/3/2021
Sample Depth:	1.5-3.0	**Checked by:**	ACE 11/12/21
Visual Description:	FILL: Brown, lean CLAY (CL), with gravel, trace sand		

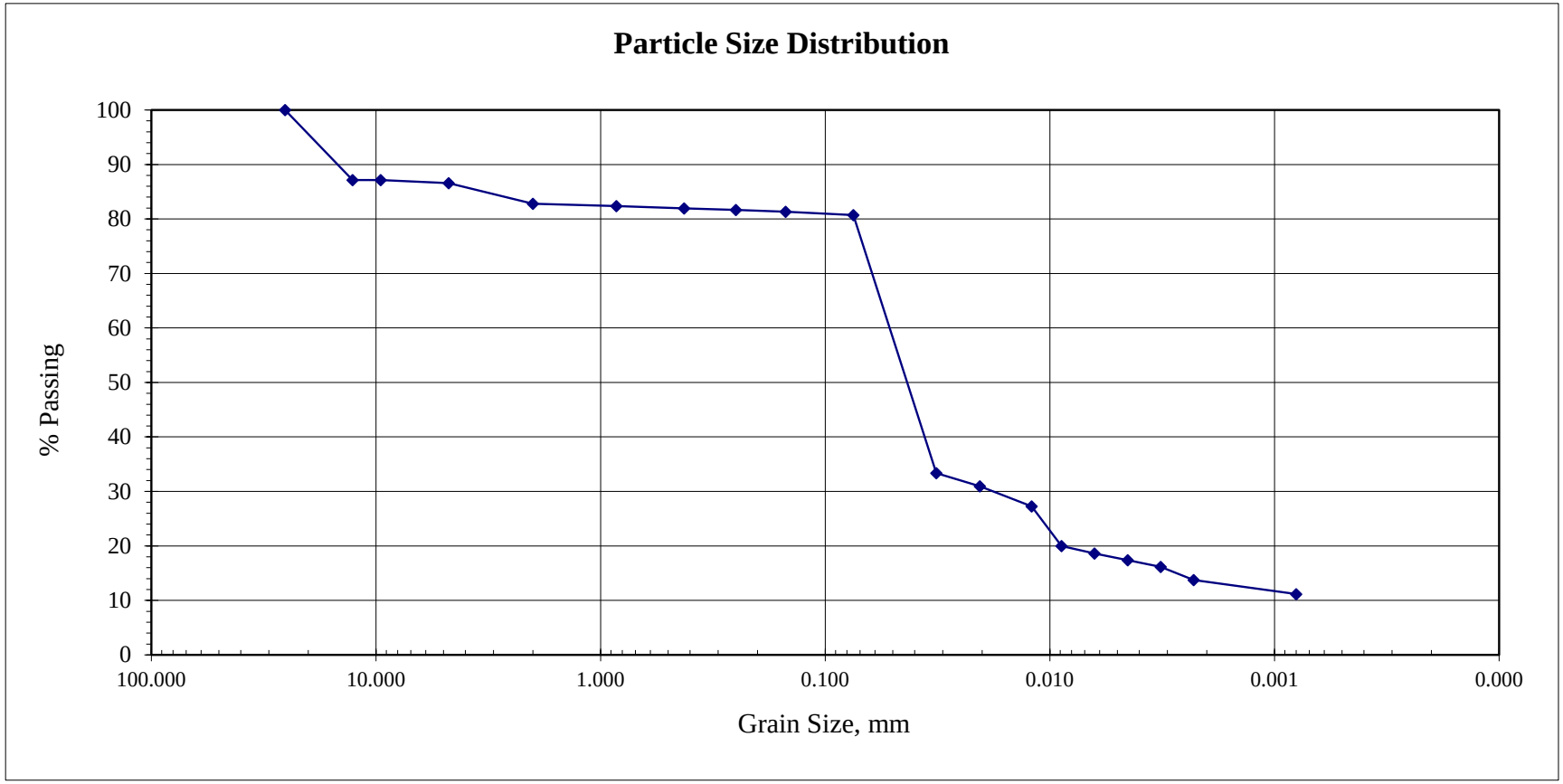
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	87
3/8"	9.53	87
No.4	4.75	87
No.10	2.00	83
No.20	0.85	82
No.40	0.425	82
No.60	0.250	82
No.100	0.150	81
No.200	0.075	81
Hydrometer Analysis	0.0320	33
	0.0205	31
	0.0121	27
	0.0089	20
	0.0063	19
	0.0045	17
	0.0032	16
	0.0023	14
	0.0009	11

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	13
Coarse Sand	2.00 to 4.75	4
Medium Sand	0.43 to 2.00	1
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	63
Clay	<0.005	18

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-1	**Tested by:**	SLY 11/1/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/3/2021
Sample Depth:	1.5-3.0	**Checked by:**	ACE 11/12/21
Visual Description:	FILL: Brown, lean CLAY (CL), with gravel, trace		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-1	**Tested by:**	SLY 11/1/2021
Sample Number:	SS-3	**Calculated by:**	SLY 11/3/2021
Sample Depth:	3.0-4.5	**Checked by:**	ACE 11/12/21
Visual Description:	Brown, sandy organic CLAY (OH), with gravel		

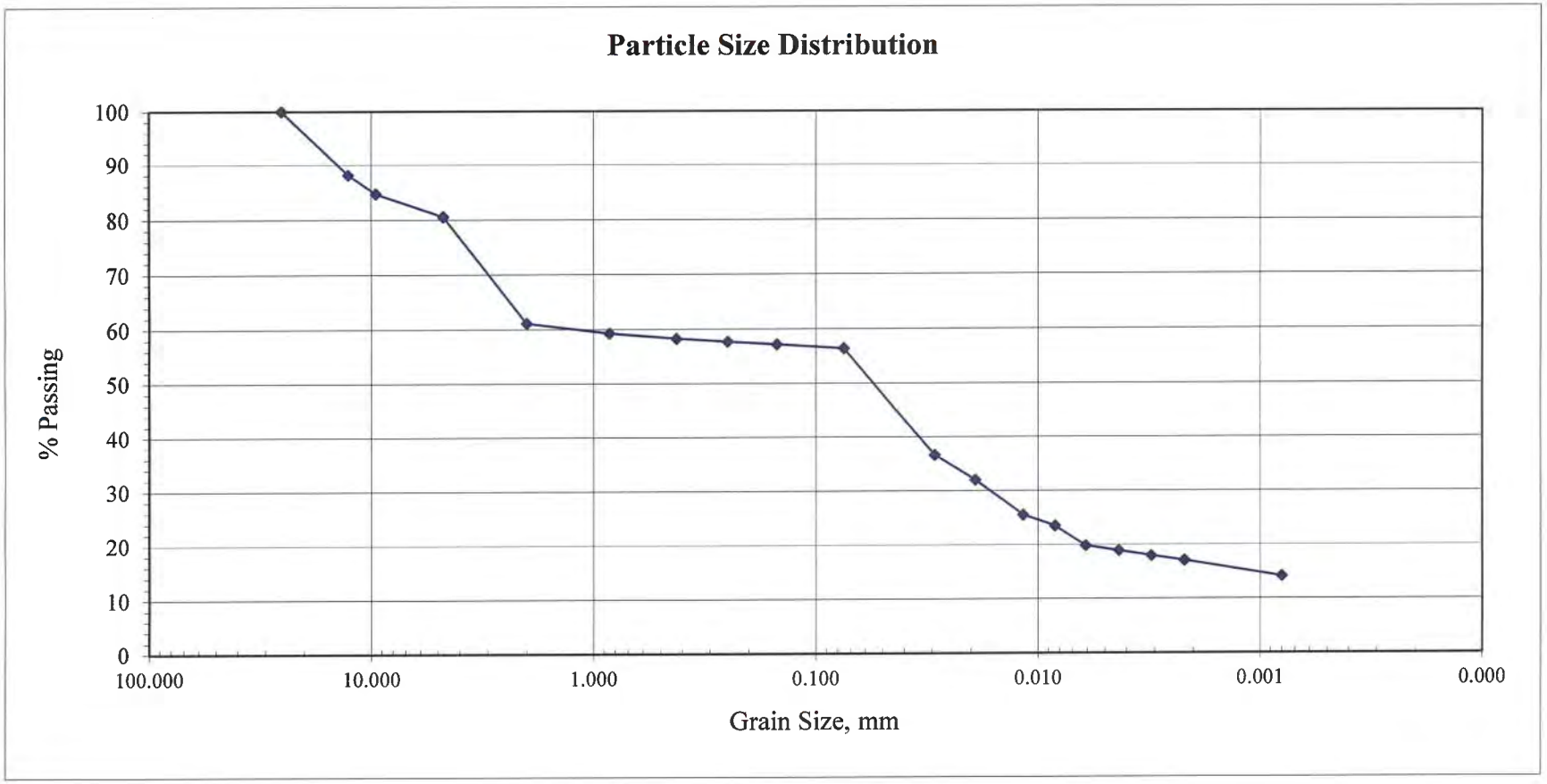
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	88
3/8"	9.53	85
No.4	4.75	81
No.10	2.00	61
No.20	0.85	59
No.40	0.425	58
No.60	0.250	58
No.100	0.150	57
No.200	0.075	56
Hydrometer Analysis	0.0292	37
	0.0192	32
	0.0117	25
	0.0084	23
	0.0061	20
	0.0043	19
	0.0031	18
	0.0022	17
	0.0009	14

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	19
Coarse Sand	2.00 to 4.75	19
Medium Sand	0.43 to 2.00	3
Fine Sand	0.075 to 0.43	2
Silt	0.005 to 0.075	37
Clay	<0.005	19

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-1	**Tested by:**	SLY 11/1/2021
Sample Number:	SS-3	**Calculated by:**	SLY 11/3/2021
Sample Depth:	3.0-4.5	**Checked by:**	ACE 11/12/21
Visual Description:	Brown, sandy organic CLAY (OH), with gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-1	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-4	**Calculated by:**	SLY 11/10/2021
Sample Depth:	4.5-6.0	**Checked by:**	ACE 11/12/2021
Visual Description:	Brown, clayey GRAVEL (GC)		

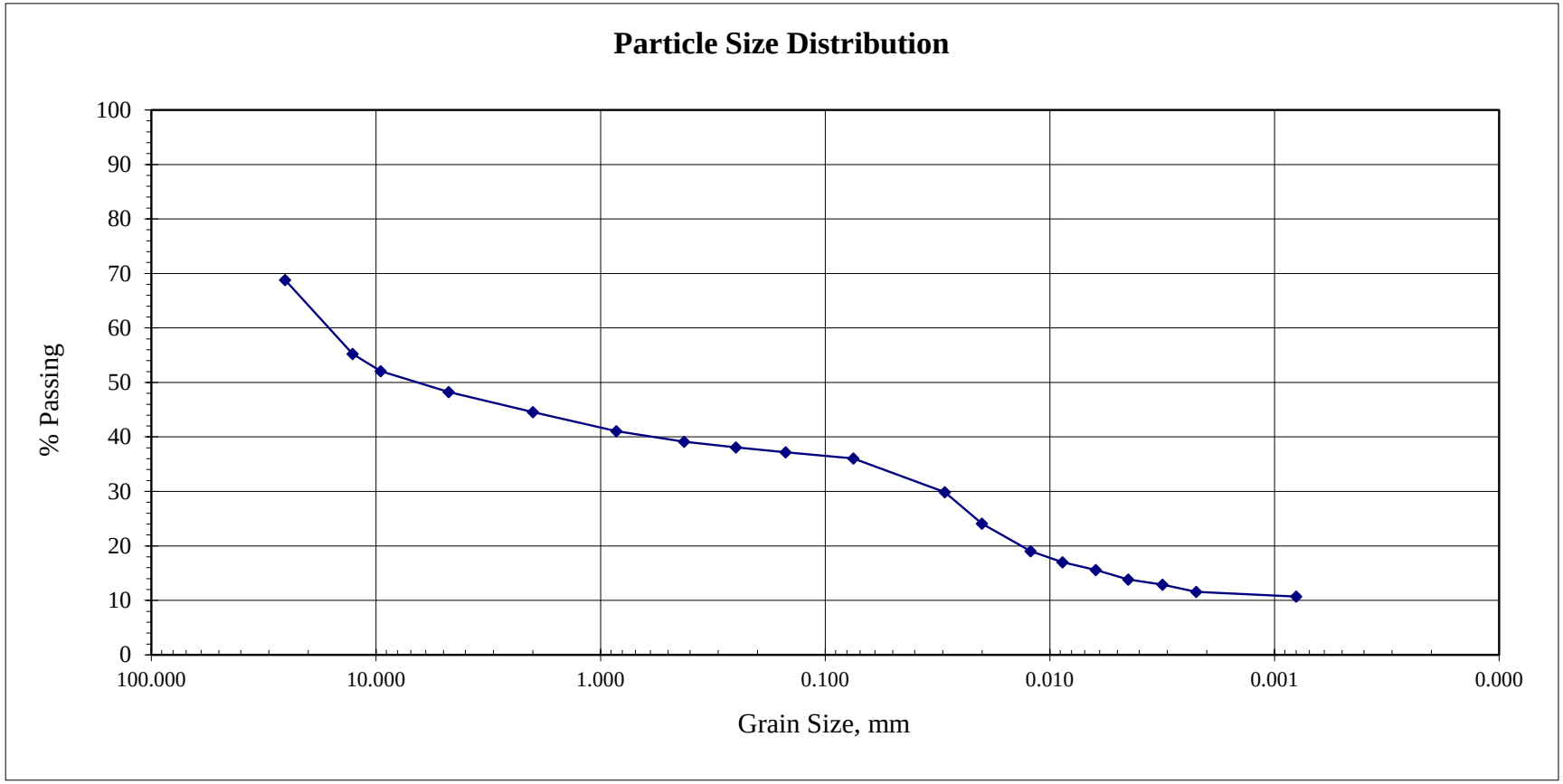
Sieve	Particle Size, mm	Percent Finer
1"	25.40	69
1/2"	12.70	55
3/8"	9.53	52
No.4	4.75	48
No.10	2.00	45
No.20	0.85	41
No.40	0.425	39
No.60	0.250	38
No.100	0.150	37
No.200	0.075	36
Hydrometer Analysis	0.0294	30
	0.0201	24
	0.0122	19
	0.0088	17
	0.0063	16
	0.0045	14
	0.0032	13
	0.0022	12
	0.0013	11

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	52
Coarse Sand	2.00 to 4.75	4
Medium Sand	0.43 to 2.00	5
Fine Sand	0.075 to 0.43	3
Silt	0.005 to 0.075	22
Clay	<0.005	14

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-1	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-4	**Calculated by:**	SLY 11/10/2021
Sample Depth:	4.5-6.0	**Checked by:**	ACE 11/12/2021
Visual Description:	Brown, clayey GRAVEL (GC)		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-1	**Tested by:**	SLY 11/24/2021
Sample Number:	SS-5	**Calculated by:**	SLY 11/29/2021
Sample Depth:	6.0-7.5	**Checked by:**	AD 11/30/2021
Visual Description:	Brown and gray, lean CLAY (CL), trace sand and gravel		

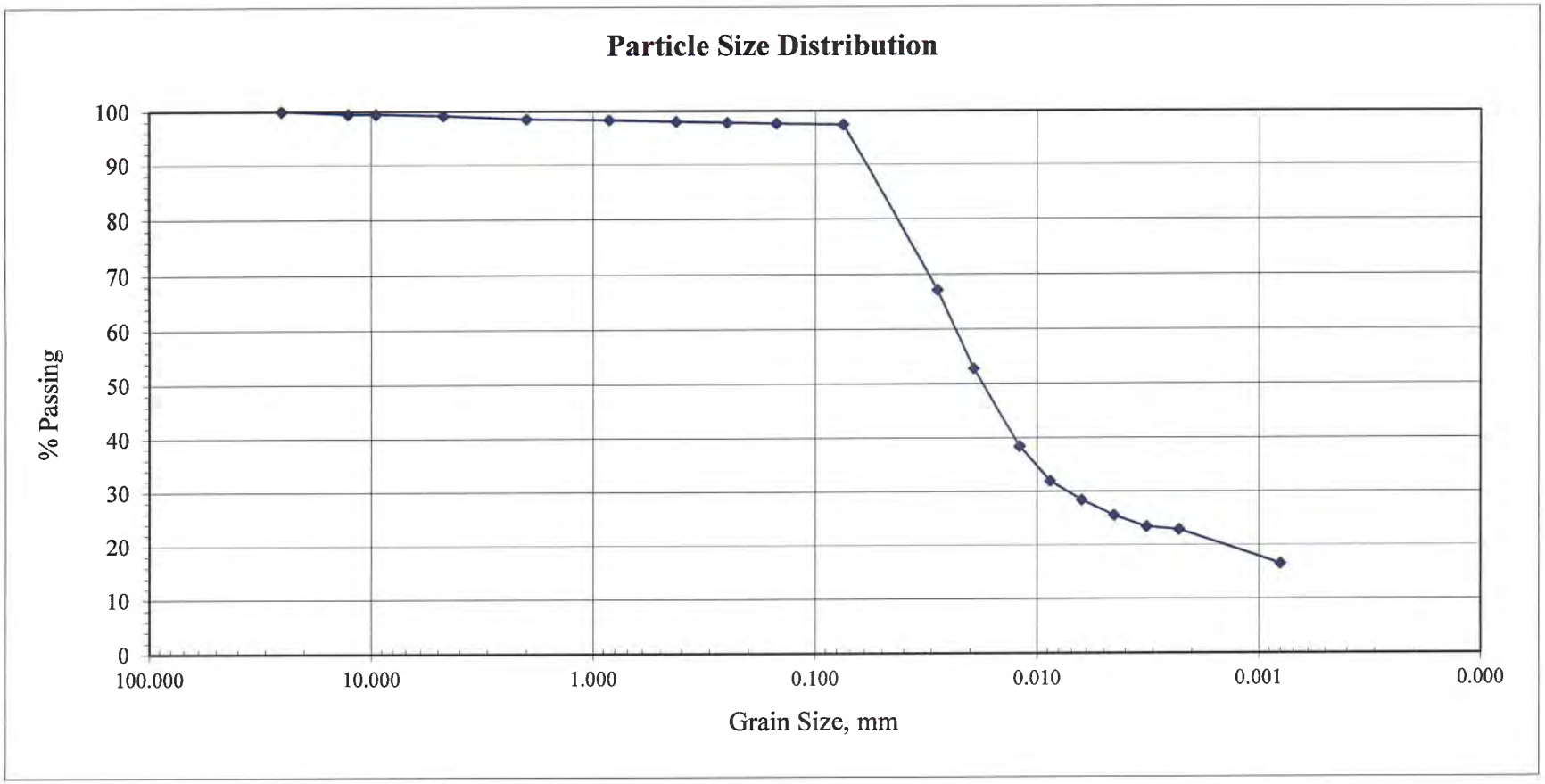
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	99
3/8"	9.53	99
No.4	4.75	99
No.10	2.00	99
No.20	0.85	98
No.40	0.425	98
No.60	0.250	98
No.100	0.150	98
No.200	0.075	97
Hydrometer Analysis	0.0282	67
	0.0194	53
	0.0120	38
	0.0087	32
	0.0063	28
	0.0045	26
	0.0032	23
	0.0023	23
	0.0006	17

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	1
Coarse Sand	2.00 to 4.75	1
Medium Sand	0.43 to 2.00	1
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	71
Clay	<0.005	26

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-1	**Tested by:**	SLY 11/24/2021
Sample Number:	SS-5	**Calculated by:**	SLY 11/29/2021
Sample Depth:	6.0-7.5	**Checked by:**	AD 11/30/2021
Visual Description:	Brown and gray, lean CLAY (CL), trace sand and gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-2	**Tested by:**	SLY 11/1/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/3/2021
Sample Depth:	1.5-3.0	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, lean CLAY (CL), trace sand and gravel		

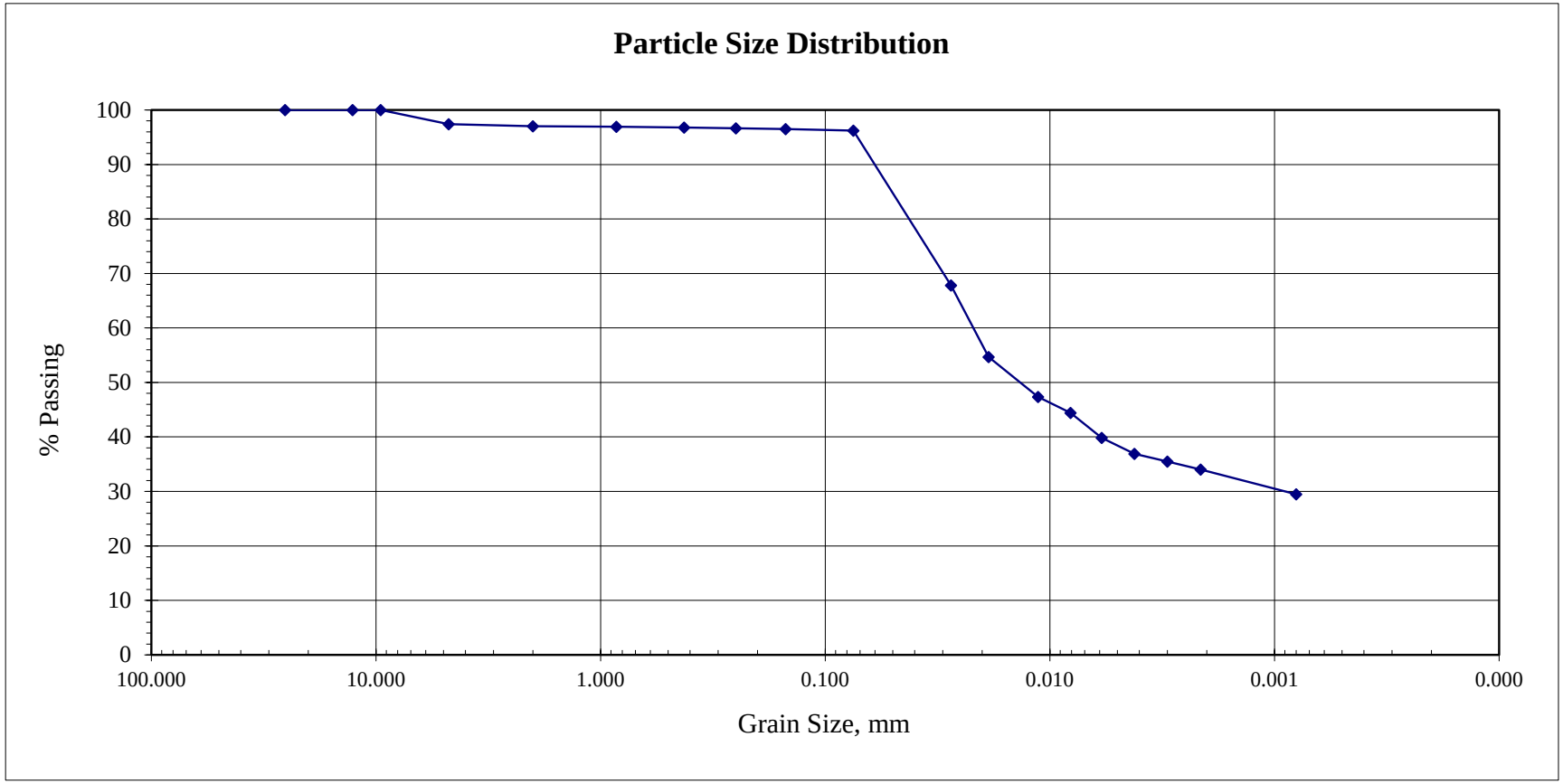
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	97
No.10	2.00	97
No.20	0.85	97
No.40	0.425	97
No.60	0.250	97
No.100	0.150	96
No.200	0.075	96
Hydrometer Analysis	0.0275	68
	0.0187	55
	0.0113	47
	0.0081	44
	0.0059	40
	0.0042	37
	0.0030	35
	0.0021	34
	0.0009	29

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	3
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	58
Clay	<0.005	38

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-2	**Tested by:**	SLY 11/1/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/3/2021
Sample Depth:	1.5-3.0	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, lean CLAY (CL), trace sand and gr		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-2	**Tested by:**	SLY 11/1/2021
Sample Number:	SS-3	**Calculated by:**	SLY 11/3/2021
Sample Depth:	3.0-4.5	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, lean CLAY (CL), trace sand		

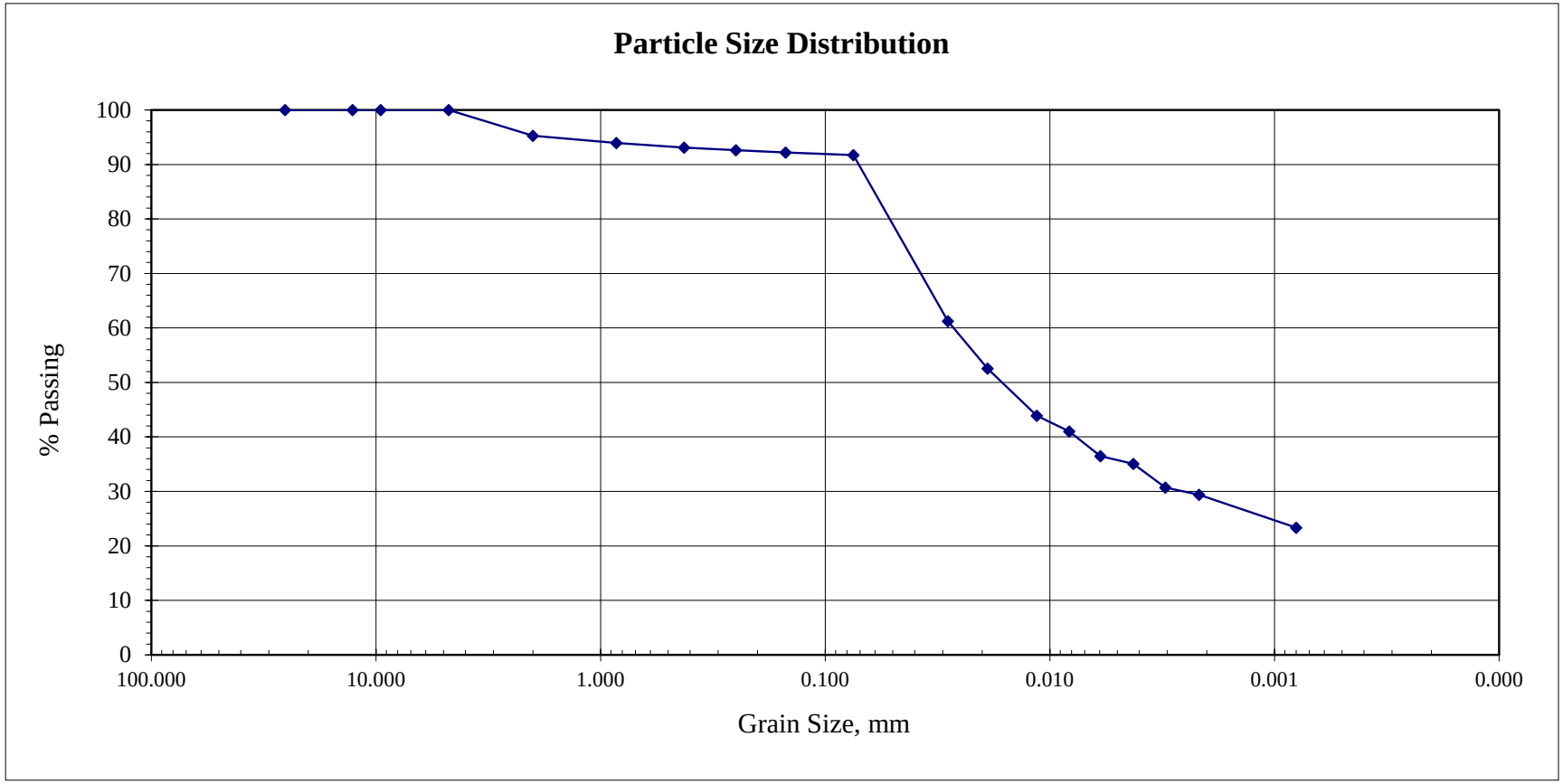
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	95
No.20	0.85	94
No.40	0.425	93
No.60	0.250	93
No.100	0.150	92
No.200	0.075	92
Hydrometer Analysis	0.0284	61
	0.0189	53
	0.0114	44
	0.0082	41
	0.0060	36
	0.0042	35
	0.0031	31
	0.0022	29
	0.0009	23

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	5
Medium Sand	0.43 to 2.00	2
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	56
Clay	<0.005	36

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-2	**Tested by:**	SLY 11/1/2021
Sample Number:	SS-3	**Calculated by:**	SLY 11/3/2021
Sample Depth:	3.0-4.5	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, lean CLAY (CL), trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-2	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-4	**Calculated by:**	SLY 11/10/2021
Sample Depth:	4.5-6.0	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, lean CLAY (CL), trace sand		

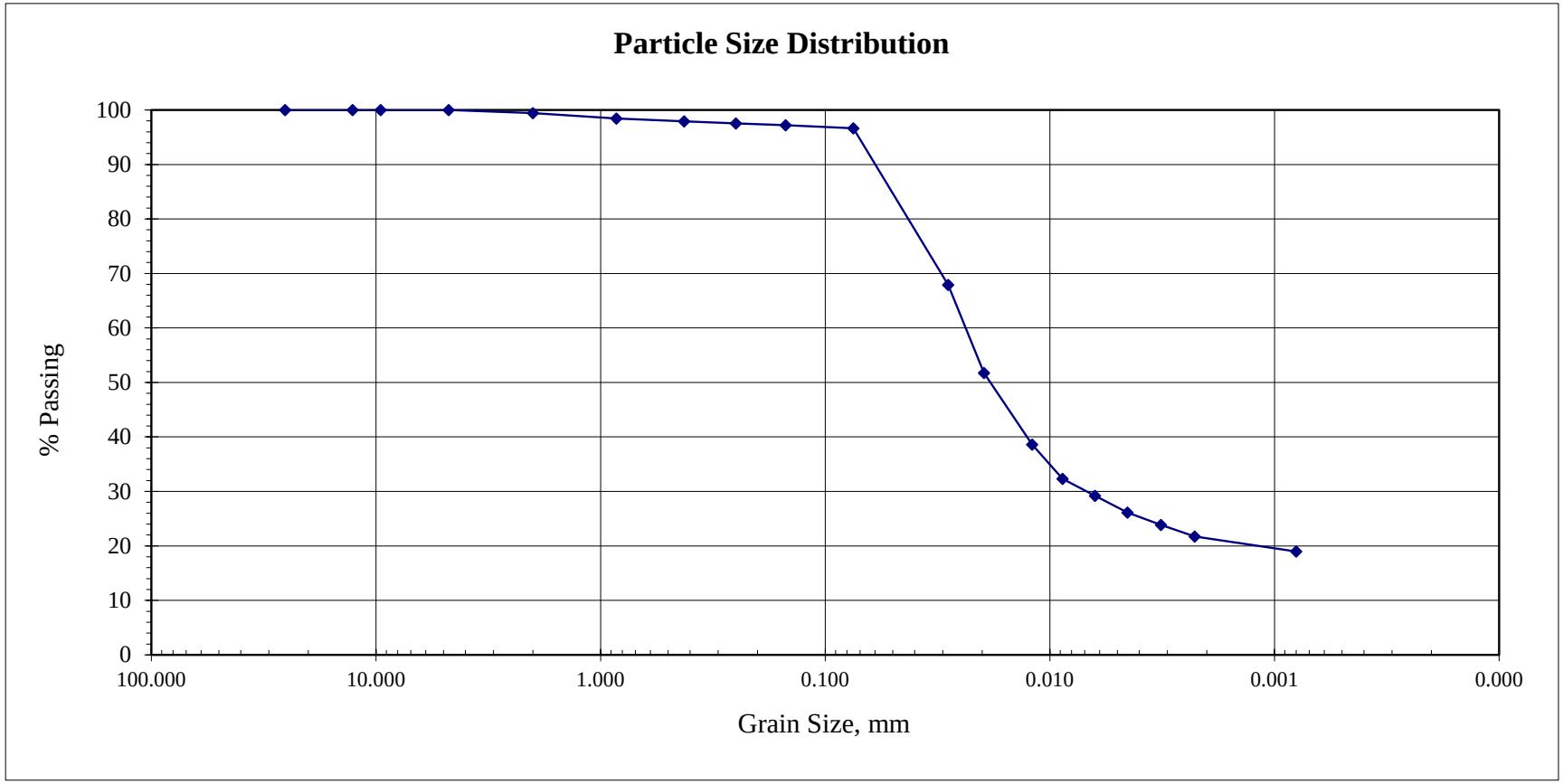
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	99
No.20	0.85	98
No.40	0.425	98
No.60	0.250	98
No.100	0.150	97
No.200	0.075	97
Hydrometer Analysis	0.0284	68
	0.0197	52
	0.0120	39
	0.0088	32
	0.0063	29
	0.0045	26
	0.0032	24
	0.0023	22
	0.0013	19

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	1
Medium Sand	0.43 to 2.00	2
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	70
Clay	<0.005	27

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-2	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-4	**Calculated by:**	SLY 11/10/2021
Sample Depth:	4.5-6.0	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, lean CLAY (CL), trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-2	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-5	**Calculated by:**	SLY 11/10/2021
Sample Depth:	6.0-7.5	**Checked by:**	ACE 11/12/2021
Visual Description:	Brown and gray, clayey GRAVEL (GC), with sand		

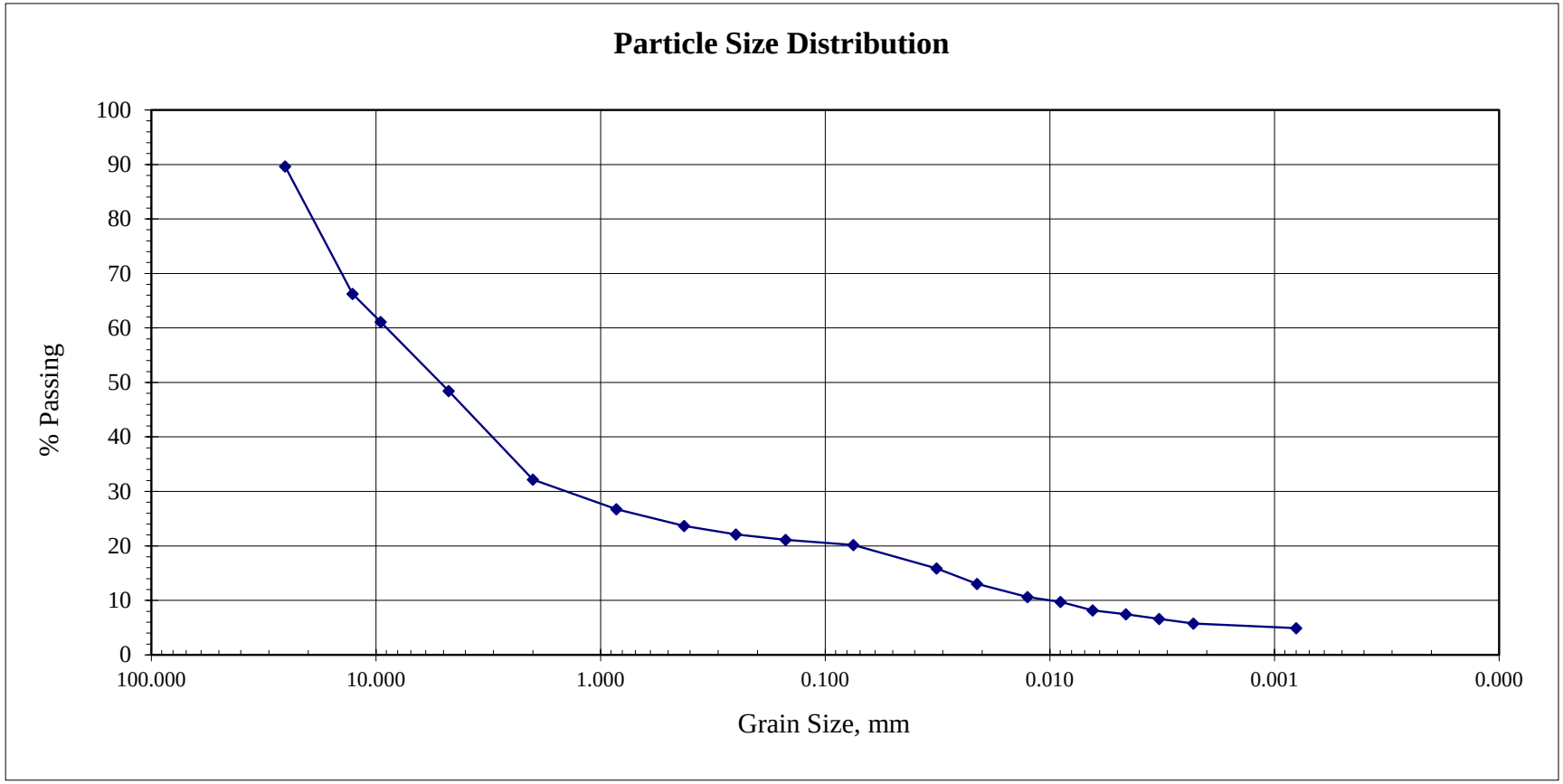
Sieve	Particle Size, mm	Percent Finer
1"	25.40	90
1/2"	12.70	66
3/8"	9.53	61
No.4	4.75	48
No.10	2.00	32
No.20	0.85	27
No.40	0.425	24
No.60	0.250	22
No.100	0.150	21
No.200	0.075	20
Hydrometer Analysis	0.0319	16
	0.0211	13
	0.0126	11
	0.0090	10
	0.0065	8
	0.0046	7
	0.0033	7
	0.0023	6
	0.0014	5

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	52
Coarse Sand	2.00 to 4.75	16
Medium Sand	0.43 to 2.00	9
Fine Sand	0.075 to 0.43	3
Silt	0.005 to 0.075	13
Clay	<0.005	8

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-2	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-5	**Calculated by:**	SLY 11/10/2021
Sample Depth:	6.0-7.5	**Checked by:**	ACE 11/12/2021
Visual Description:	Brown and gray, clayey GRAVEL (GC), with san		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-3	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-1	**Calculated by:**	SLY 11/10/2021
Sample Depth:	0.0-1.5	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, lean CLAY (CL), trace sand		

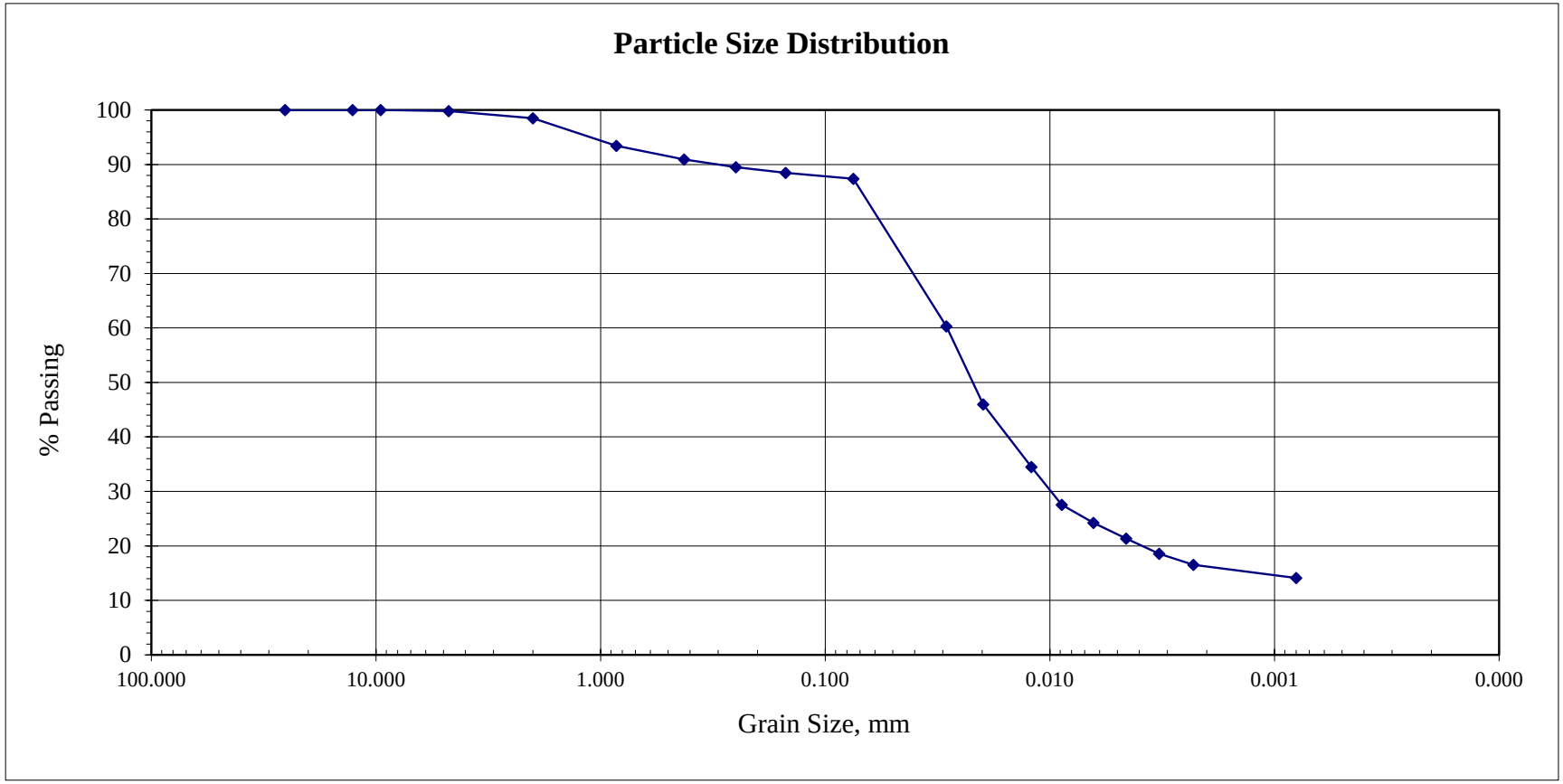
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	98
No.20	0.85	93
No.40	0.425	91
No.60	0.250	90
No.100	0.150	88
No.200	0.075	87
Hydrometer Analysis	0.0289	60
	0.0198	46
	0.0121	34
	0.0089	28
	0.0064	24
	0.0046	21
	0.0033	19
	0.0023	17
	0.0014	14

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	1
Medium Sand	0.43 to 2.00	8
Fine Sand	0.075 to 0.43	4
Silt	0.005 to 0.075	65
Clay	<0.005	22

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-3	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-1	**Calculated by:**	SLY 11/10/2021
Sample Depth:	0.0-1.5	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, lean CLAY (CL), trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-3	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/10/2021
Sample Depth:	1.5-3.0	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, lean CLAY (CL), trace sand and gravel		

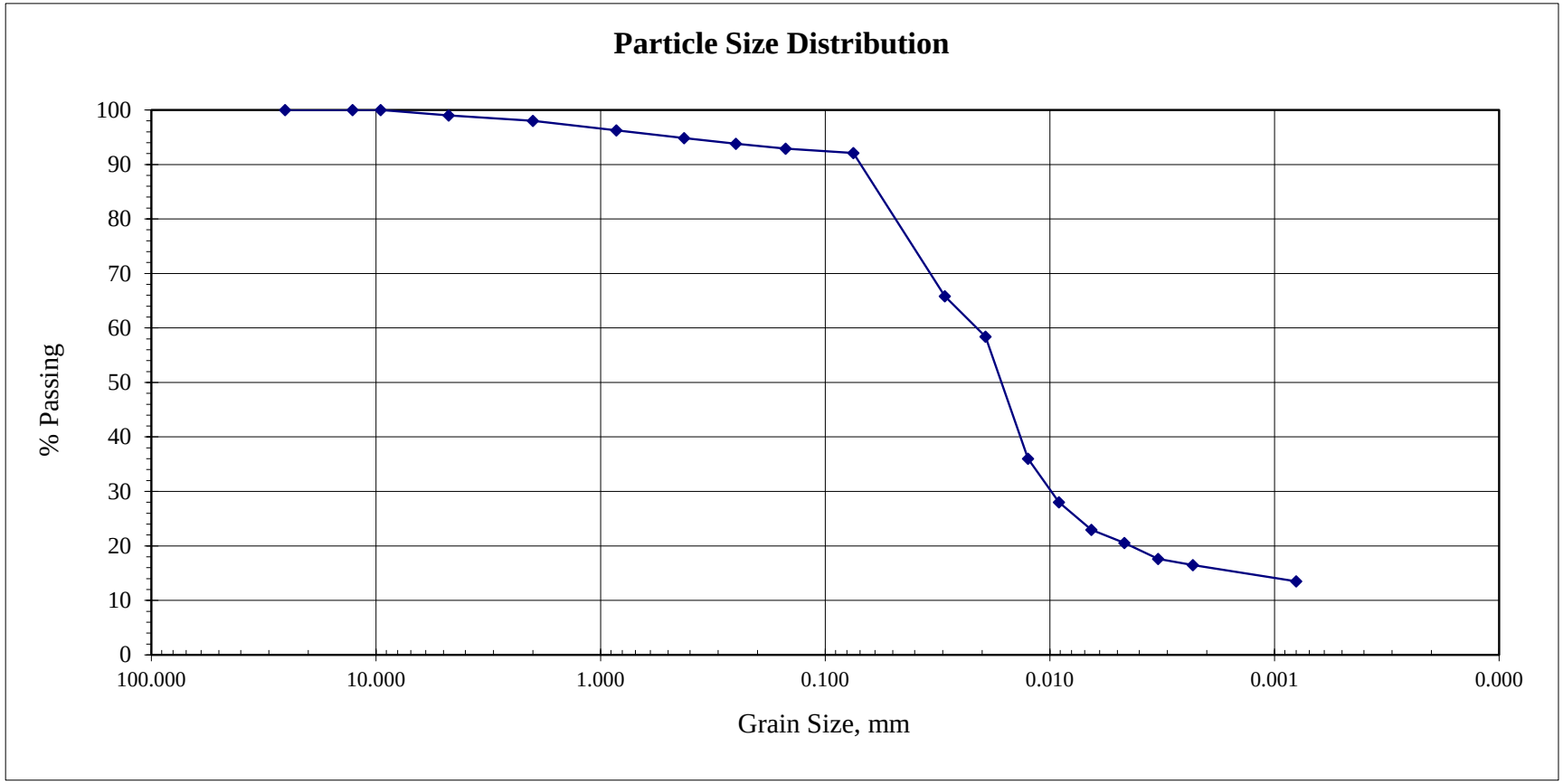
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	99
No.10	2.00	98
No.20	0.85	96
No.40	0.425	95
No.60	0.250	94
No.100	0.150	93
No.200	0.075	92
Hydrometer Analysis	0.0293	66
	0.0193	58
	0.0125	36
	0.0091	28
	0.0065	23
	0.0047	21
	0.0033	18
	0.0023	17
	0.0014	13

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	1
Coarse Sand	2.00 to 4.75	1
Medium Sand	0.43 to 2.00	3
Fine Sand	0.075 to 0.43	3
Silt	0.005 to 0.075	71
Clay	<0.005	21

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-3	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/10/2021
Sample Depth:	1.5-3.0	**Checked by:**	ACE 11/12/2021
Visual Description:	FILL: Brown, lean CLAY (CL), trace sand and gr		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-3	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-6	**Calculated by:**	SLY 11/10/2021
Sample Depth:	7.5-9.0	**Checked by:**	ACE 11/12/2021
Visual Description:	Brown, organic CLAY (OH)		

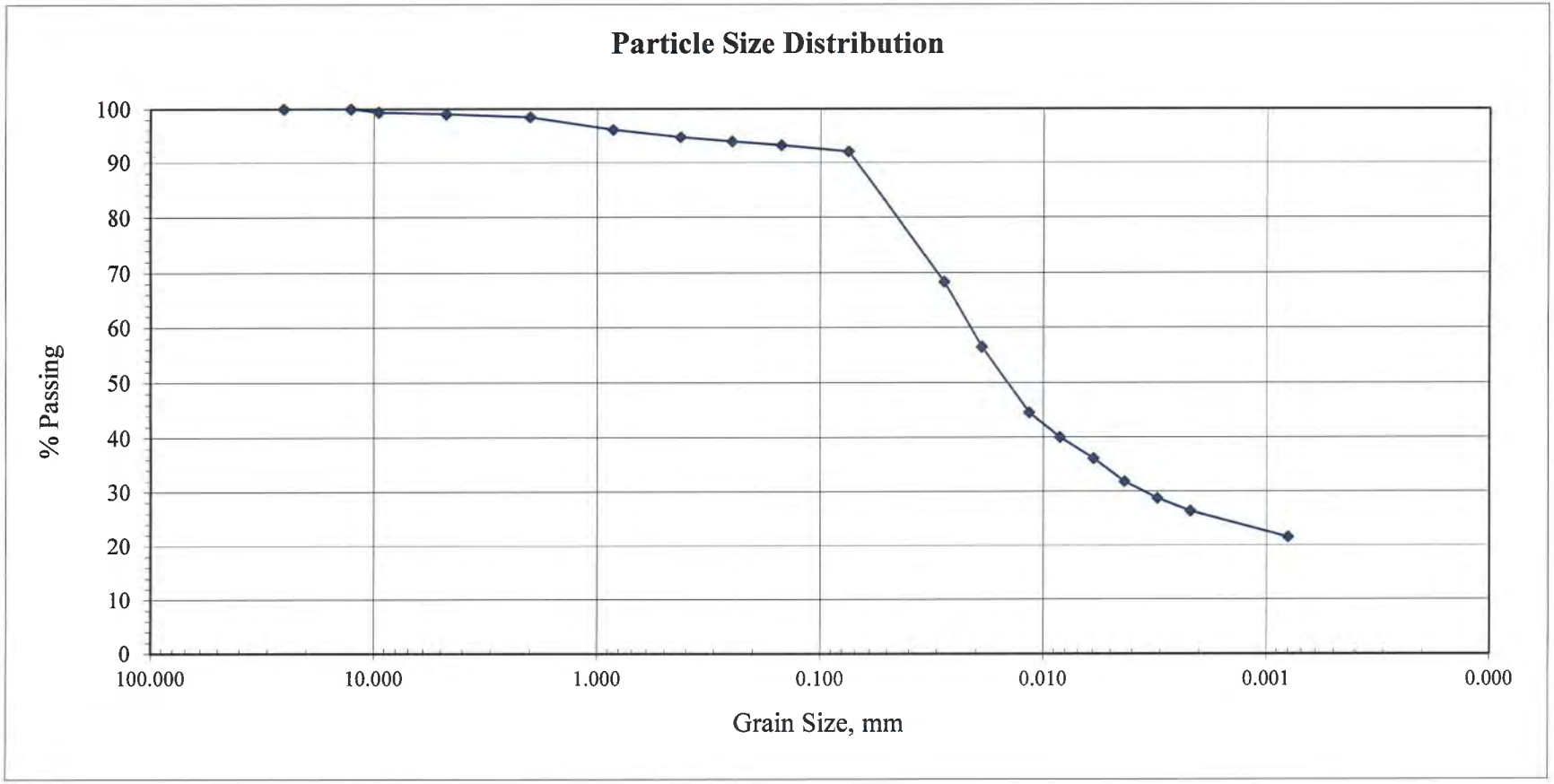
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	99
No.4	4.75	99
No.10	2.00	98
No.20	0.85	96
No.40	0.425	95
No.60	0.250	94
No.100	0.150	93
No.200	0.075	92
Hydrometer Analysis	0.0279	68
	0.0189	56
	0.0116	45
	0.0084	40
	0.0060	36
	0.0043	32
	0.0031	29
	0.0022	26
	0.0013	21

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	1
Coarse Sand	2.00 to 4.75	1
Medium Sand	0.43 to 2.00	4
Fine Sand	0.075 to 0.43	3
Silt	0.005 to 0.075	58
Clay	<0.005	34

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	B-3	**Tested by:**	SLY 11/4/2021
Sample Number:	SS-6	**Calculated by:**	SLY 11/10/2021
Sample Depth:	7.5-9.0	**Checked by:**	ACE 11/12/2021
Visual Description:	Brown, organic CLAY (OH)		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-1	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-1	**Calculated by:**	SLY 11/19/2021
Sample Depth:	0.0-1.5	**Checked by:**	AD 11/22/2021
Visual Description:	Brown, lean CLAY (CL); with gravel, trace sand		

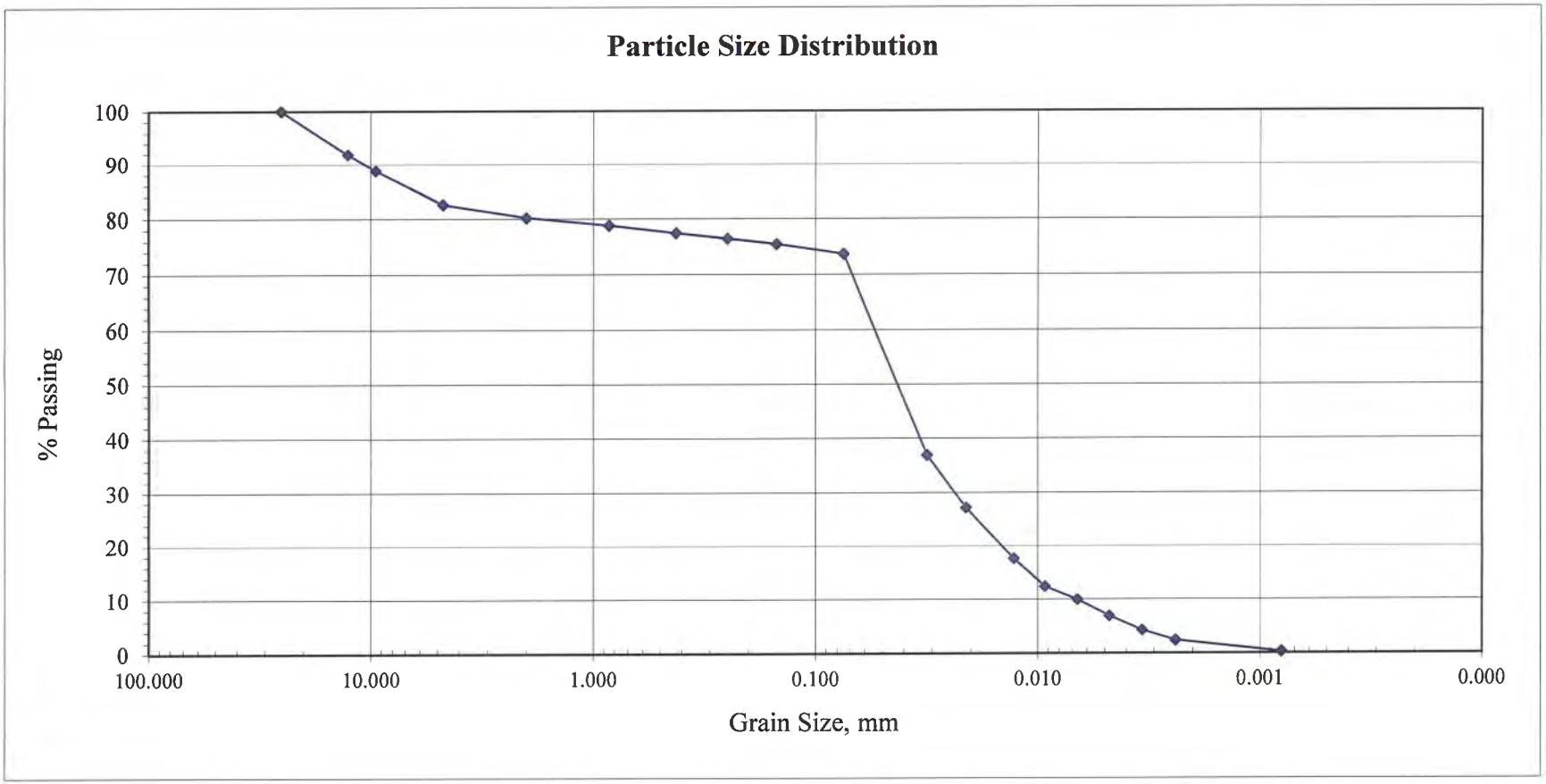
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	92
3/8"	9.53	89
No.4	4.75	83
No.10	2.00	80
No.20	0.85	79
No.40	0.425	77
No.60	0.250	76
No.100	0.150	75
No.200	0.075	74
Hydrometer Analysis	0.0316	37
	0.0211	27
	0.0128	18
	0.0093	12
	0.0066	10
	0.0048	7
	0.0034	4
	0.0024	2
	0.0014	0

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	17
Coarse Sand	2.00 to 4.75	2
Medium Sand	0.43 to 2.00	3
Fine Sand	0.075 to 0.43	4
Silt	0.005 to 0.075	66
Clay	<0.005	7

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-1	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-1	**Calculated by:**	SLY 11/19/2021
Sample Depth:	0.0-1.5	**Checked by:**	AD 11/22/2021
Visual Description:	Brown, lean CLAY (CL); with gravel, trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-1	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/19/2021
Sample Depth:	1.5-3.0	**Checked by:**	AD 11/22/2021
Visual Description:	Brown, sandy lean CLAY (CL); with gravel		

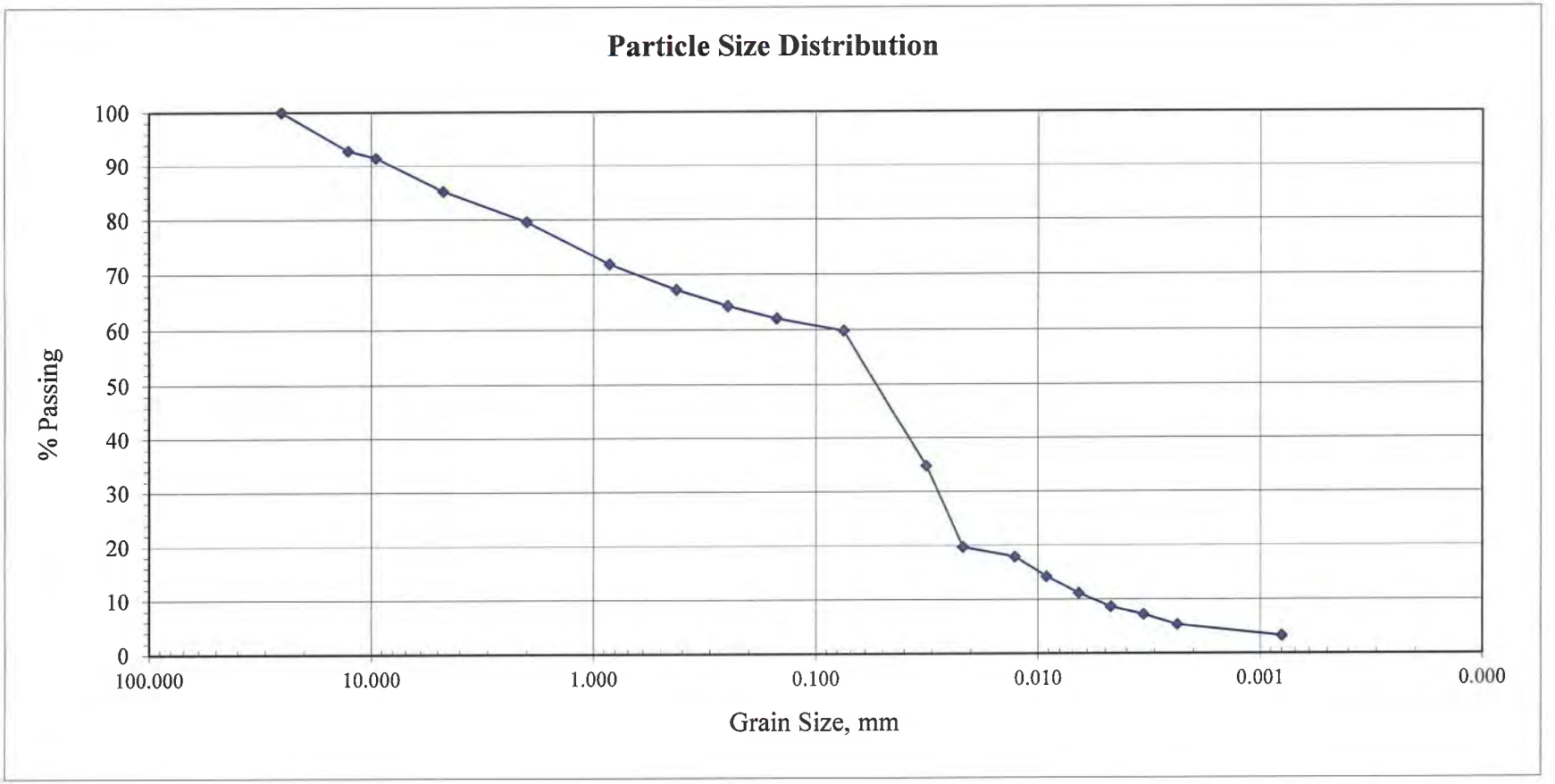
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	93
3/8"	9.53	91
No.4	4.75	85
No.10	2.00	80
No.20	0.85	72
No.40	0.425	67
No.60	0.250	64
No.100	0.150	62
No.200	0.075	60
Hydrometer Analysis	0.0319	35
	0.0218	20
	0.0127	18
	0.0092	14
	0.0066	11
	0.0047	9
	0.0034	7
	0.0024	5
	0.0014	3

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	15
Coarse Sand	2.00 to 4.75	6
Medium Sand	0.43 to 2.00	12
Fine Sand	0.075 to 0.43	7
Silt	0.005 to 0.075	51
Clay	<0.005	9

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-1	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/19/2021
Sample Depth:	1.5-3.0	**Checked by:**	AD 11/22/2021
Visual Description:	Brown, sandy lean CLAY (CL); with gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/17/2021
Sample Number:	SS-1	**Calculated by:**	SLY 11/19/2021
Sample Depth:	0.0-1.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); with gravel, trace sand		

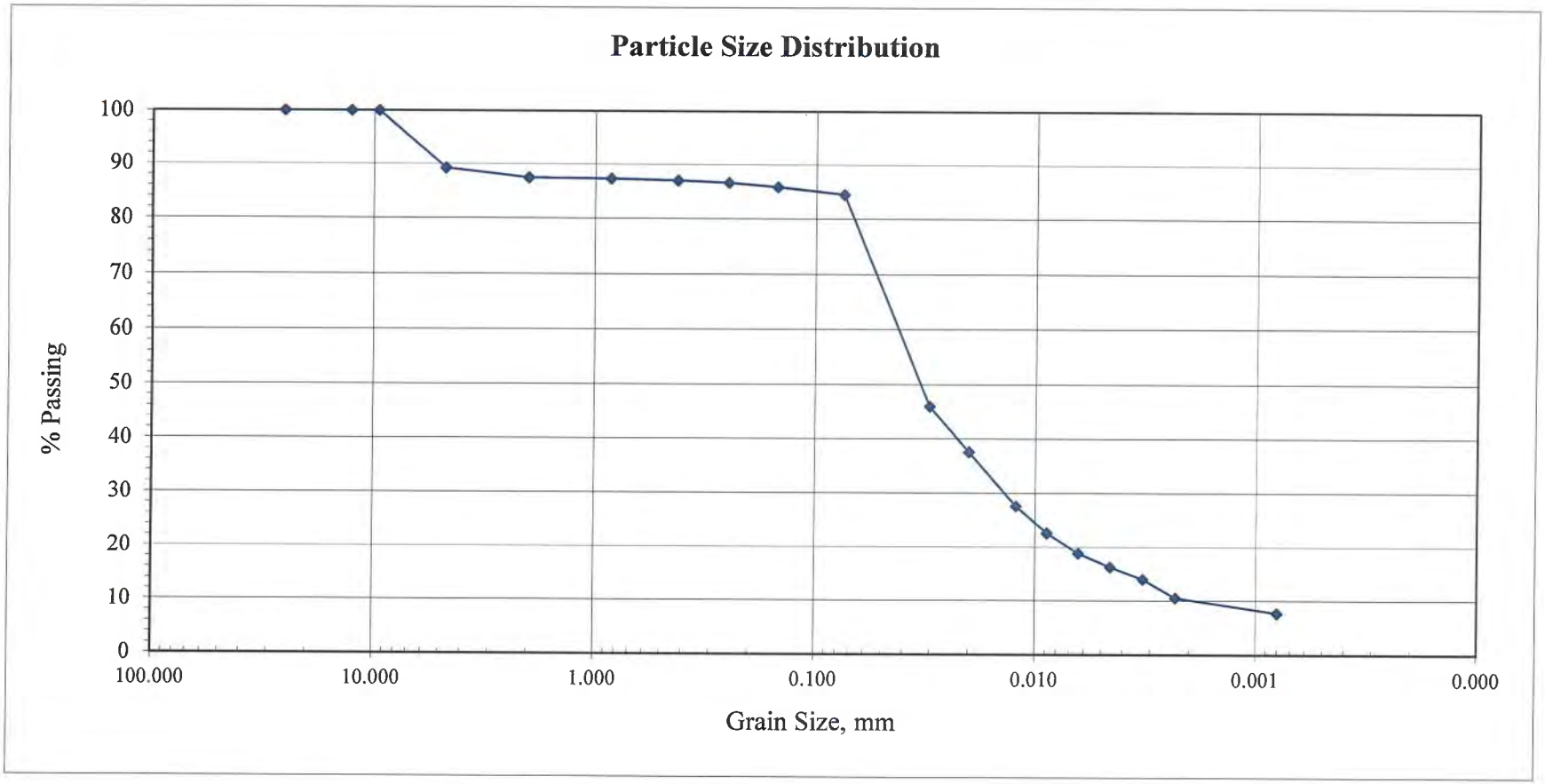
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	89
No.10	2.00	87
No.20	0.85	87
No.40	0.425	87
No.60	0.250	87
No.100	0.150	86
No.200	0.075	85
Hydrometer Analysis	0.0303	46
	0.0201	38
	0.0122	28
	0.0089	23
	0.0064	19
	0.0046	16
	0.0032	14
	0.0023	11
	0.0014	8

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	11
Coarse Sand	2.00 to 4.75	2
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	3
Silt	0.005 to 0.075	68
Clay	<0.005	17

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/17/2021
Sample Number:	SS-1	**Calculated by:**	SLY 11/19/2021
Sample Depth:	0.0-1.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); with gravel, trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/19/2021
Sample Depth:	1.5-3.0	**Checked by:**	AD 11/22/021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		

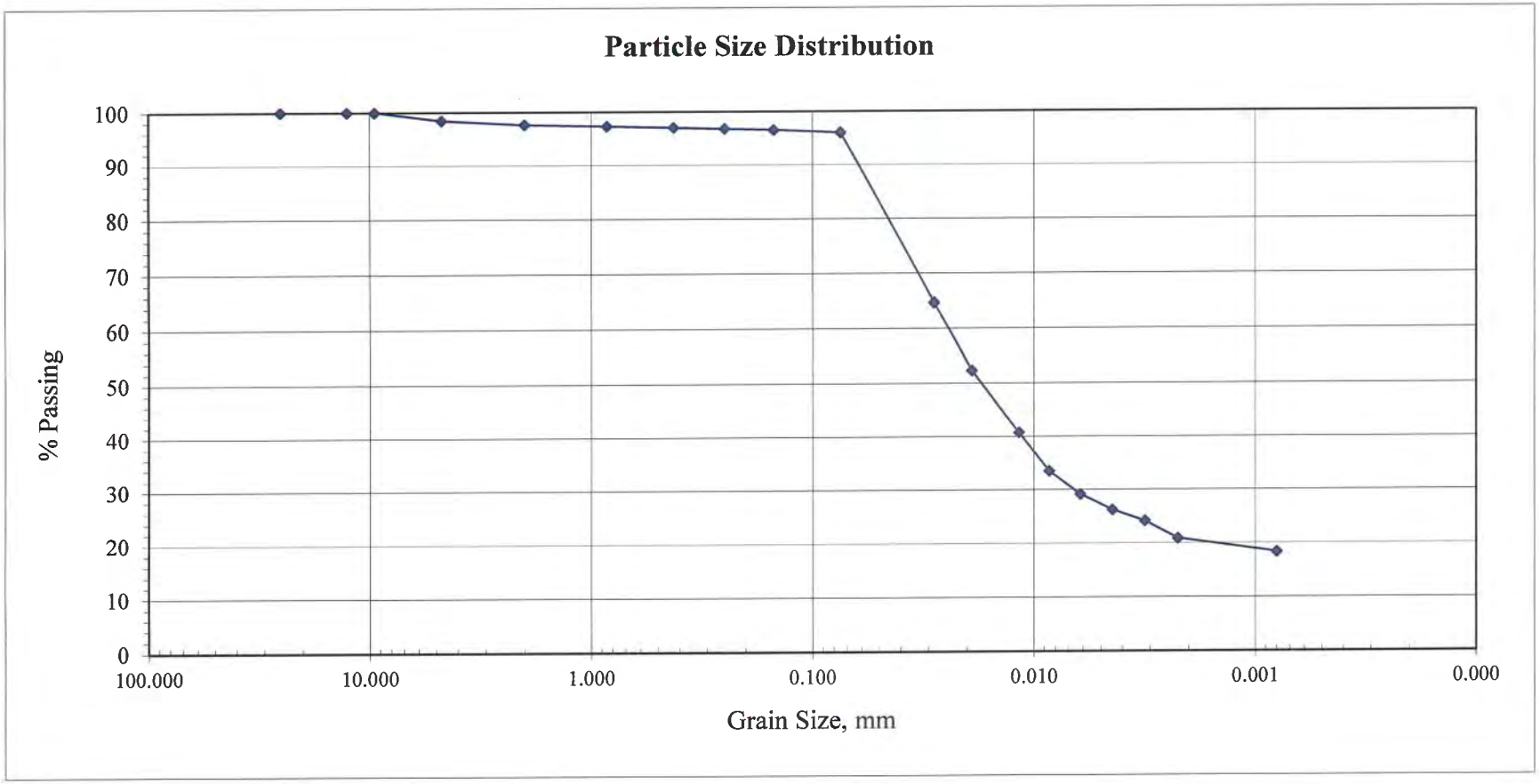
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	98
No.10	2.00	98
No.20	0.85	97
No.40	0.425	97
No.60	0.250	97
No.100	0.150	97
No.200	0.075	96
Hydrometer Analysis	0.0283	65
	0.0191	52
	0.0117	41
	0.0086	34
	0.0062	29
	0.0044	26
	0.0032	24
	0.0022	21
	0.0013	18

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	2
Coarse Sand	2.00 to 4.75	1
Medium Sand	0.43 to 2.00	1
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	69
Clay	<0.005	27

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/19/2021
Sample Depth:	1.5-3.0	**Checked by:**	AD 11/22/021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gr		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/17/2021
Sample Number:	SS-3	**Calculated by:**	SLY 11/19/2021
Sample Depth:	3.0-4.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		

Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	99
3/8"	9.53	97
No.4	4.75	92
No.10	2.00	90
No.20	0.85	90
No.40	0.425	90
No.60	0.250	90
No.100	0.150	89
No.200	0.075	88
Hydrometer Analysis	0.0272	62
	0.0187	49
	0.0115	39
	0.0083	35
	0.0059	33
	0.0043	29
	0.0030	28
	0.0022	26
	0.0013	23

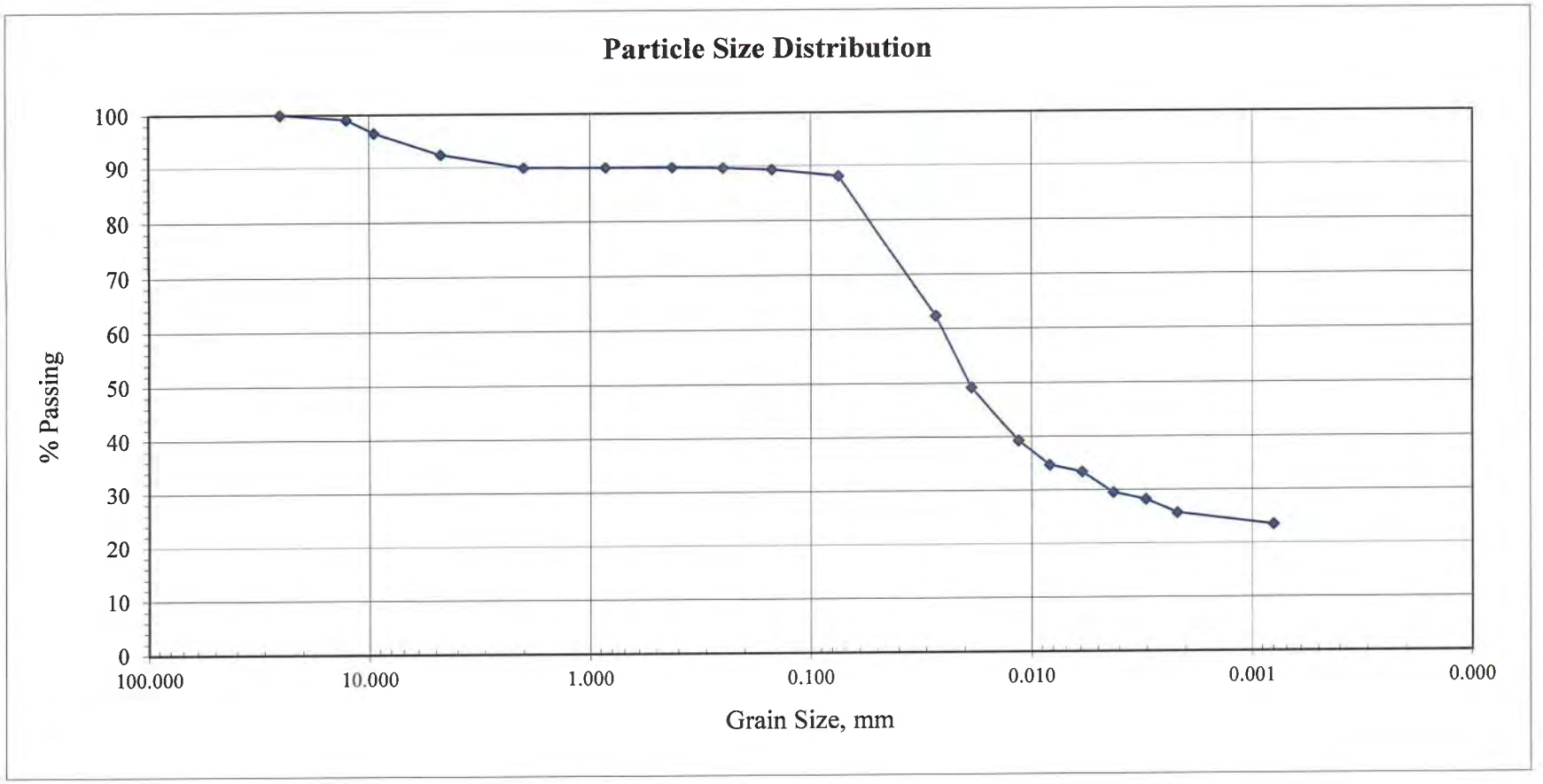
Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	8
Coarse Sand	2.00 to 4.75	3
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	2
Silt	0.005 to 0.075	57
Clay	<0.005	31

TSi Geotechnical, Inc.

HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/17/2021
Sample Number:	SS-3	**Calculated by:**	SLY 11/19/2021
Sample Depth:	3.0-4.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-4	**Calculated by:**	SLY 11/19/2021
Sample Depth:	4.5-6.0	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		

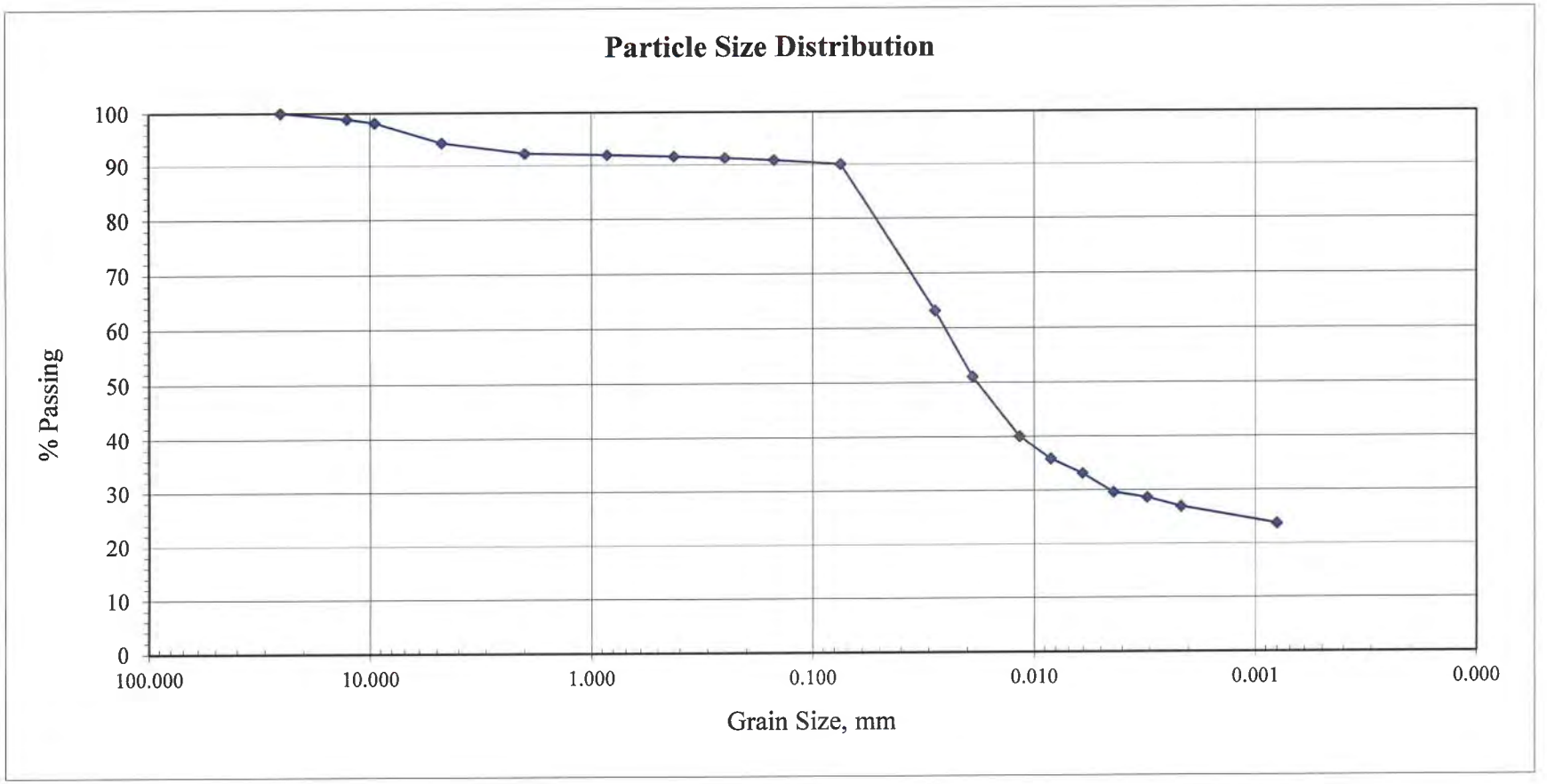
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	99
3/8"	9.53	98
No.4	4.75	94
No.10	2.00	92
No.20	0.85	92
No.40	0.425	92
No.60	0.250	91
No.100	0.150	91
No.200	0.075	90
Hydrometer Analysis	0.0281	63
	0.0190	51
	0.0117	40
	0.0084	36
	0.0061	33
	0.0044	30
	0.0031	29
	0.0022	27
	0.0013	24

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	6
Coarse Sand	2.00 to 4.75	2
Medium Sand	0.43 to 2.00	1
Fine Sand	0.075 to 0.43	2
Silt	0.005 to 0.075	59
Clay	<0.005	31

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-4	**Calculated by:**	SLY 11/19/2021
Sample Depth:	4.5-6.0	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-5	**Calculated by:**	SLY 11/19/2021
Sample Depth:	6.0-7.5	**Checked by:**	AD 11/22/2021
Visual Description:	Brown and gray, fat CLAY (CH); trace sand		

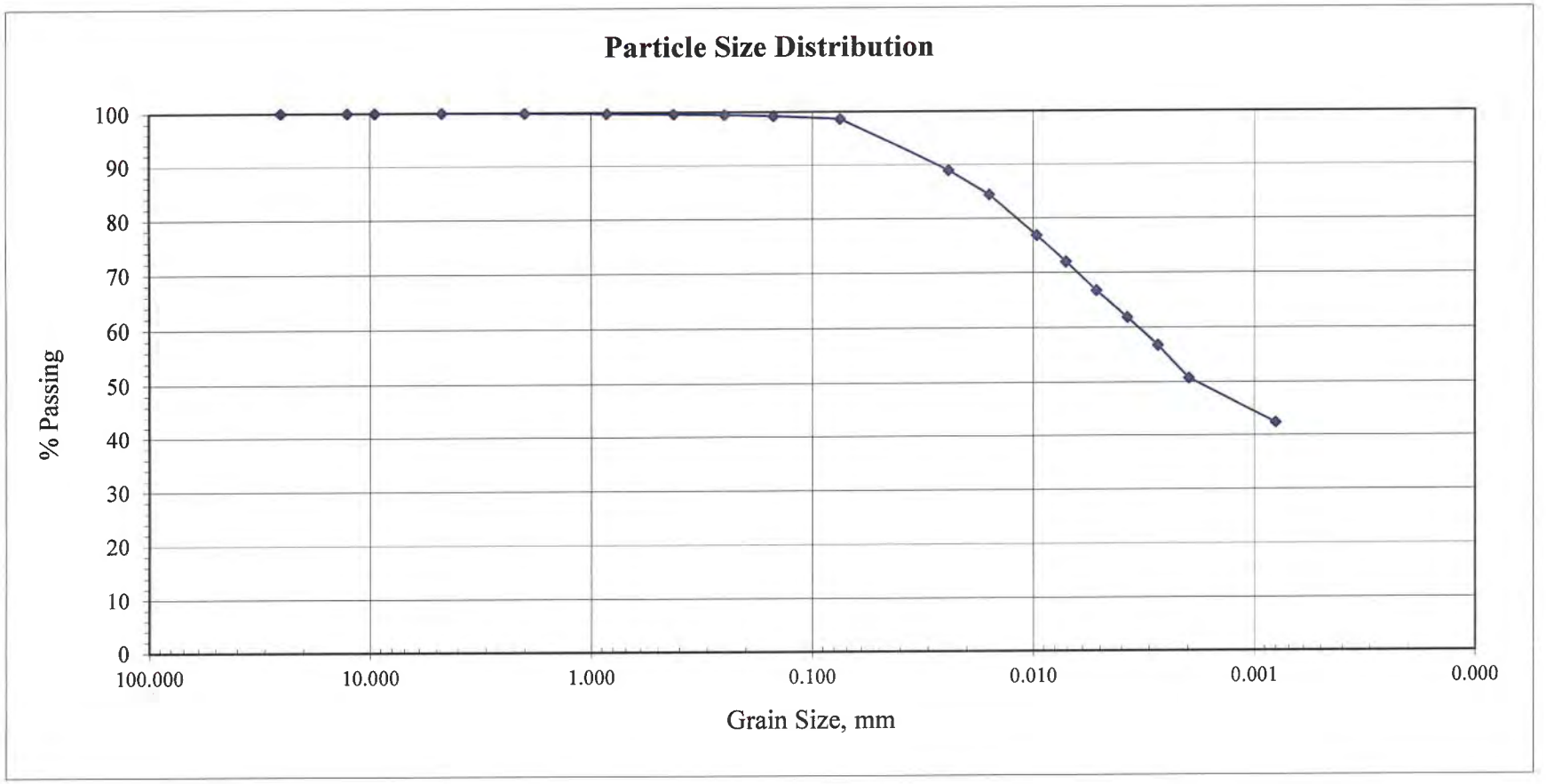
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	100
No.40	0.425	100
No.60	0.250	99
No.100	0.150	99
No.200	0.075	99
Hydrometer Analysis	0.0242	89
	0.0159	84
	0.0097	77
	0.0071	72
	0.0052	67
	0.0038	62
	0.0027	57
	0.0020	51
	0.0012	42

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	33
Clay	<0.005	66

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-5	**Calculated by:**	SLY 11/19/2021
Sample Depth:	6.0-7.5	**Checked by:**	AD 11/22/2021
Visual Description:	Brown and gray, fat CLAY (CH); trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-6	**Calculated by:**	SLY 11/19/2021
Sample Depth:	7.5-9.0	**Checked by:**	AD 11/21/2021
Visual Description:	Brown and gray, fat CLAY (CH); trace sand		

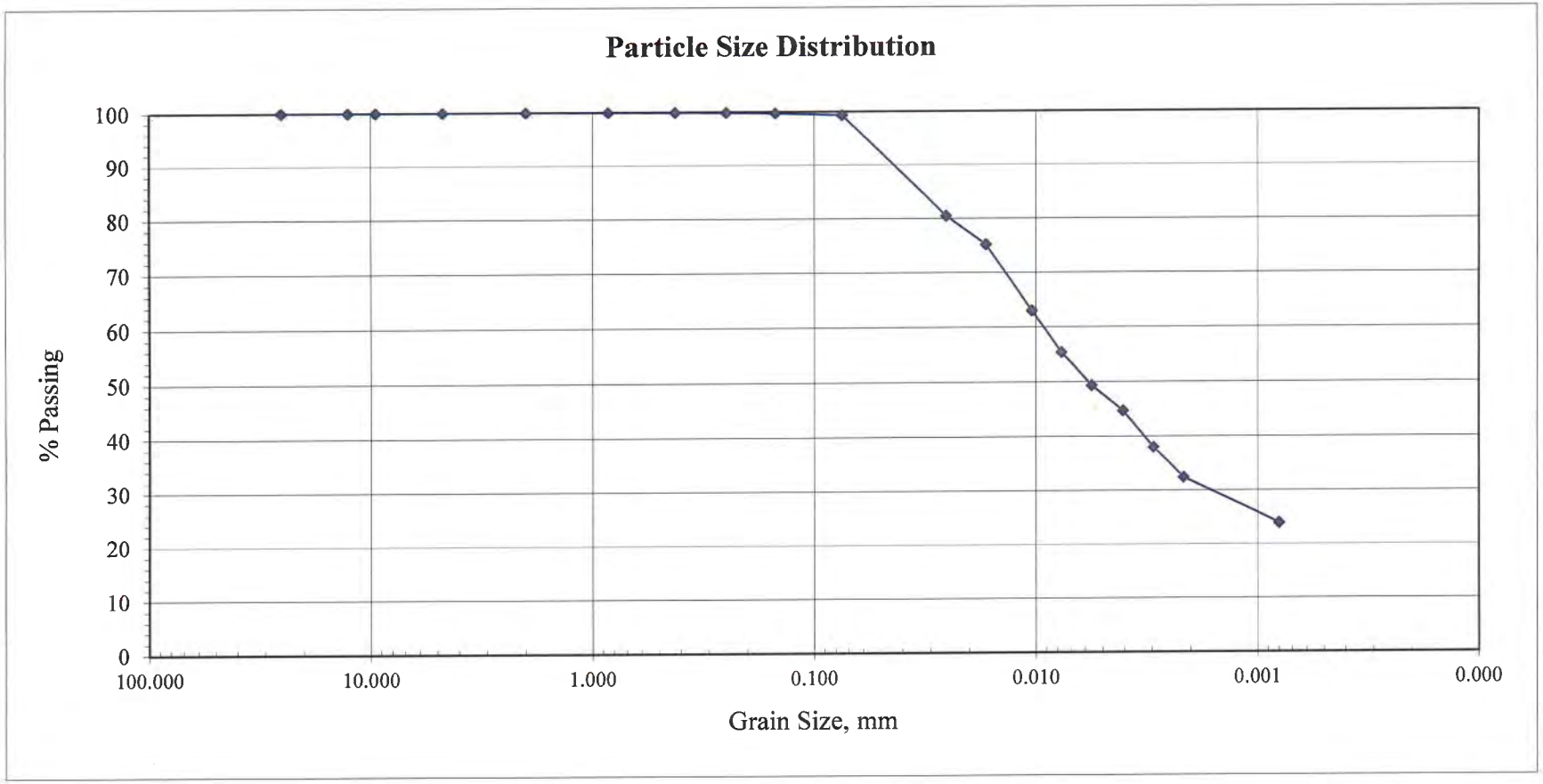
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	100
No.40	0.425	100
No.60	0.250	100
No.100	0.150	100
No.200	0.075	99
Hydrometer Analysis	0.0255	80
	0.0168	75
	0.0105	63
	0.0077	55
	0.0056	49
	0.0040	45
	0.0029	38
	0.0022	32
	0.0013	24

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	52
Clay	<0.005	48

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-6	**Calculated by:**	SLY 11/19/2021
Sample Depth:	7.5-9.0	**Checked by:**	AD 11/21/2021
Visual Description:	Brown and gray, fat CLAY (CH); trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/17/2021
Sample Number:	SS-7	**Calculated by:**	SLY 11/19/2021
Sample Depth:	9.0-10.5	**Checked by:**	AD 11/22/21
Visual Description:	Brown and gray, shaley lean CLAY (CL); trace sand		

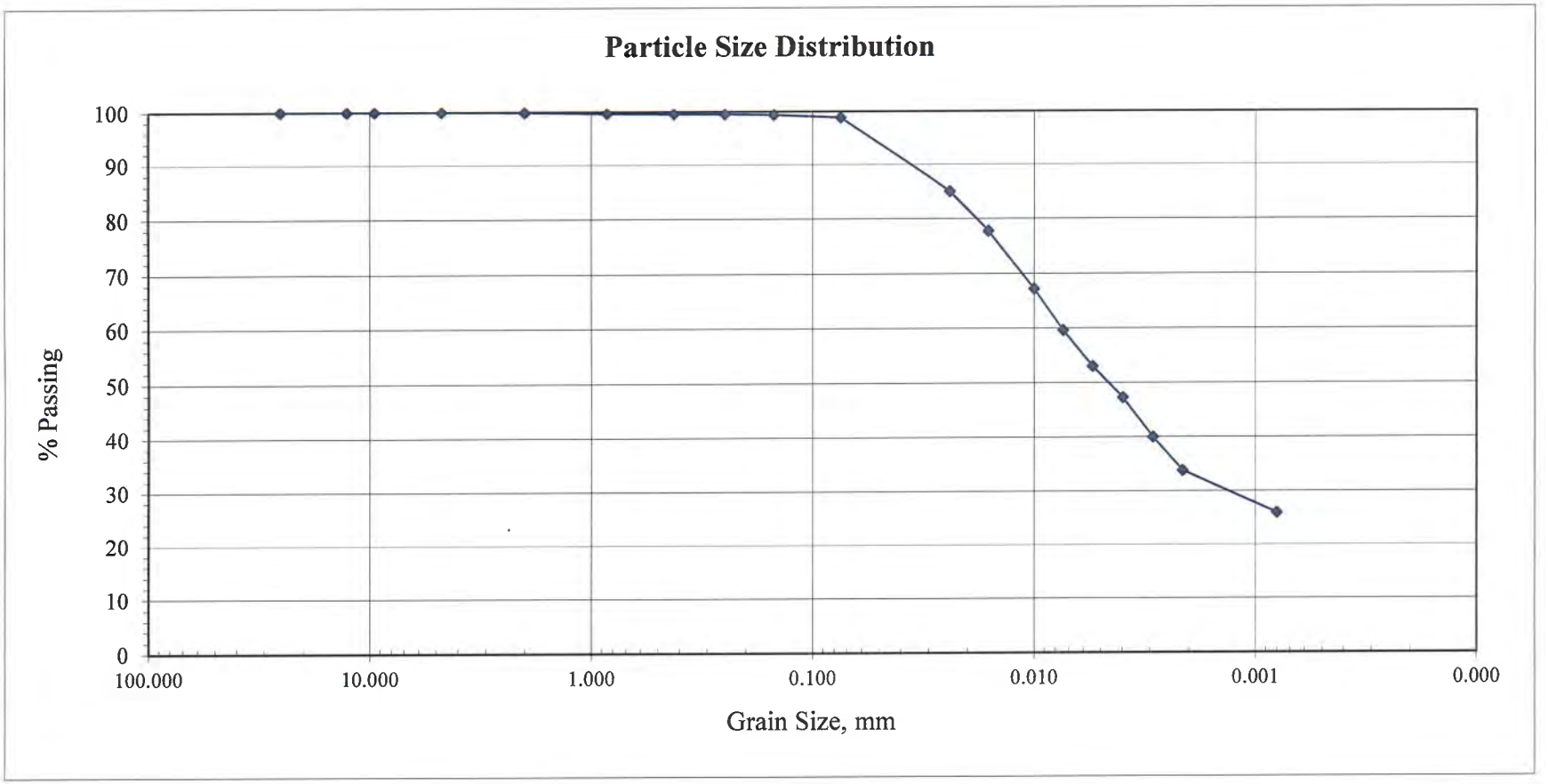
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	100
No.40	0.425	100
No.60	0.250	100
No.100	0.150	99
No.200	0.075	99
Hydrometer Analysis	0.0241	85
	0.0161	78
	0.0100	67
	0.0074	60
	0.0054	53
	0.0040	47
	0.0029	40
	0.0021	34
	0.0013	26

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	48
Clay	<0.005	51

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-2	**Tested by:**	SLY 11/17/2021
Sample Number:	SS-7	**Calculated by:**	SLY 11/19/2021
Sample Depth:	9.0-10.5	**Checked by:**	AD 11/22/21
Visual Description:	Brown and gray, shaley lean CLAY (CL); trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-1	**Calculated by:**	SLY 11/22/2021
Sample Depth:	0.0-1.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); with sand, trace gravel		

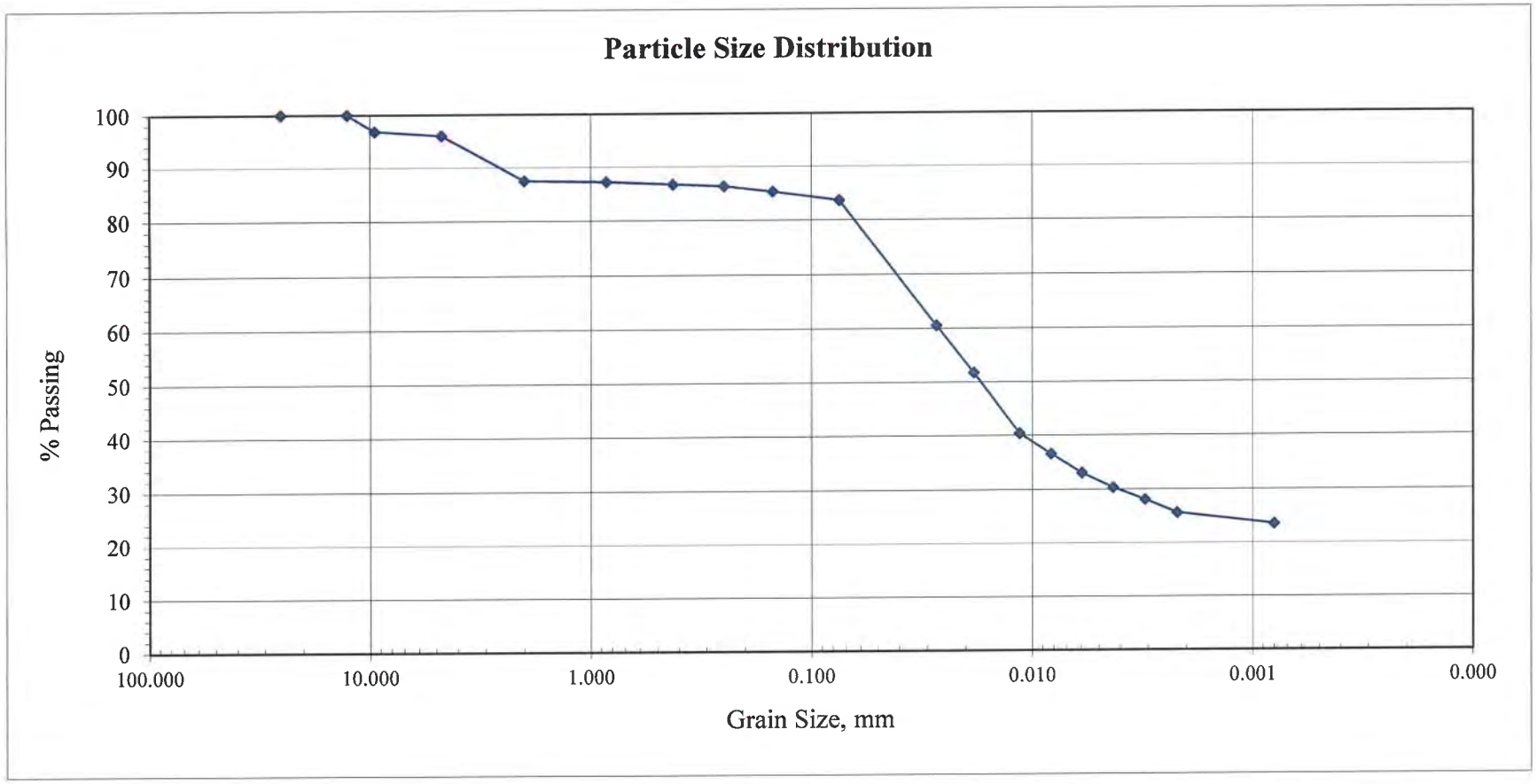
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	97
No.4	4.75	96
No.10	2.00	87
No.20	0.85	87
No.40	0.425	87
No.60	0.250	86
No.100	0.150	85
No.200	0.075	84
Hydrometer Analysis	0.0272	61
	0.0184	52
	0.0114	40
	0.0082	37
	0.0060	33
	0.0043	30
	0.0031	28
	0.0022	26
	0.0013	24

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	4
Coarse Sand	2.00 to 4.75	9
Medium Sand	0.43 to 2.00	1
Fine Sand	0.075 to 0.43	3
Silt	0.005 to 0.075	52
Clay	<0.005	31

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-1	**Calculated by:**	SLY 11/22/2021
Sample Depth:	0.0-1.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); with sand, trace gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/22/2021
Sample Depth:	1.5-3.0	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, sandy lean CLAY (CL), trace gravel		

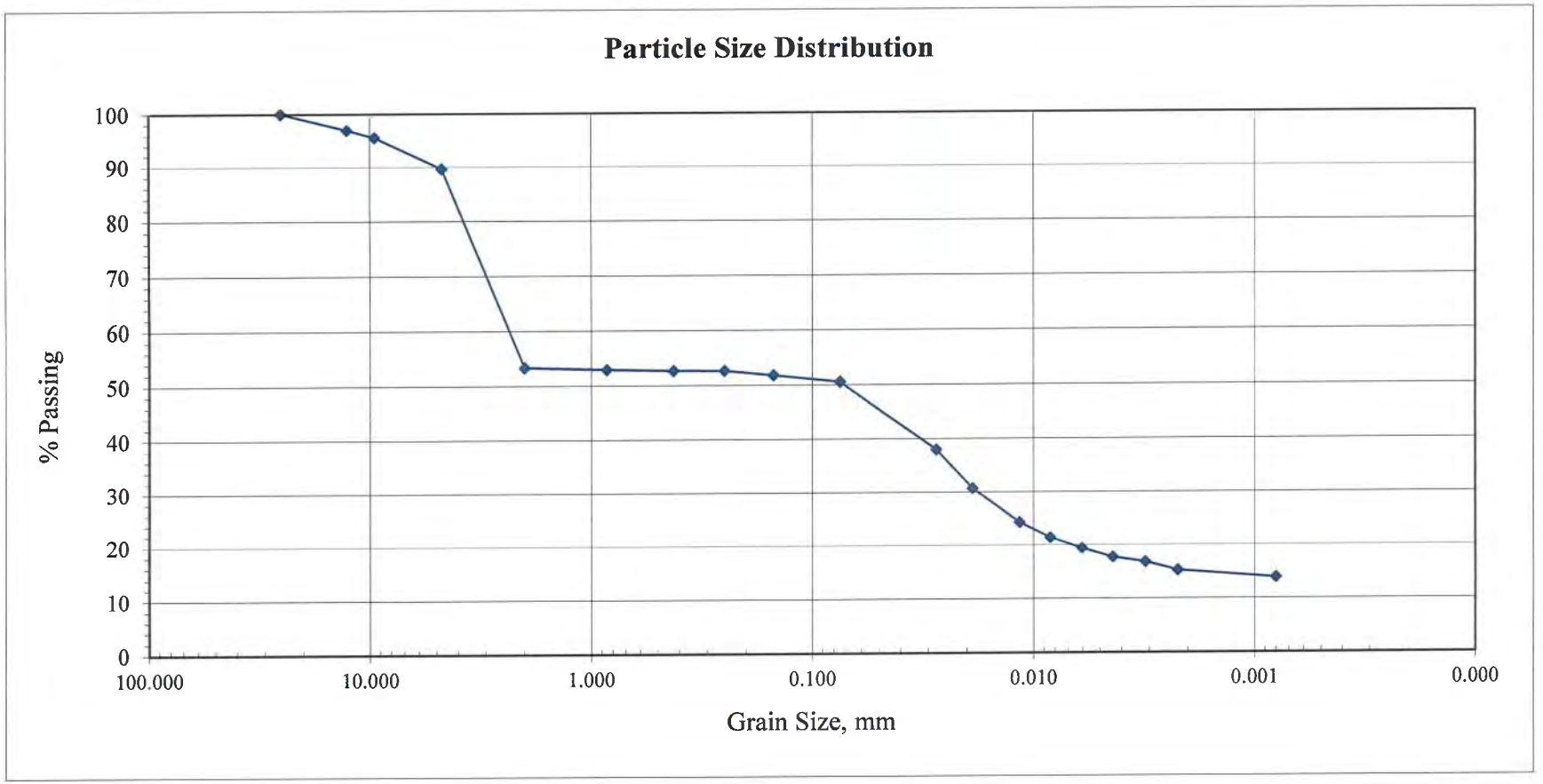
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	97
3/8"	9.53	96
No.4	4.75	90
No.10	2.00	53
No.20	0.85	53
No.40	0.425	53
No.60	0.250	53
No.100	0.150	52
No.200	0.075	51
Hydrometer Analysis	0.0276	38
	0.0189	31
	0.0116	24
	0.0084	21
	0.0061	19
	0.0044	18
	0.0031	17
	0.0022	15
	0.0013	14

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	10
Coarse Sand	2.00 to 4.75	36
Medium Sand	0.43 to 2.00	1
Fine Sand	0.075 to 0.43	2
Silt	0.005 to 0.075	32
Clay	<0.005	18

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-2	**Calculated by:**	SLY 11/22/2021
Sample Depth:	1.5-3.0	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, sandy lean CLAY (CL), trace gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-3	**Calculated by:**	SLY 11/22/2021
Sample Depth:	3.0-4.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		

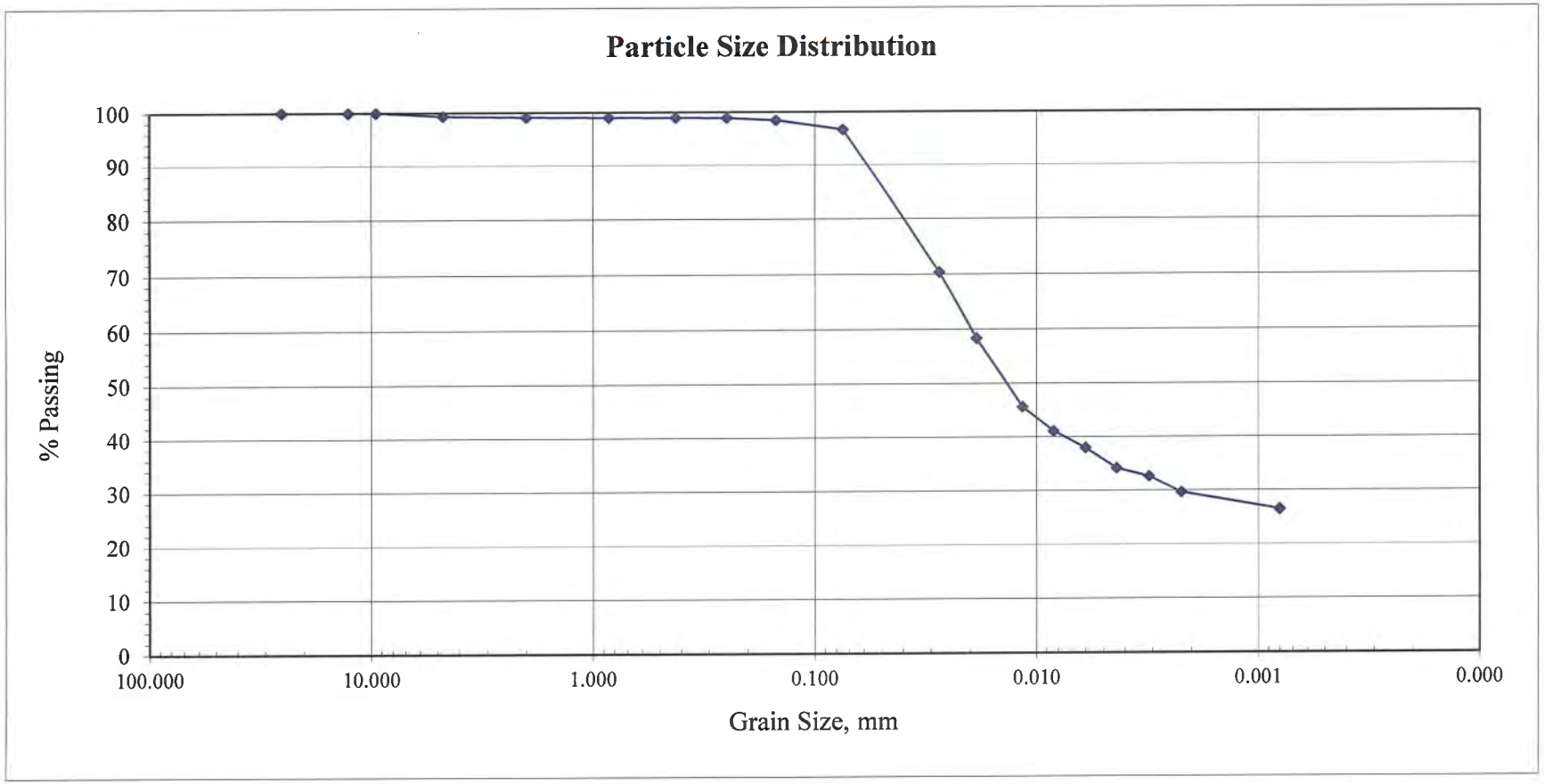
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	99
No.10	2.00	99
No.20	0.85	99
No.40	0.425	99
No.60	0.250	99
No.100	0.150	98
No.200	0.075	97
Hydrometer Analysis	0.0276	70
	0.0187	58
	0.0116	46
	0.0084	41
	0.0060	38
	0.0044	34
	0.0031	33
	0.0022	30
	0.0013	26

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	1
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	2
Silt	0.005 to 0.075	61
Clay	<0.005	36

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-3	**Calculated by:**	SLY 11/22/2021
Sample Depth:	3.0-4.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-4	**Calculated by:**	SLY 11/22/2021
Sample Depth:	4.5-6	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		

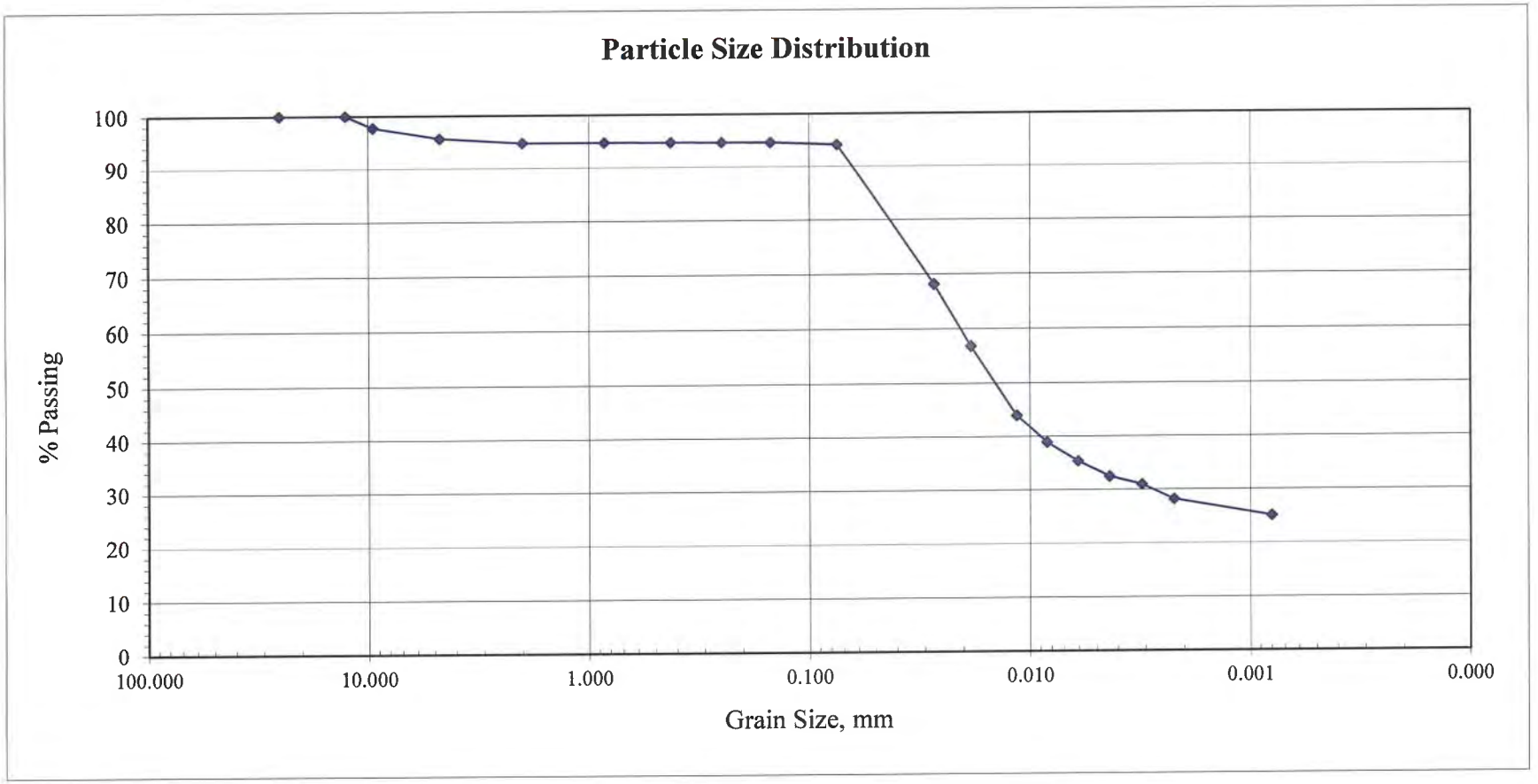
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	98
No.4	4.75	96
No.10	2.00	95
No.20	0.85	95
No.40	0.425	95
No.60	0.250	95
No.100	0.150	95
No.200	0.075	94
Hydrometer Analysis	0.0273	68
	0.0185	57
	0.0115	44
	0.0084	39
	0.0061	35
	0.0044	32
	0.0031	31
	0.0022	28
	0.0013	25

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	4
Coarse Sand	2.00 to 4.75	1
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	61
Clay	<0.005	34

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/18/2021
Sample Number:	SS-4	**Calculated by:**	SLY 11/22/2021
Sample Depth:	4.5-6	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		



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TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/22/2021
Sample Number:	SS-5	**Calculated by:**	SLY 11/29/2021
Sample Depth:	6.0-7.5	**Checked by:**	AD 11/30/2021
Visual Description:	FILL: Brown, gravelly lean CLAY (CL), trace sand		

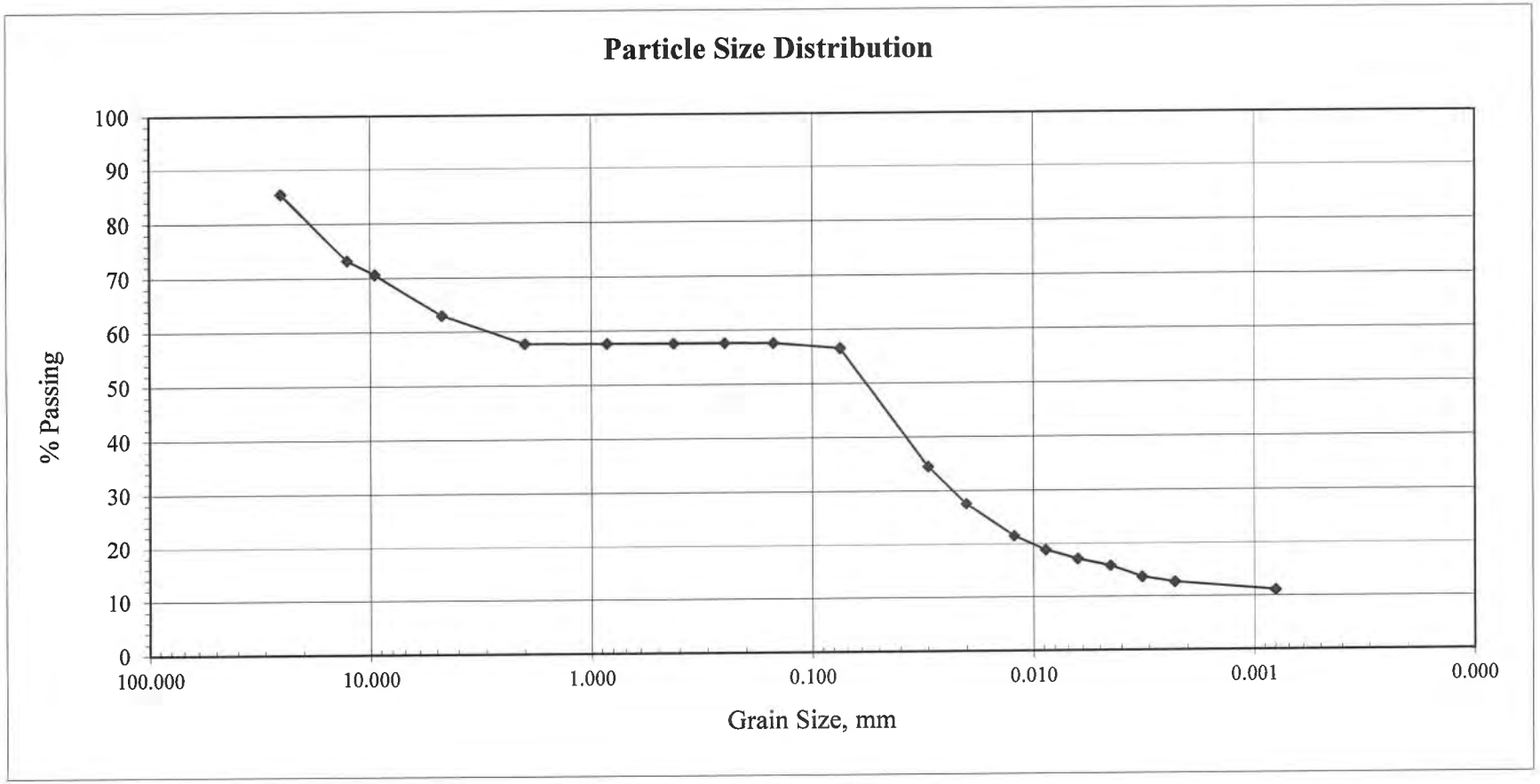
Sieve	Particle Size, mm	Percent Finer
1"	25.40	85
1/2"	12.70	73
3/8"	9.53	71
No.4	4.75	63
No.10	2.00	58
No.20	0.85	58
No.40	0.425	58
No.60	0.250	58
No.100	0.150	58
No.200	0.075	57
Hydrometer Analysis	0.0300	35
	0.0202	28
	0.0123	21
	0.0088	19
	0.0063	17
	0.0045	16
	0.0032	14
	0.0023	13
	0.0013	11

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	37
Coarse Sand	2.00 to 4.75	5
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	40
Clay	<0.005	16

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/22/2021
Sample Number:	SS-5	**Calculated by:**	SLY 11/29/2021
Sample Depth:	6.0-7.5	**Checked by:**	AD 11/30/2021
Visual Description:	FILL: Brown, gravelly lean CLAY (CL), trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/19/2021
Sample Number:	SS-6	**Calculated by:**	SLY 11/23/2021
Sample Depth:	7.5-9.0	**Checked by:**	AD 11/24/2021
Visual Description:	Brown and gray, shaley lean CLAY (CL); with sand, trace gravel		

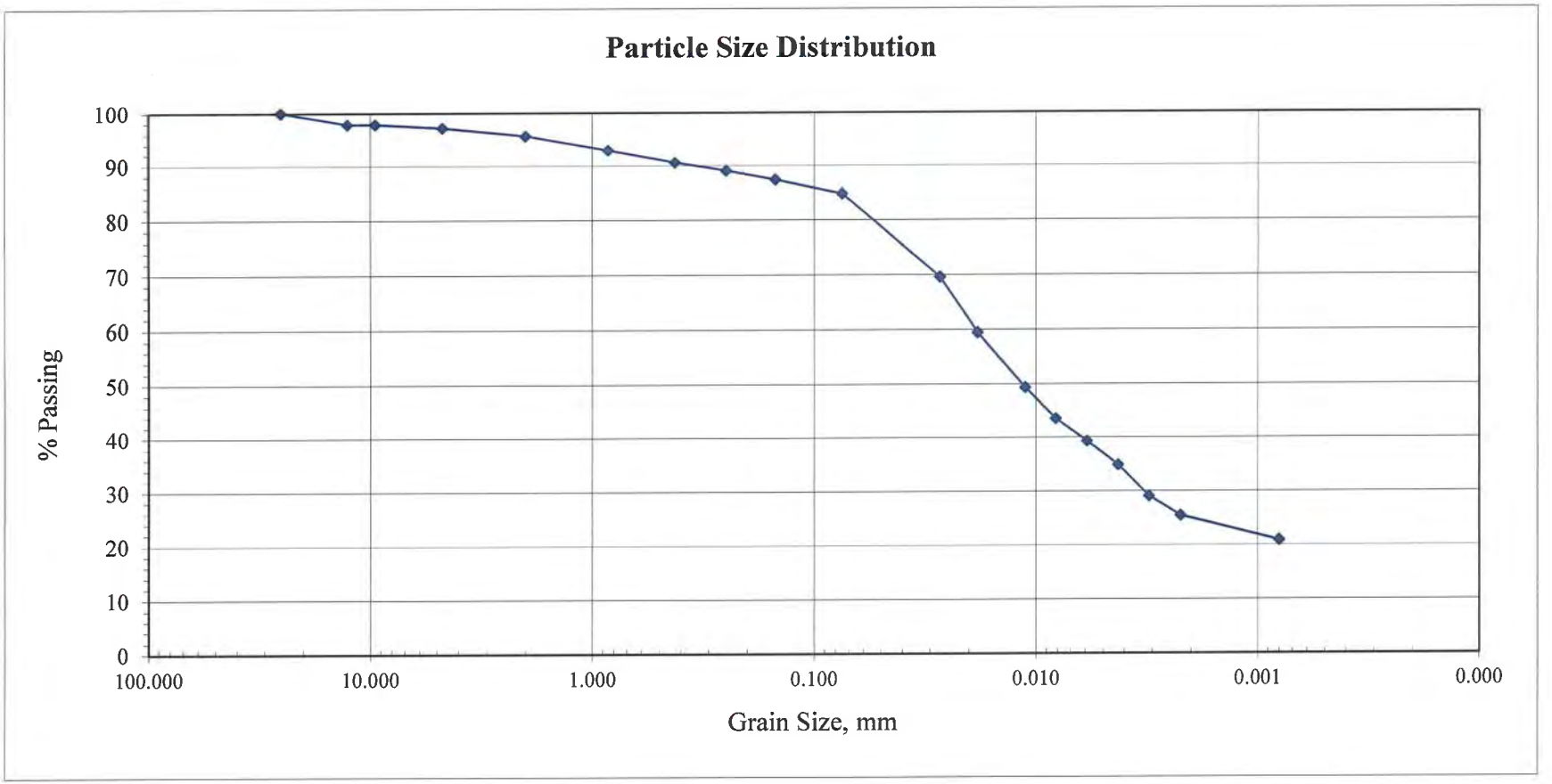
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	98
3/8"	9.53	98
No.4	4.75	97
No.10	2.00	96
No.20	0.85	93
No.40	0.425	91
No.60	0.250	89
No.100	0.150	87
No.200	0.075	85
Hydrometer Analysis	0.0272	70
	0.0184	59
	0.0112	49
	0.0082	44
	0.0059	39
	0.0043	35
	0.0031	29
	0.0022	25
	0.0013	21

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	3
Coarse Sand	2.00 to 4.75	2
Medium Sand	0.43 to 2.00	5
Fine Sand	0.075 to 0.43	6
Silt	0.005 to 0.075	48
Clay	<0.005	37

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/19/2021
Sample Number:	SS-6	**Calculated by:**	SLY 11/23/2021
Sample Depth:	7.5-9.0	**Checked by:**	AD 11/24/2021
Visual Description:	Brown and gray, shaley lean CLAY (CL); with sand, trace gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/19/2021
Sample Number:	SS-7	**Calculated by:**	SLY 11/24/2021
Sample Depth:	9.0-10.5	**Checked by:**	AD 11/30/2021
Visual Description:	Gray, gravelly shaley, lean CLAY (CL), trace sand		

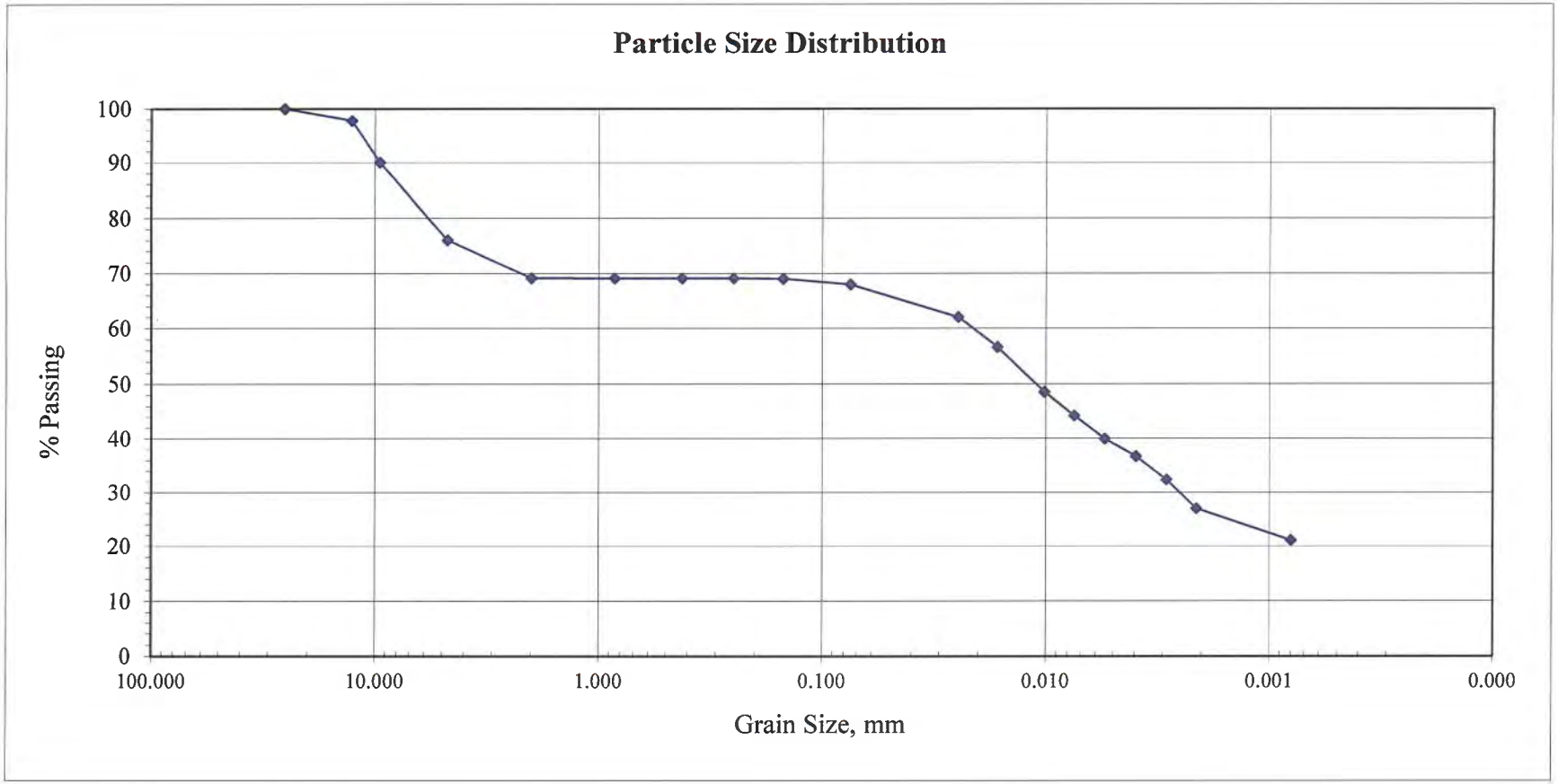
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	98
3/8"	9.53	90
No.4	4.75	76
No.10	2.00	69
No.20	0.85	69
No.40	0.425	69
No.60	0.250	69
No.100	0.150	69
No.200	0.075	68
Hydrometer Analysis	0.0248	62
	0.0165	57
	0.0102	49
	0.0075	44
	0.0055	40
	0.0040	37
	0.0029	32
	0.0021	27
	0.0012	21

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	24
Coarse Sand	2.00 to 4.75	7
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	29
Clay	<0.005	39

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/19/2021
Sample Number:	SS-7	**Calculated by:**	SLY 11/24/2021
Sample Depth:	9.0-10.5	**Checked by:**	AD 11/30/2021
Visual Description:	Gray, gravelly shaley, lean CLAY (CL), trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/22/2021
Sample Number:	SS-8	**Calculated by:**	SLY 11/24/2021
Sample Depth:	13.5-14.45	**Checked by:**	AD 11/30/2021
Visual Description:	Gray, shaley lean CLAY (CL); trace sand		

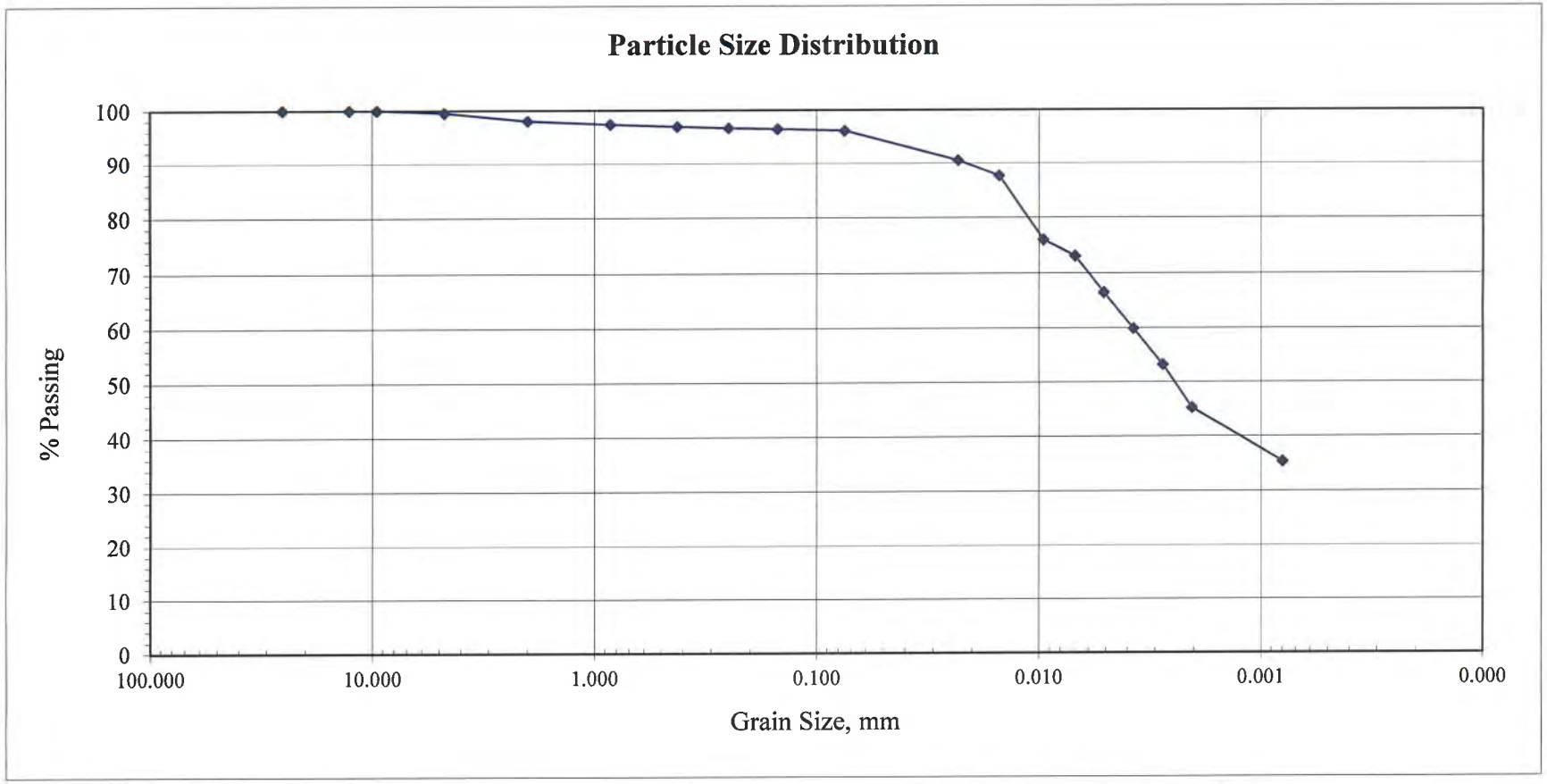
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	98
No.20	0.85	97
No.40	0.425	97
No.60	0.250	97
No.100	0.150	96
No.200	0.075	96
Hydrometer Analysis	0.0232	91
	0.0151	88
	0.0096	76
	0.0069	73
	0.0051	66
	0.0038	60
	0.0028	53
	0.0021	45
	0.0012	35

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	2
Medium Sand	0.43 to 2.00	1
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	30
Clay	<0.005	66

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-3	**Tested by:**	SLY 11/22/2021
Sample Number:	SS-8	**Calculated by:**	SLY 11/24/2021
Sample Depth:	13.5-14.45	**Checked by:**	AD 11/30/2021
Visual Description:	Gray, shaley lean CLAY (CL); trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-4	**Tested by:**	HTH 5/24/22
Sample Number:	SS-2	**Calculated by:**	HTH 5/24/22
Sample Depth:	1.5-3.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, fat CLAY (CH)		

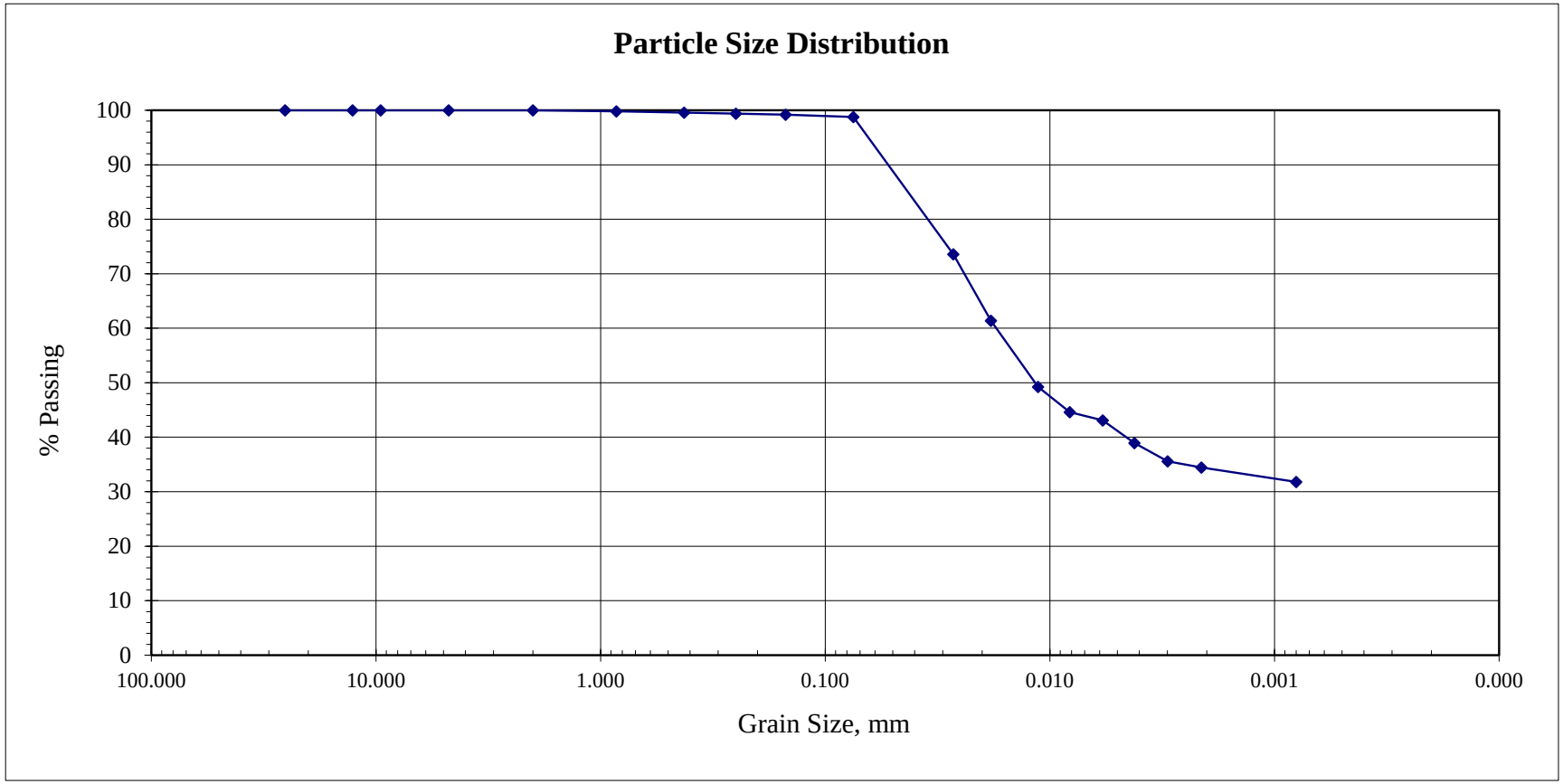
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	100
No.40	0.425	100
No.60	0.250	99
No.100	0.150	99
No.200	0.075	99
Hydrometer Analysis	0.0269	74
	0.0183	61
	0.0113	49
	0.0082	45
	0.0058	43
	0.0042	39
	0.0030	36
	0.0021	34
	0.0009	32

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	58
Clay	<0.005	41

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-4	**Tested by:**	HTH 5/24/22
Sample Number:	SS-2	**Calculated by:**	HTH 5/24/22
Sample Depth:	1.5-3.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, fat CLAY (CH)		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-4	**Tested by:**	HTH 5/24/22
Sample Number:	SS-3	**Calculated by:**	HTH 5/24/22
Sample Depth:	3.0 - 4.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown fat CLAY (CH), trace sand and gravel		

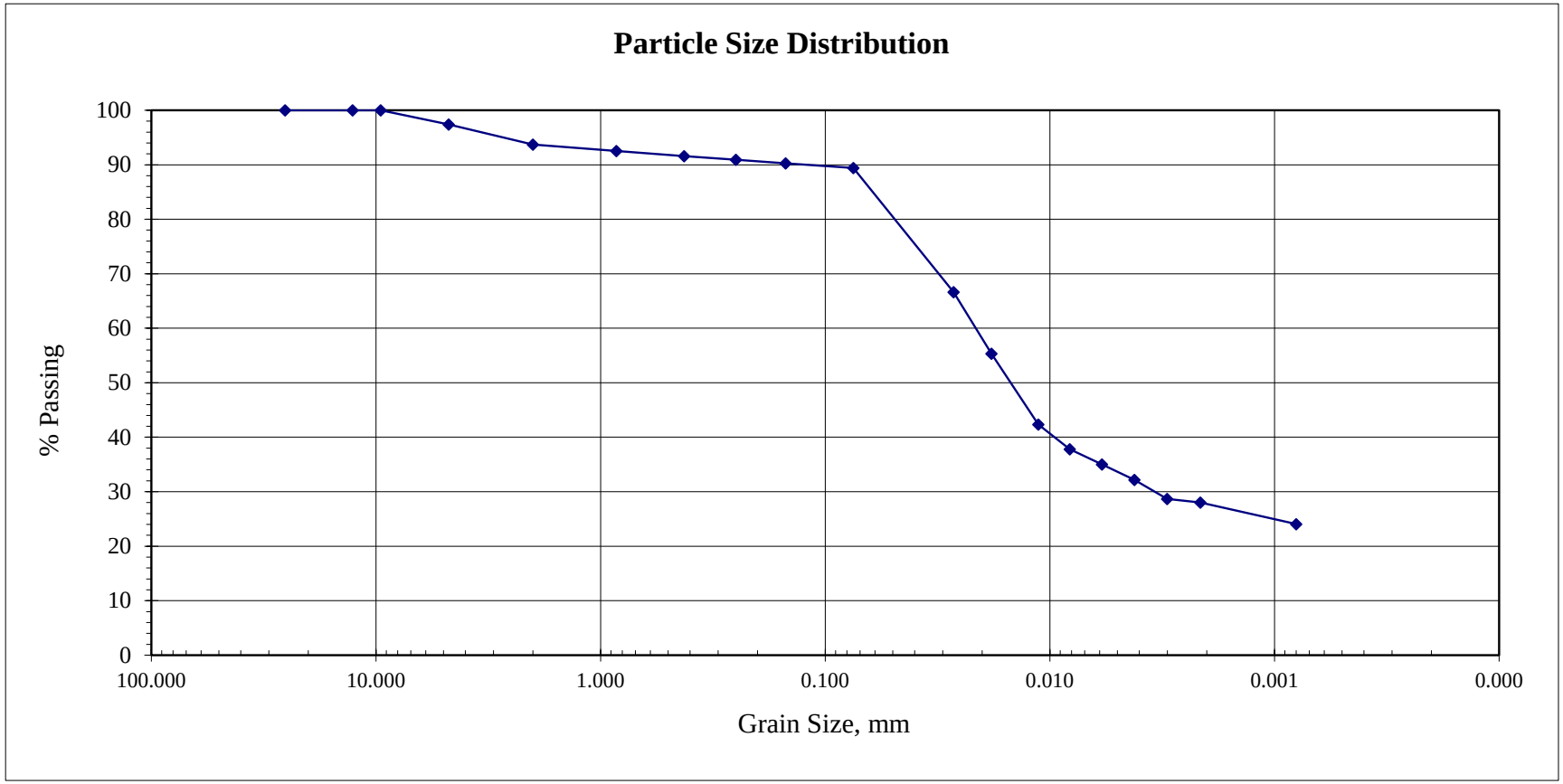
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	97
No.10	2.00	94
No.20	0.85	93
No.40	0.425	92
No.60	0.250	91
No.100	0.150	90
No.200	0.075	89
Hydrometer Analysis	0.0268	67
	0.0182	55
	0.0113	42
	0.0082	38
	0.0059	35
	0.0042	32
	0.0030	29
	0.0021	28
	0.0009	24

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	3
Coarse Sand	2.00 to 4.75	4
Medium Sand	0.43 to 2.00	2
Fine Sand	0.075 to 0.43	2
Silt	0.005 to 0.075	56
Clay	<0.005	34

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-4	**Tested by:**	HTH 5/24/22
Sample Number:	SS-3	**Calculated by:**	HTH 5/24/22
Sample Depth:	3.0 - 4.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown fat CLAY (CH), trace sand and gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-4	**Tested by:**	HTH 5/24/22
Sample Number:	SS-5	**Calculated by:**	HTH 5/24/22
Sample Depth:	6.0 - 7.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, shaley fat CLAY (CH), with sand, trace gravel		

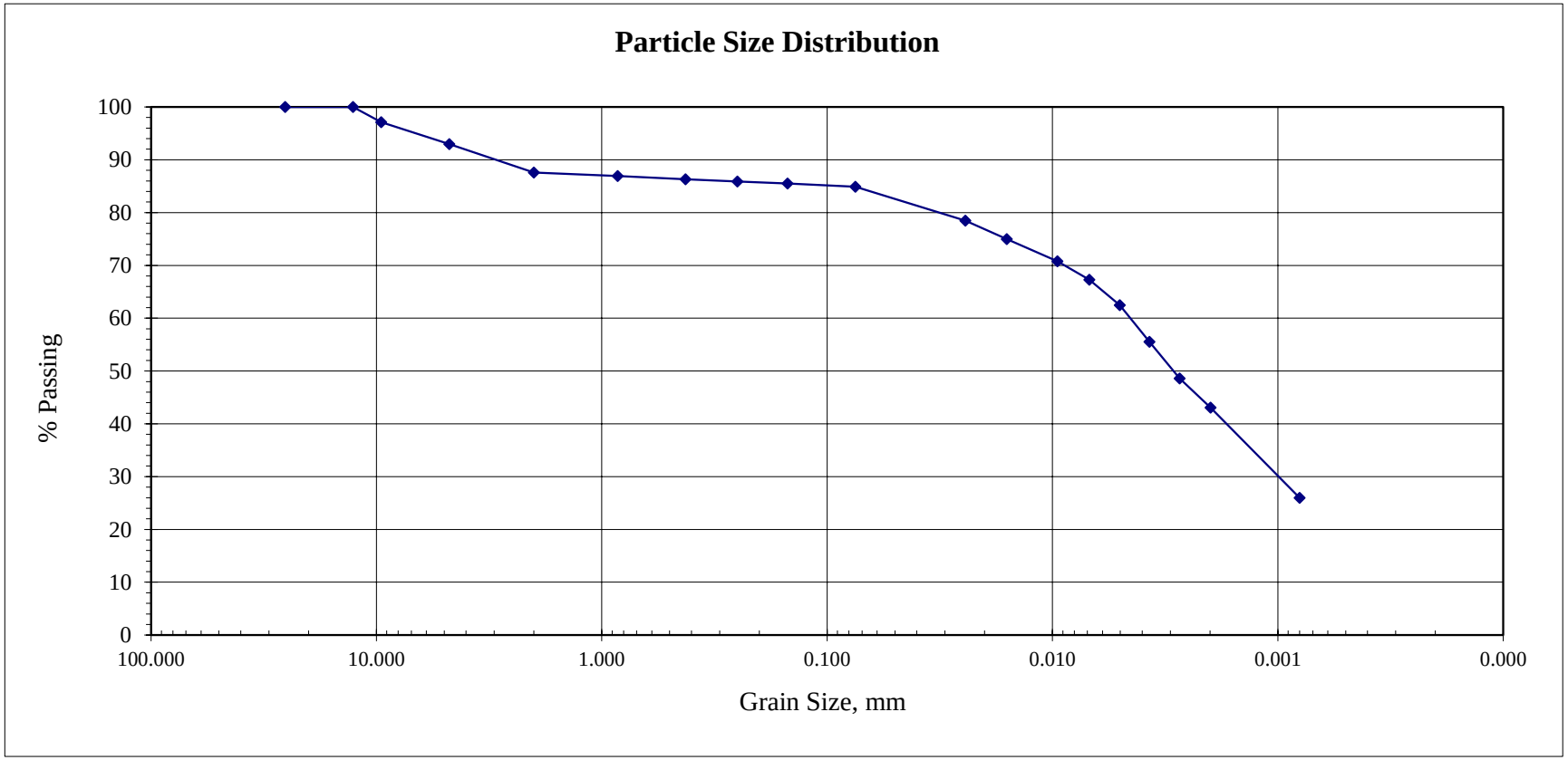
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	97
No.4	4.75	93
No.10	2.00	88
No.20	0.85	87
No.40	0.425	86
No.60	0.250	86
No.100	0.150	85
No.200	0.075	85
Hydrometer Analysis	0.0244	78
	0.0160	75
	0.0095	71
	0.0069	67
	0.0050	62
	0.0037	56
	0.0027	49
	0.0020	43
	0.0009	26

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	7
Coarse Sand	2.00 to 4.75	5
Medium Sand	0.43 to 2.00	1
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	23
Clay	<0.005	62

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-4	**Tested by:**	HTH 5/24/22
Sample Number:	SS-5	**Calculated by:**	HTH 5/24/22
Sample Depth:	6.0 - 7.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, shaley fat CLAY (CH), with sand, trace gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-4	**Tested by:**	HTH 5/24/22
Sample Number:	SS-6	**Calculated by:**	HTH 5/24/22
Sample Depth:	7.5 - 9.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown and gray, shaley sandy fat CLAY (CH), with gravel		

Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	96
No.4	4.75	84
No.10	2.00	67
No.20	0.85	63
No.40	0.425	61
No.60	0.250	60
No.100	0.150	60
No.200	0.075	58
Hydrometer Analysis	0.0268	52
	0.0172	49
	0.0104	44
	0.0075	41
	0.0055	37
	0.0040	33
	0.0029	28
	0.0021	25
	0.0009	16

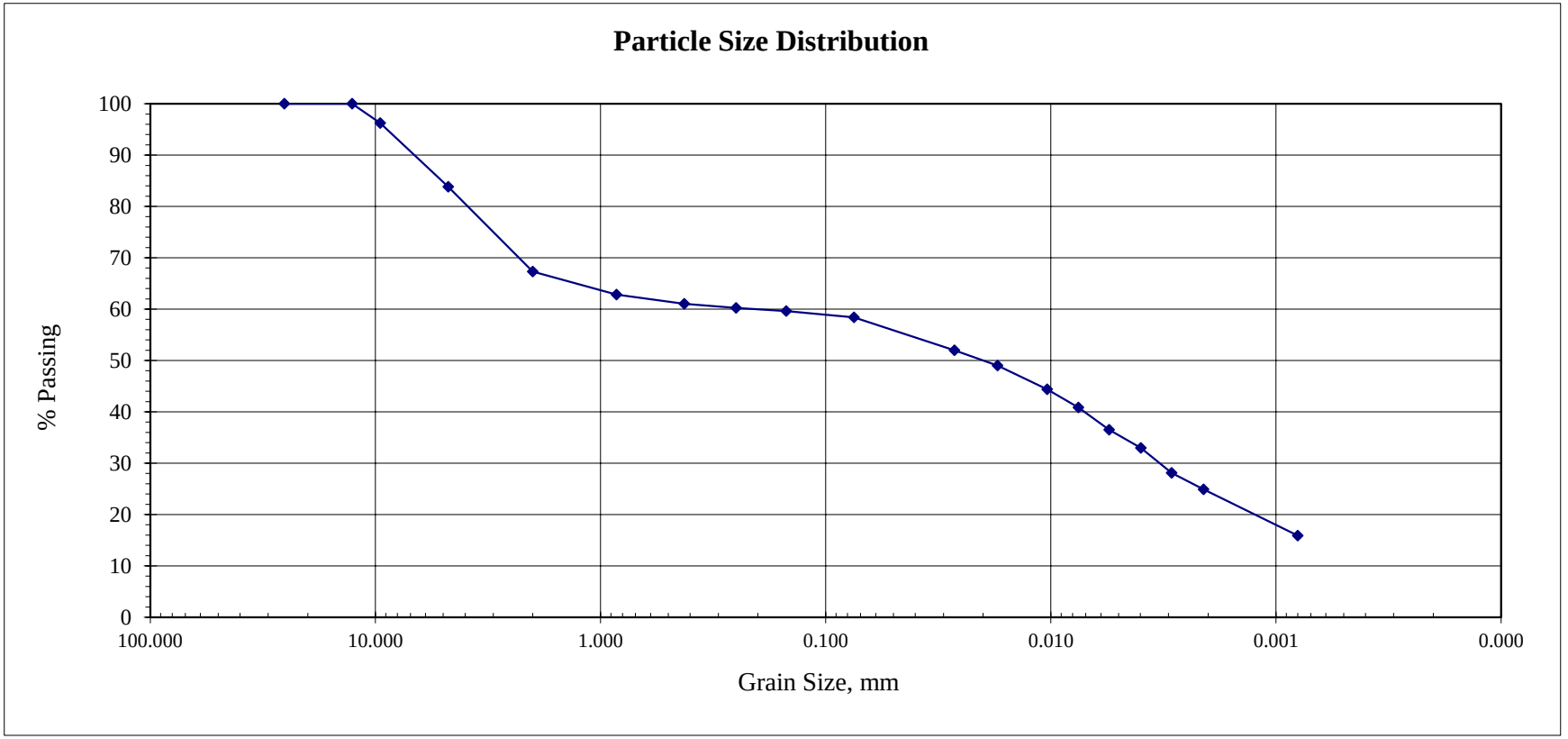
Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	16
Coarse Sand	2.00 to 4.75	16
Medium Sand	0.43 to 2.00	6
Fine Sand	0.075 to 0.43	3
Silt	0.005 to 0.075	23
Clay	<0.005	35

TSi Geotechnical, Inc.

HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-4	**Tested by:**	HTH 5/24/22
Sample Number:	SS-6	**Calculated by:**	HTH 5/24/22
Sample Depth:	7.5 - 9.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown and gray, shaley sandy fat CLAY (CH), with gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-4	**Tested by:**	HTH 5/24/22
Sample Number:	SS-7	**Calculated by:**	HTH 5/24/22
Sample Depth:	9.0 - 10.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown and gray, shaley fat CLAY (CH), trace sand		

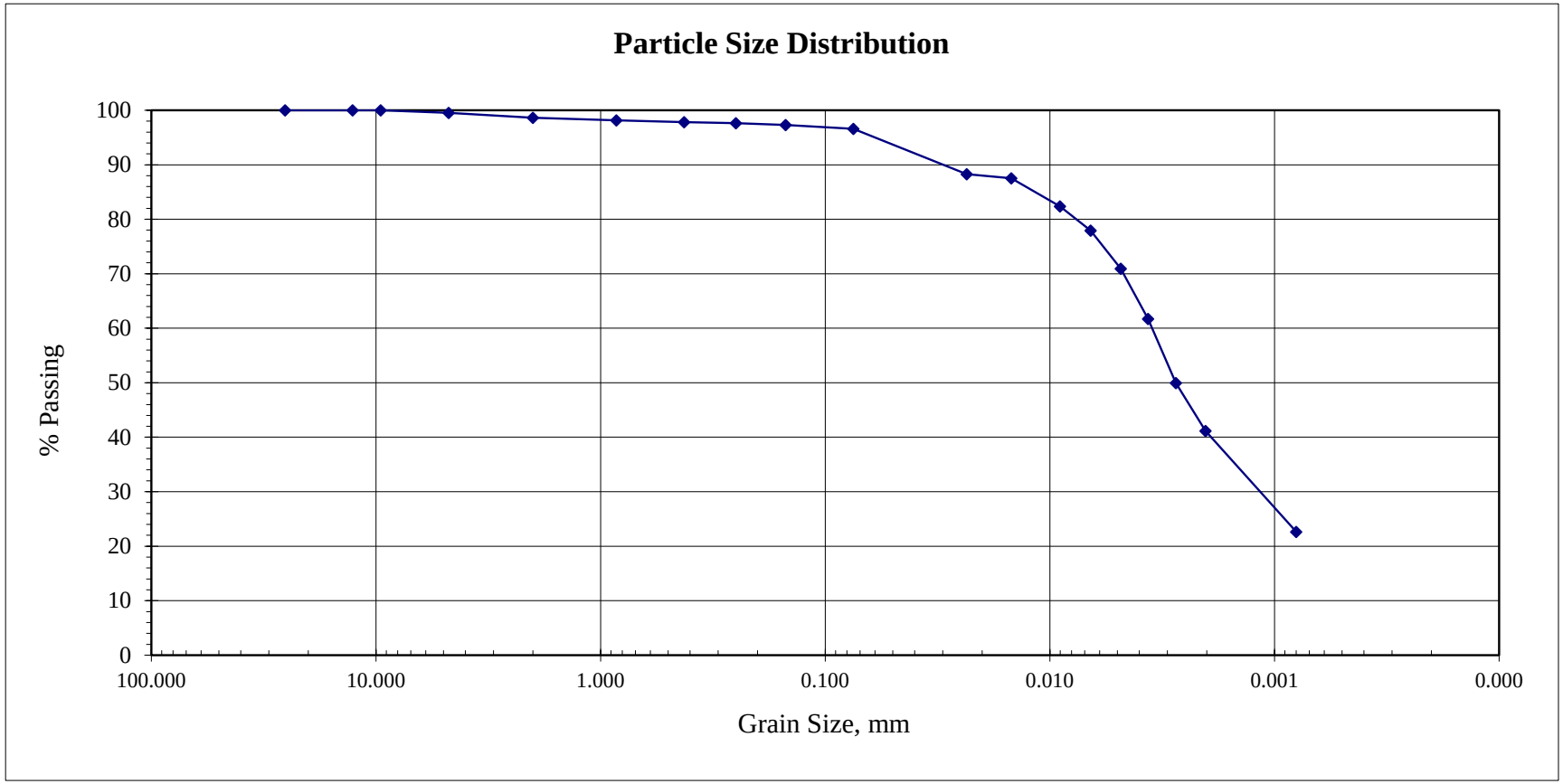
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	99
No.20	0.85	98
No.40	0.425	98
No.60	0.250	98
No.100	0.150	97
No.200	0.075	97
Hydrometer Analysis	0.0235	88
	0.0148	88
	0.0090	82
	0.0066	78
	0.0048	71
	0.0037	62
	0.0028	50
	0.0020	41
	0.0009	23

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	1
Medium Sand	0.43 to 2.00	1
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	24
Clay	<0.005	72

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-4	**Tested by:**	HTH 5/24/22
Sample Number:	SS-7	**Calculated by:**	HTH 5/24/22
Sample Depth:	9.0 - 10.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown and gray, shaley fat CLAY (CH), trace sa		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-1	**Calculated by:**	HTH 5/24/22
Sample Depth:	0 - 1.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, fat CLAY (CH), trace sand		

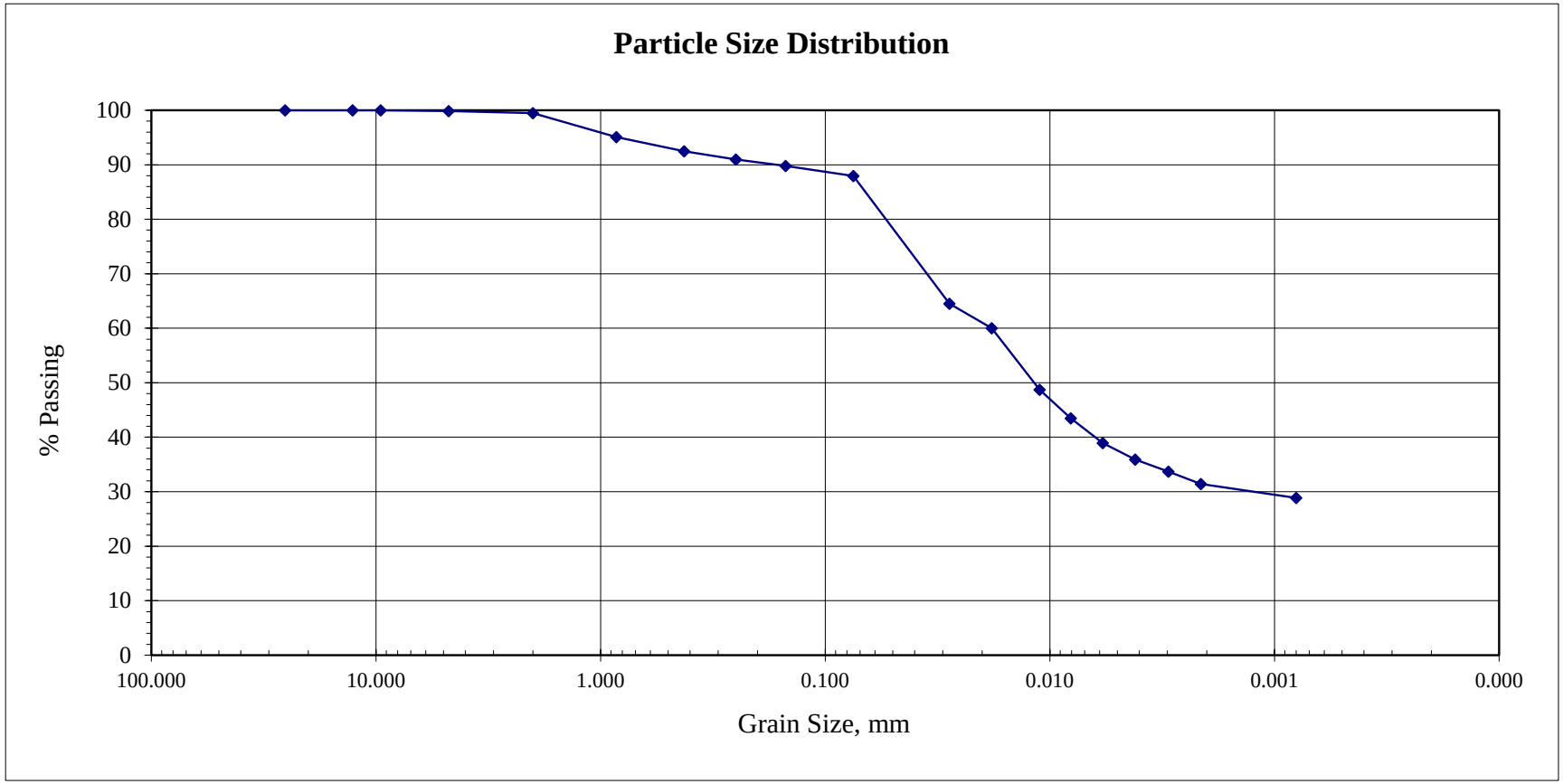
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	99
No.20	0.85	95
No.40	0.425	92
No.60	0.250	91
No.100	0.150	90
No.200	0.075	88
Hydrometer Analysis	0.0280	65
	0.0182	60
	0.0111	49
	0.0081	43
	0.0058	39
	0.0042	36
	0.0030	34
	0.0021	31
	0.0009	29

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	7
Fine Sand	0.075 to 0.43	5
Silt	0.005 to 0.075	50
Clay	<0.005	37

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-1	**Calculated by:**	HTH 5/24/22
Sample Depth:	0 - 1.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, fat CLAY (CH), trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-2	**Calculated by:**	HTH 5/24/22
Sample Depth:	1.5 - 3.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, fat CLAY (CH), trace sand		

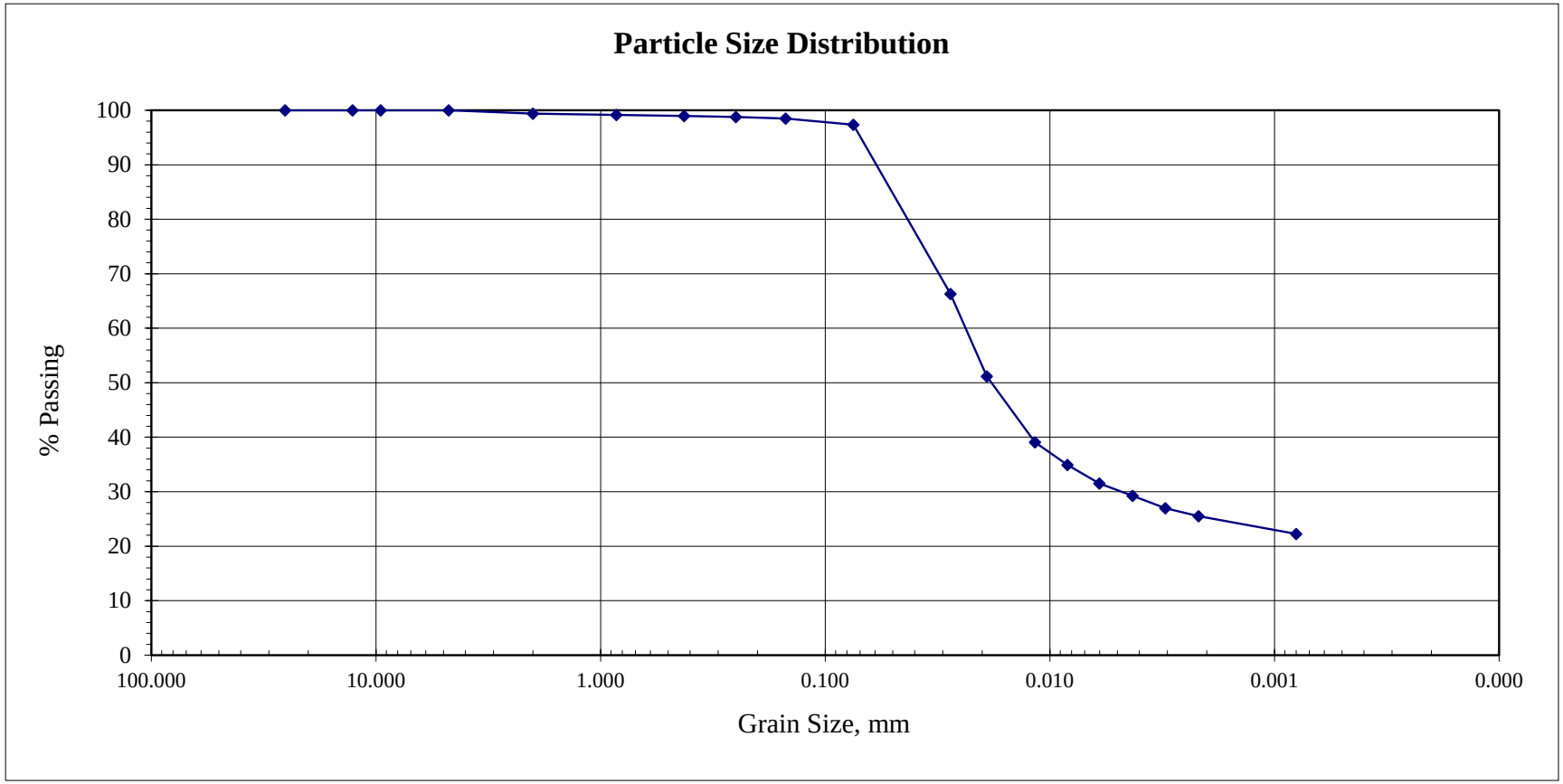
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	99
No.20	0.85	99
No.40	0.425	99
No.60	0.250	99
No.100	0.150	98
No.200	0.075	97
Hydrometer Analysis	0.0277	66
	0.0191	51
	0.0117	39
	0.0083	35
	0.0060	32
	0.0043	29
	0.0031	27
	0.0022	26
	0.0009	22

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	1
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	2
Silt	0.005 to 0.075	67
Clay	<0.005	30

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-2	**Calculated by:**	HTH 5/24/22
Sample Depth:	1.5 - 3.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, fat CLAY (CH), trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-3	**Calculated by:**	HTH 5/24/22
Sample Depth:	3.0 - 4.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, fat CLAY (CH), trace sand		

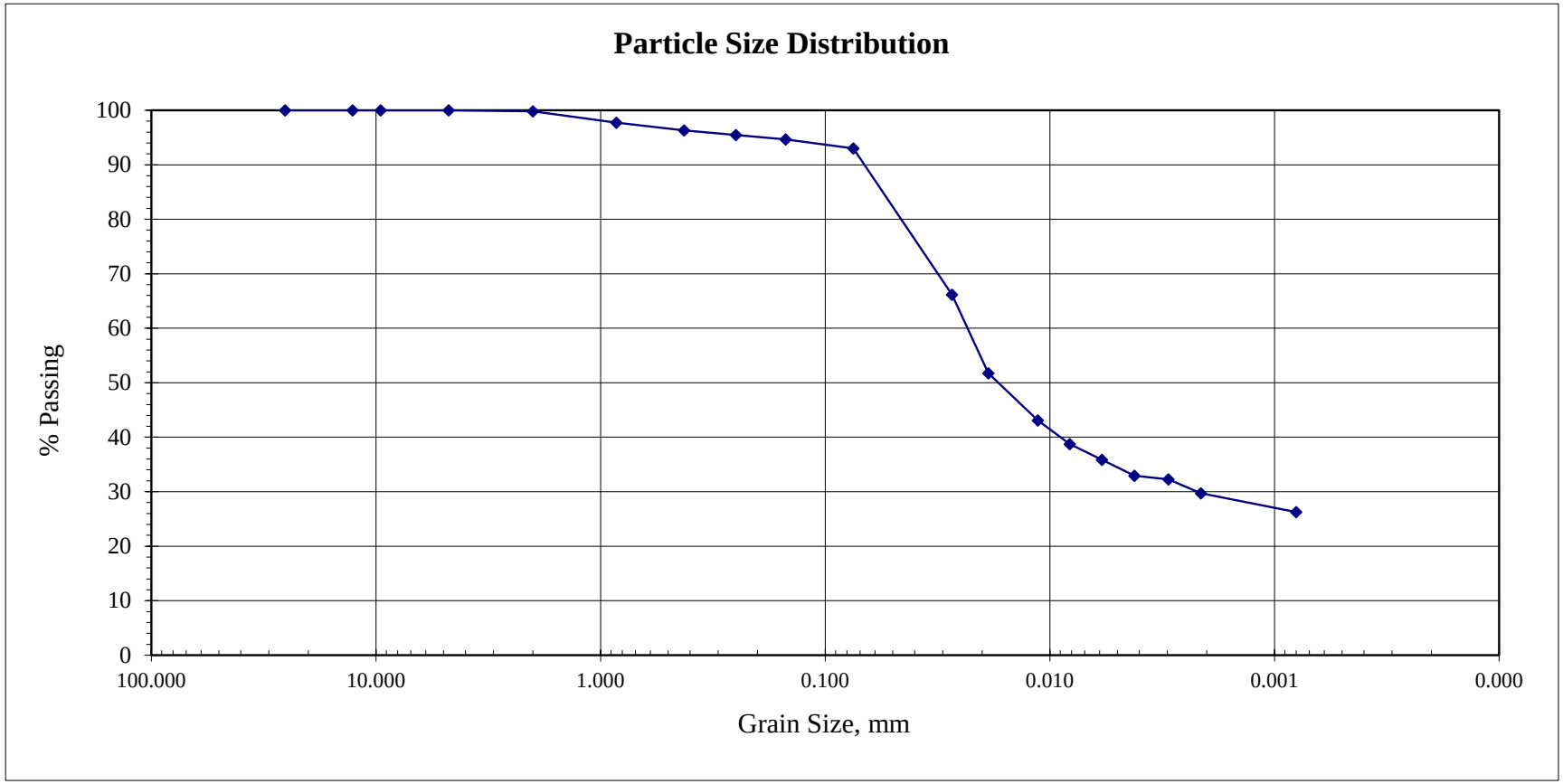
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	98
No.40	0.425	96
No.60	0.250	95
No.100	0.150	95
No.200	0.075	93
Hydrometer Analysis	0.0272	66
	0.0188	52
	0.0113	43
	0.0082	39
	0.0059	36
	0.0042	33
	0.0030	32
	0.0021	30
	0.0009	26

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	3
Fine Sand	0.075 to 0.43	3
Silt	0.005 to 0.075	59
Clay	<0.005	34

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-3	**Calculated by:**	HTH 5/24/22
Sample Depth:	3.0 - 4.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, fat CLAY (CH), trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-4	**Calculated by:**	HTH 5/24/22
Sample Depth:	4.5 - 6.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, lean CLAY (CL), trace sand and gravel		

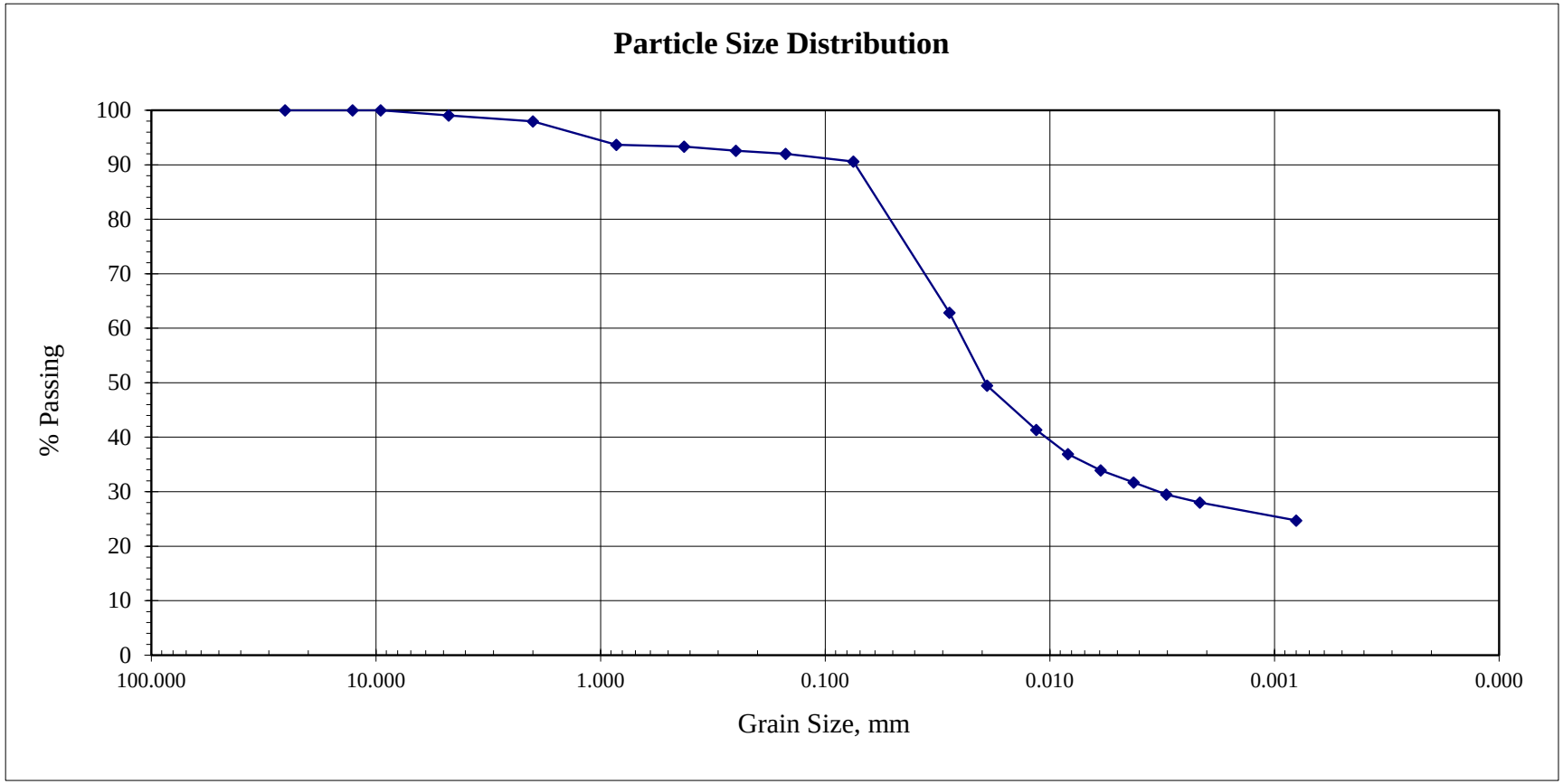
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	99
No.10	2.00	98
No.20	0.85	94
No.40	0.425	93
No.60	0.250	93
No.100	0.150	92
No.200	0.075	91
Hydrometer Analysis	0.0280	63
	0.0191	49
	0.0115	41
	0.0083	37
	0.0059	34
	0.0042	32
	0.0030	29
	0.0021	28
	0.0009	25

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	1
Coarse Sand	2.00 to 4.75	1
Medium Sand	0.43 to 2.00	5
Fine Sand	0.075 to 0.43	3
Silt	0.005 to 0.075	58
Clay	<0.005	33

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-4	**Calculated by:**	HTH 5/24/22
Sample Depth:	4.5 - 6.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, lean CLAY (CL), trace sand and gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-5	**Calculated by:**	HTH 5/24/22
Sample Depth:	6.0 - 7.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, lean CLAY (CL),with gravel, trace sand		

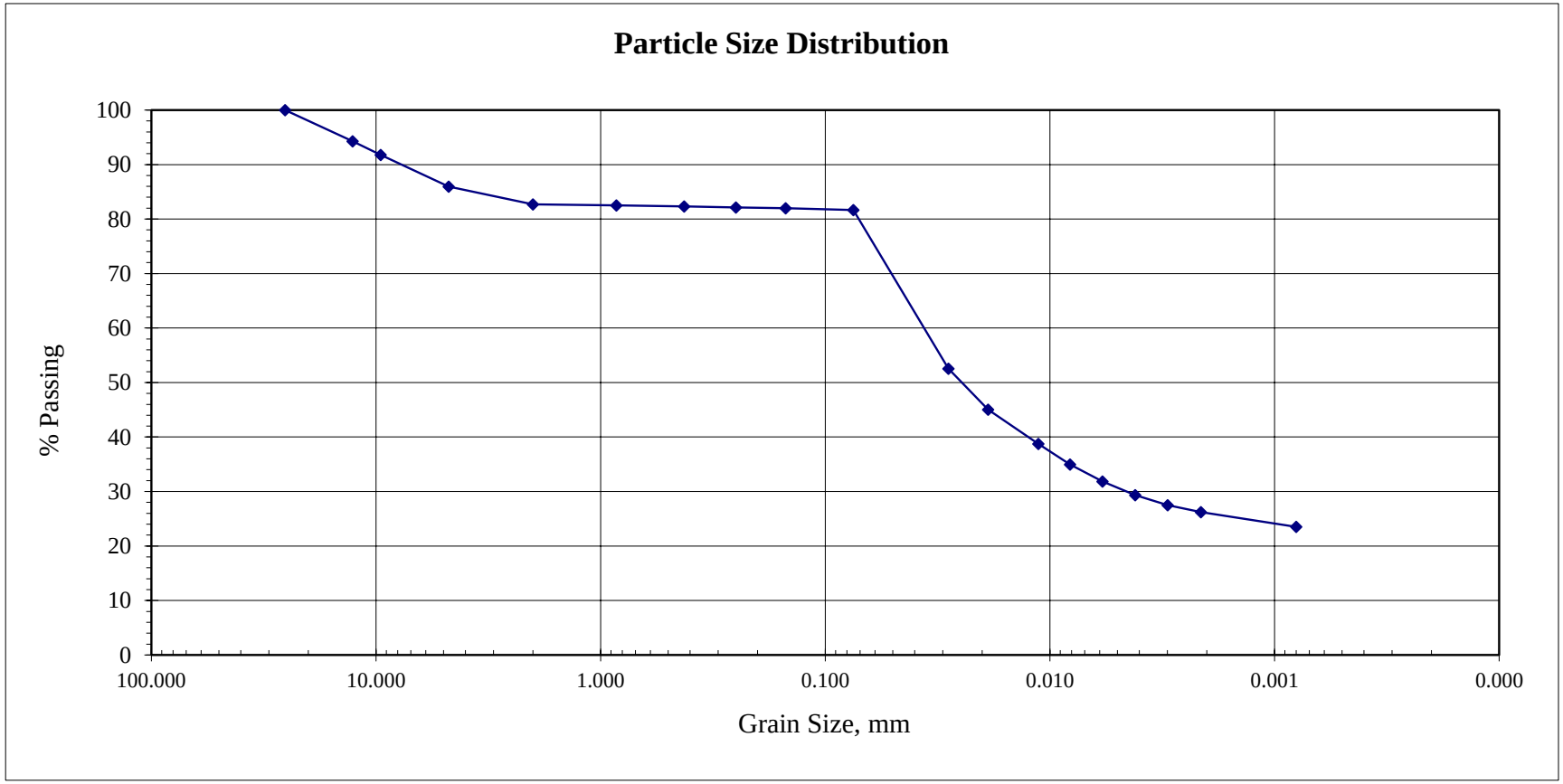
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	94
3/8"	9.53	92
No.4	4.75	86
No.10	2.00	83
No.20	0.85	83
No.40	0.425	82
No.60	0.250	82
No.100	0.150	82
No.200	0.075	82
Hydrometer Analysis	0.0283	53
	0.0188	45
	0.0113	39
	0.0081	35
	0.0058	32
	0.0042	29
	0.0030	27
	0.0021	26
	0.0009	24

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	14
Coarse Sand	2.00 to 4.75	3
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	51
Clay	<0.005	31

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-5	**Calculated by:**	HTH 5/24/22
Sample Depth:	6.0 - 7.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, lean CLAY (CL),with gravel, trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-6	**Calculated by:**	HTH 5/24/22
Sample Depth:	7.5 - 9.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, sandy fat CLAY (CH), with gravel		

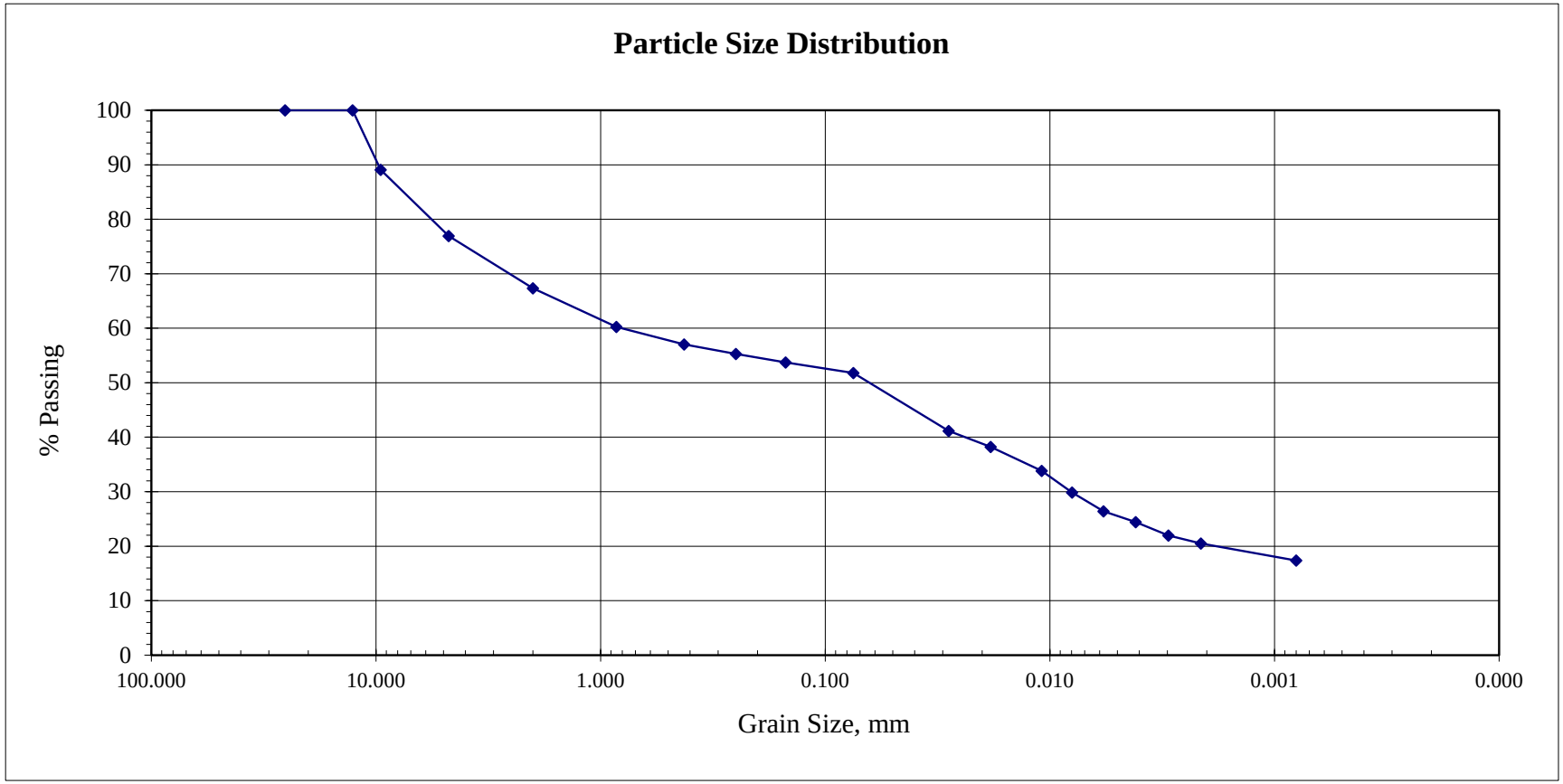
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	89
No.4	4.75	77
No.10	2.00	67
No.20	0.85	60
No.40	0.425	57
No.60	0.250	55
No.100	0.150	54
No.200	0.075	52
Hydrometer Analysis	0.0283	41
	0.0183	38
	0.0109	34
	0.0080	30
	0.0058	26
	0.0041	24
	0.0030	22
	0.0021	21
	0.0009	17

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	23
Coarse Sand	2.00 to 4.75	10
Medium Sand	0.43 to 2.00	10
Fine Sand	0.075 to 0.43	5
Silt	0.005 to 0.075	26
Clay	<0.005	25

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-6	**Calculated by:**	HTH 5/24/22
Sample Depth:	7.5 - 9.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, sandy fat CLAY (CH), with gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-7	**Calculated by:**	HTH 5/24/22
Sample Depth:	9.0 - 10.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown and gray, shaley fat CLAY (CH), with sand, trace gravel		

Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	99
No.4	4.75	91
No.10	2.00	85
No.20	0.85	79
No.40	0.425	76
No.60	0.250	75
No.100	0.150	74
No.200	0.075	73
Hydrometer Analysis	0.0273	59
	0.0182	51
	0.0111	42
	0.0080	38
	0.0058	33
	0.0042	29
	0.0030	26
	0.0022	22
	0.0009	18

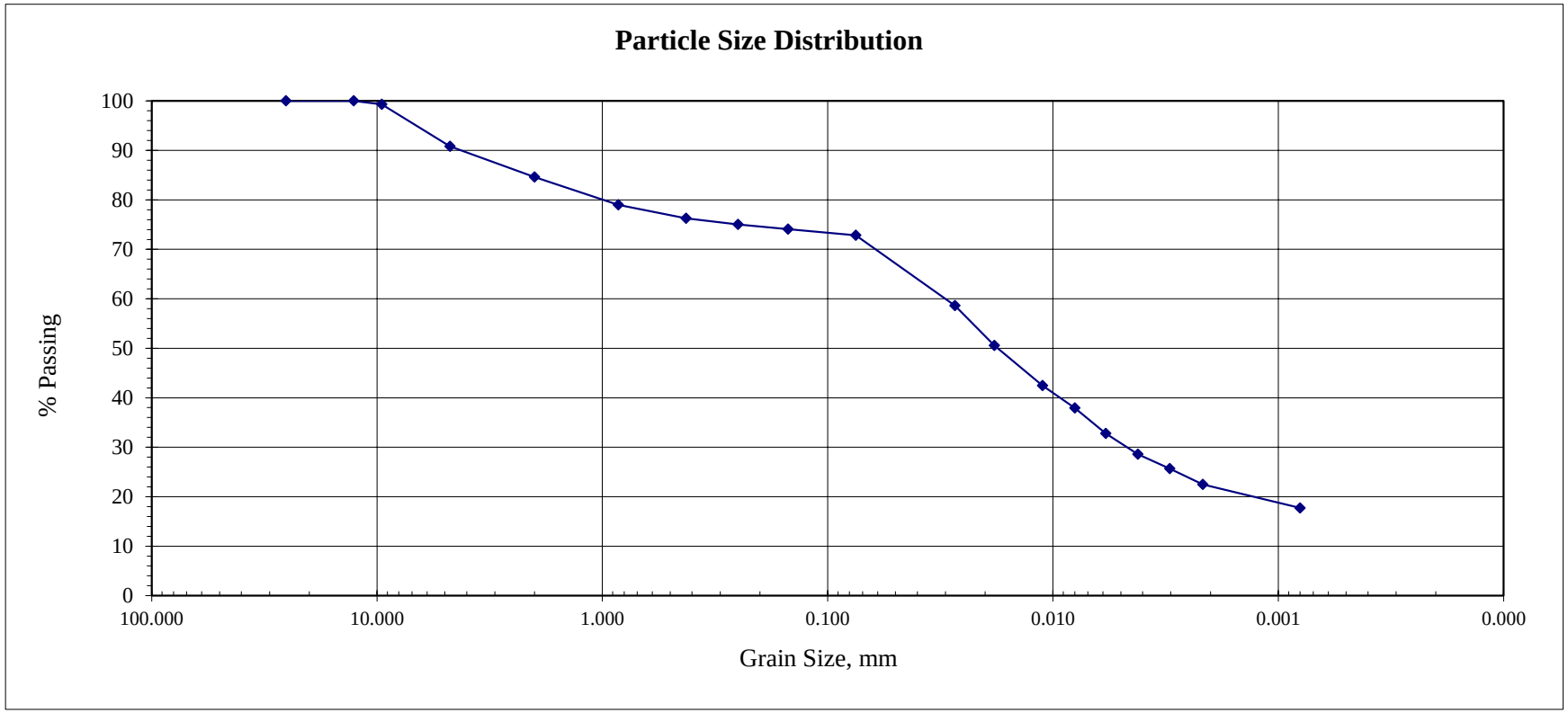
Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	9
Coarse Sand	2.00 to 4.75	6
Medium Sand	0.43 to 2.00	8
Fine Sand	0.075 to 0.43	3
Silt	0.005 to 0.075	42
Clay	<0.005	31

TSi Geotechnical, Inc.

HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-5	**Tested by:**	SLY 5/16/22
Sample Number:	SS-7	**Calculated by:**	HTH 5/24/22
Sample Depth:	9.0 - 10.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown and gray, shaley fat CLAY (CH), with sand, trace gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/18/22
Sample Number:	SS-1	**Calculated by:**	HTH 5/24/22
Sample Depth:	0 - 1.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, fat CLAY (CH)		

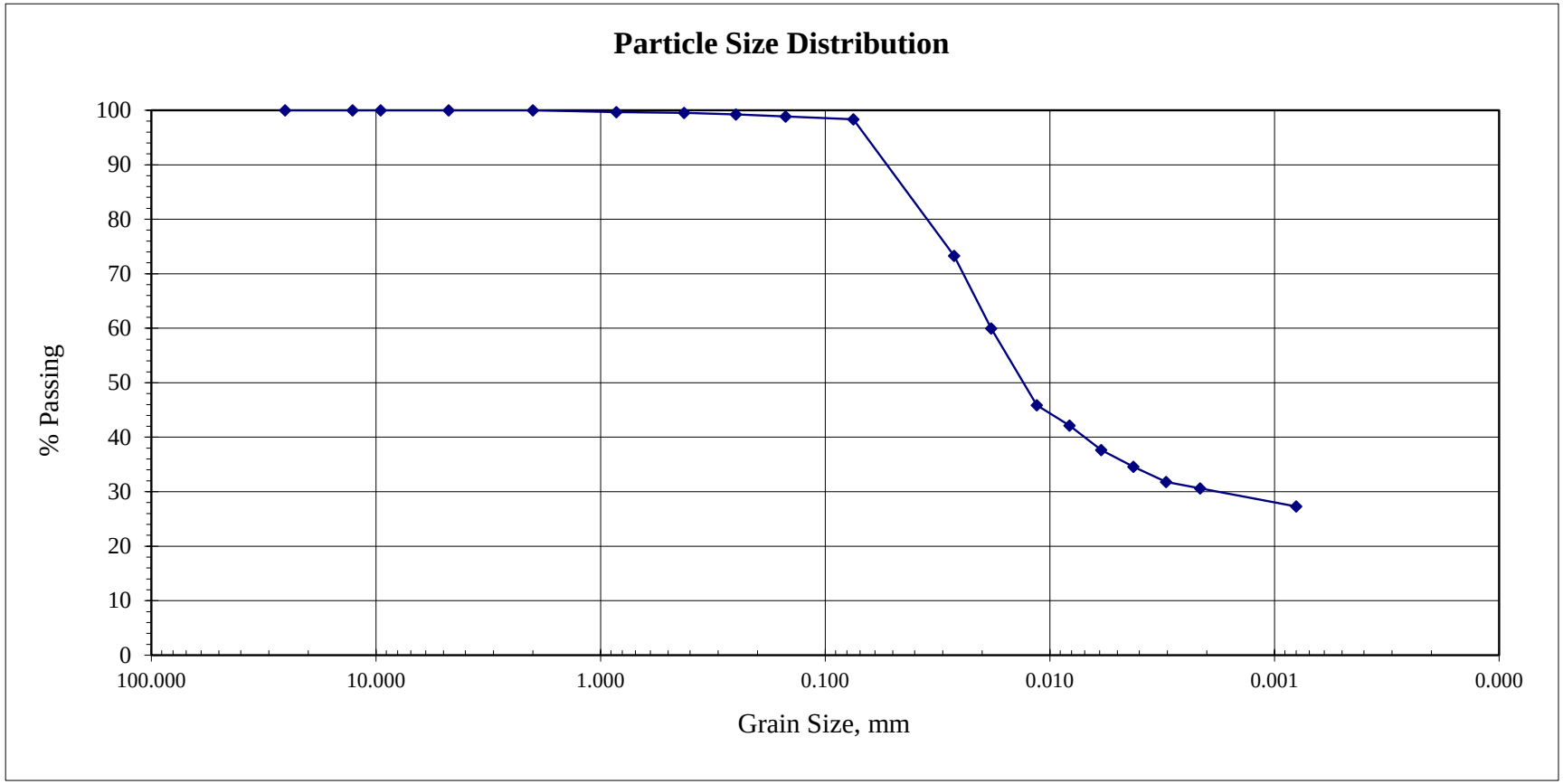
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	100
No.40	0.425	100
No.60	0.250	99
No.100	0.150	99
No.200	0.075	98
Hydrometer Analysis	0.0267	73
	0.0183	60
	0.0114	46
	0.0082	42
	0.0059	38
	0.0042	35
	0.0030	32
	0.0021	31
	0.0009	27

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	62
Clay	<0.005	36

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/18/22
Sample Number:	SS-1	**Calculated by:**	HTH 5/24/22
Sample Depth:	0 - 1.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, fat CLAY (CH)		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/18/22
Sample Number:	SS-2	**Calculated by:**	HTH 5/24/22
Sample Depth:	1.5 - 3.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, lean CLAY (CL)		

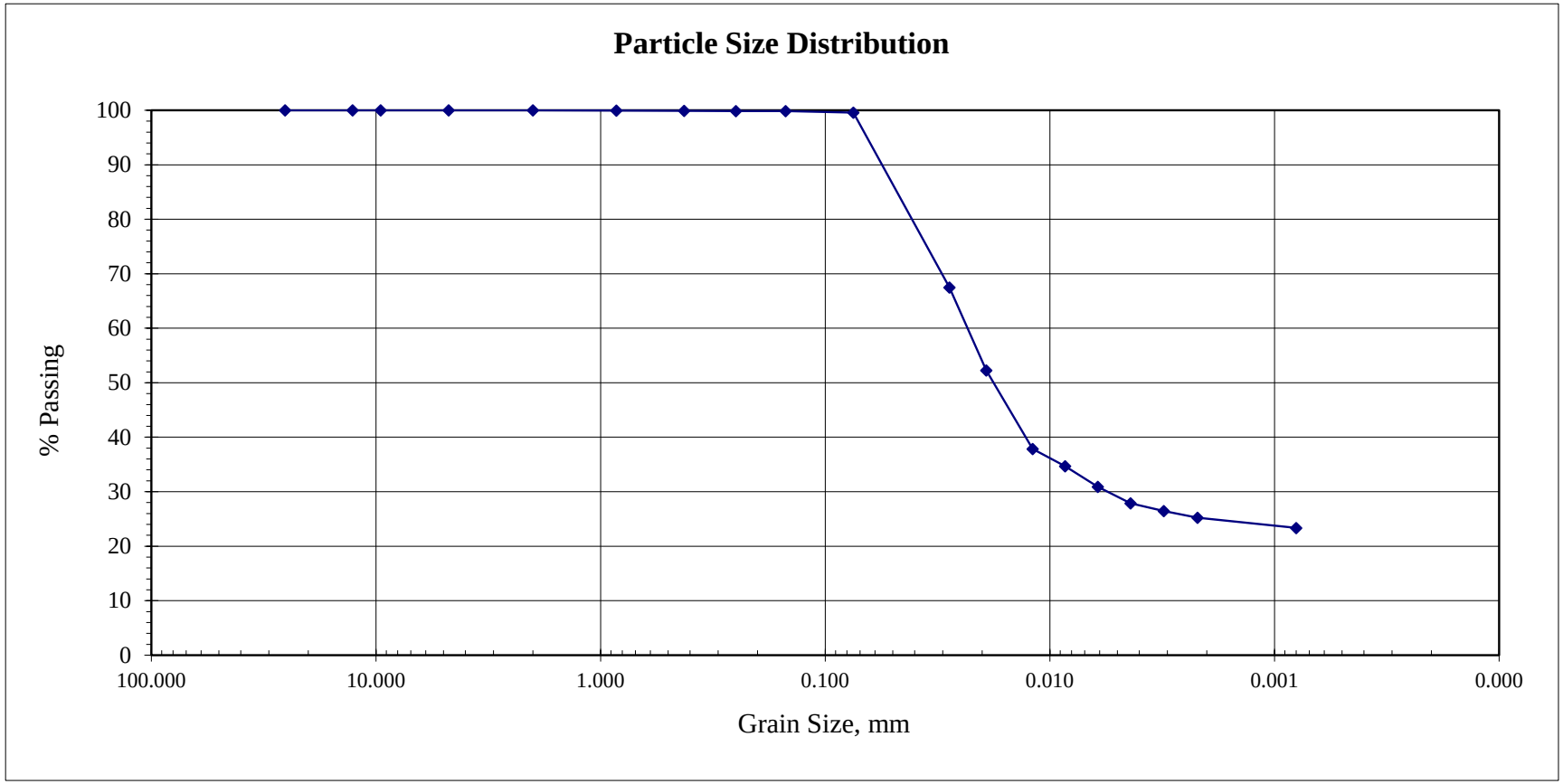
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	100
No.40	0.425	100
No.60	0.250	100
No.100	0.150	100
No.200	0.075	100
Hydrometer Analysis	0.0280	67
	0.0192	52
	0.0119	38
	0.0086	35
	0.0061	31
	0.0044	28
	0.0031	26
	0.0022	25
	0.0009	23

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	0
Silt	0.005 to 0.075	71
Clay	<0.005	29

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/18/22
Sample Number:	SS-2	**Calculated by:**	HTH 5/24/22
Sample Depth:	1.5 - 3.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, lean CLAY (CL)		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/18/22
Sample Number:	SS-3	**Calculated by:**	HTH 5/24/22
Sample Depth:	3.0 - 4.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, lean CLAY (CL)		

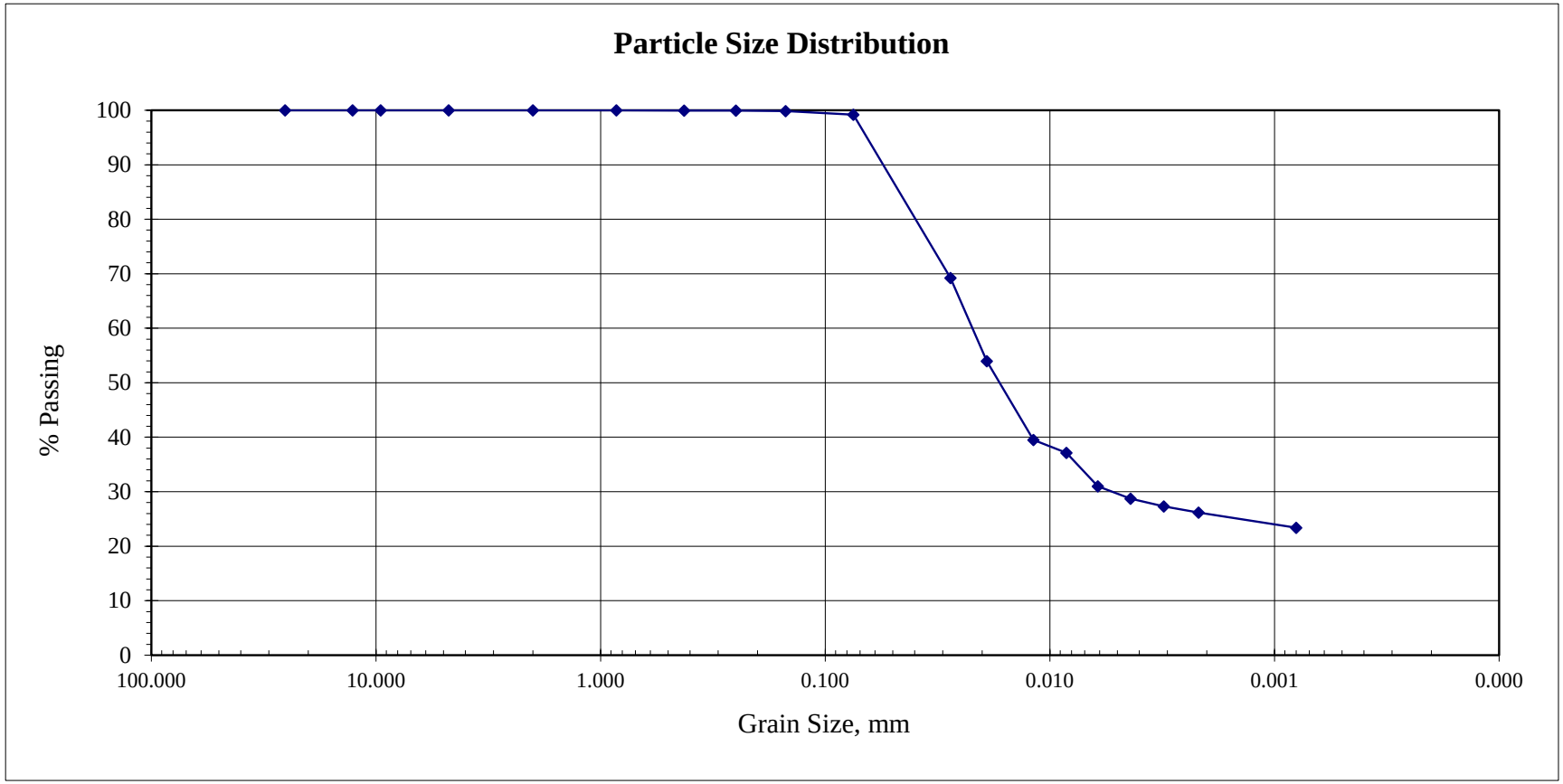
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	100
No.40	0.425	100
No.60	0.250	100
No.100	0.150	100
No.200	0.075	99
Hydrometer Analysis	0.0277	69
	0.0191	54
	0.0118	39
	0.0084	37
	0.0061	31
	0.0044	29
	0.0031	27
	0.0022	26
	0.0009	23

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	70
Clay	<0.005	30

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/18/22
Sample Number:	SS-3	**Calculated by:**	HTH 5/24/22
Sample Depth:	3.0 - 4.5	**Checked by:**	AD 5/25/22
Visual Description:	Brown, lean CLAY (CL)		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/18/22
Sample Number:	SS-4	**Calculated by:**	HTH 5/24/22
Sample Depth:	4.5 - 6.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, lean CLAY (CL)		

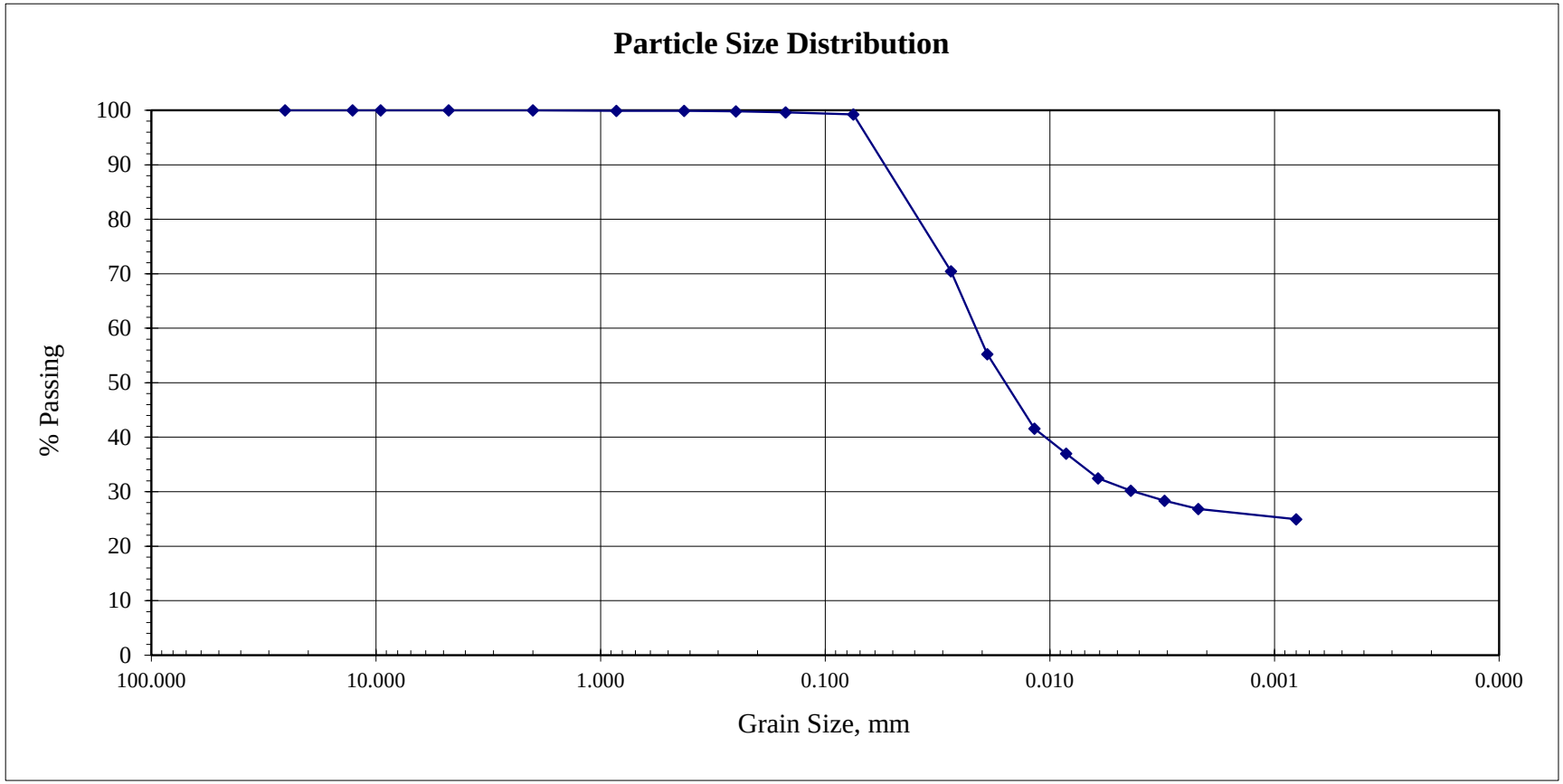
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	100
No.40	0.425	100
No.60	0.250	100
No.100	0.150	100
No.200	0.075	99
Hydrometer Analysis	0.0276	70
	0.0190	55
	0.0117	42
	0.0085	37
	0.0061	32
	0.0044	30
	0.0031	28
	0.0022	27
	0.0009	25

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	68
Clay	<0.005	31

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/18/22
Sample Number:	SS-4	**Calculated by:**	HTH 5/24/22
Sample Depth:	4.5 - 6.0	**Checked by:**	AD 5/25/22
Visual Description:	Brown, lean CLAY (CL)		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/24/22
Sample Number:	SS-5	**Calculated by:**	SLY 5/26/22
Sample Depth:	6.0 - 7.5	**Checked by:**	AD 5/26/22
Visual Description:	Brown, lean CLAY (CL)		

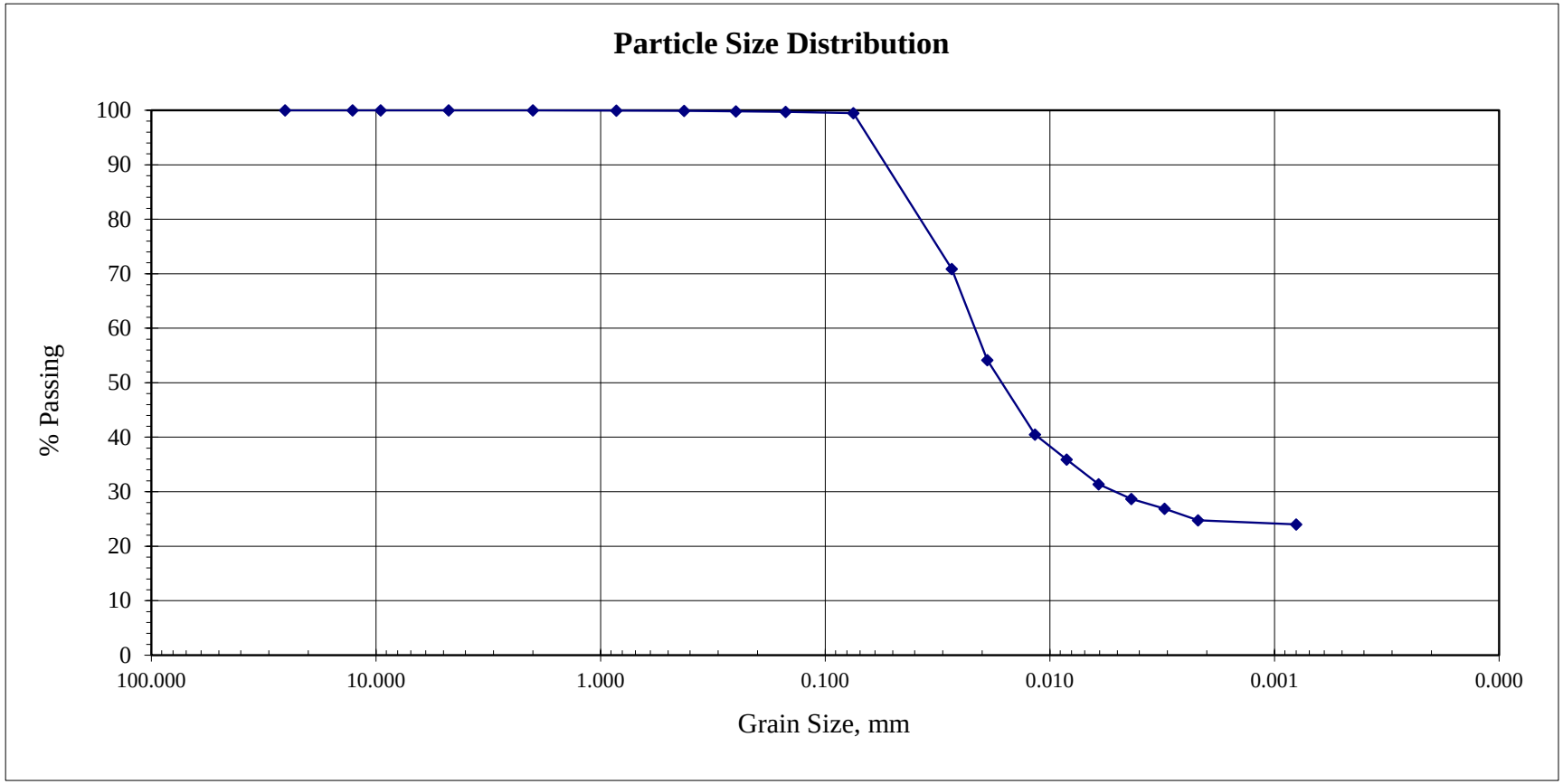
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	100
No.40	0.425	100
No.60	0.250	100
No.100	0.150	100
No.200	0.075	99
Hydrometer Analysis	0.0273	71
	0.0190	54
	0.0117	40
	0.0084	36
	0.0061	31
	0.0043	29
	0.0031	27
	0.0022	25
	0.0009	24

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	0
Silt	0.005 to 0.075	70
Clay	<0.005	30

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/24/22
Sample Number:	SS-5	**Calculated by:**	SLY 5/26/22
Sample Depth:	6.0 - 7.5	**Checked by:**	AD 5/26/22
Visual Description:	Brown, lean CLAY (CL)		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/24/22
Sample Number:	SS-6	**Calculated by:**	SLY 5/26/22
Sample Depth:	7.5 - 9.0	**Checked by:**	AD 5/26/22
Visual Description:	Brown, lean CLAY (CL)		

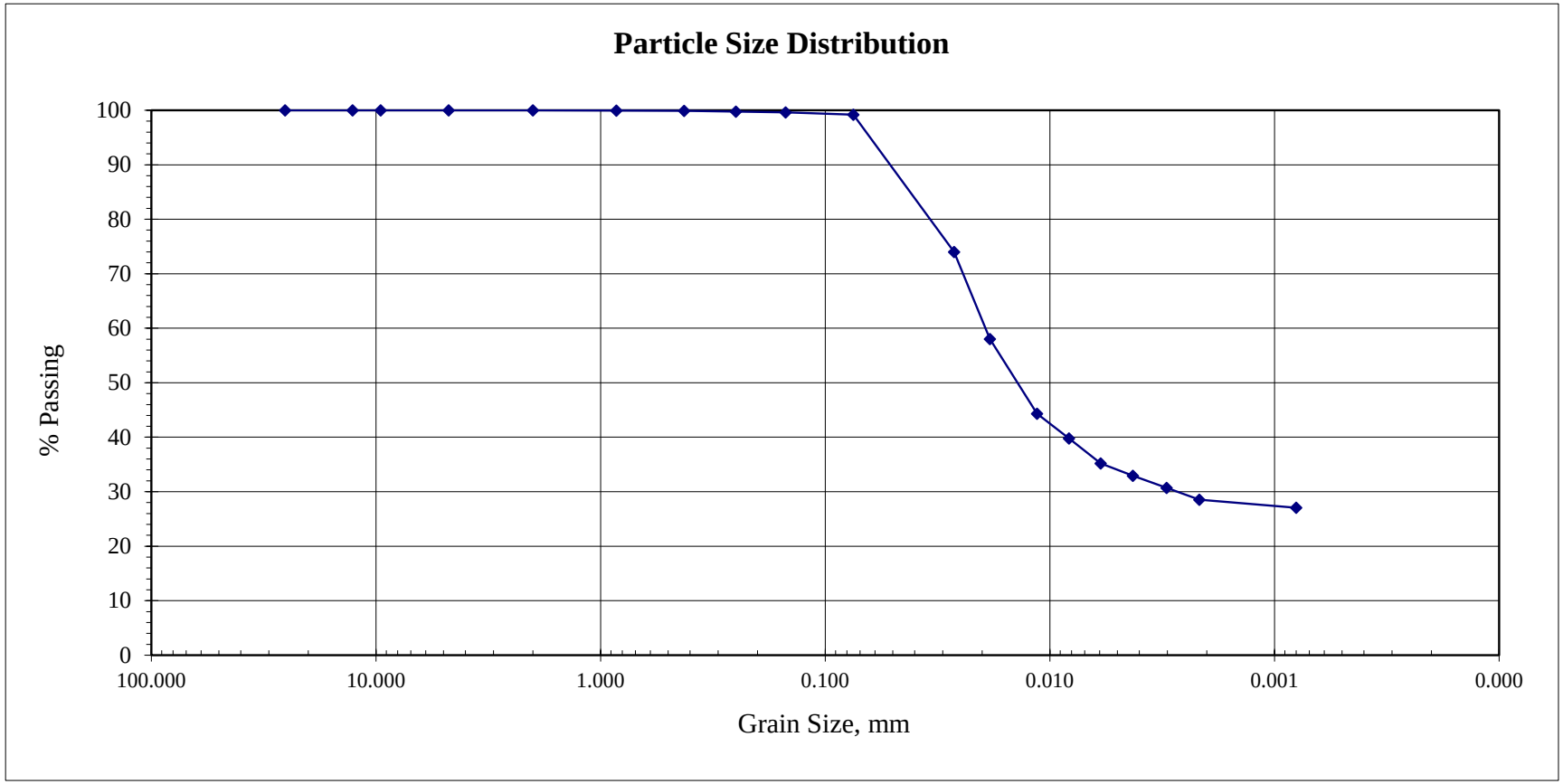
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	100
No.40	0.425	100
No.60	0.250	100
No.100	0.150	100
No.200	0.075	99
Hydrometer Analysis	0.0267	74
	0.0185	58
	0.0114	44
	0.0082	40
	0.0059	35
	0.0043	33
	0.0030	31
	0.0022	29
	0.0009	27

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	65
Clay	<0.005	34

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/24/22
Sample Number:	SS-6	**Calculated by:**	SLY 5/26/22
Sample Depth:	7.5 - 9.0	**Checked by:**	AD 5/26/22
Visual Description:	Brown, lean CLAY (CL)		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/24/22
Sample Number:	SS-7	**Calculated by:**	SLY 5/26/22
Sample Depth:	9.0 - 10.5	**Checked by:**	AD 5/26/22
Visual Description:	Brown, lean CLAY (CL), trace sand		

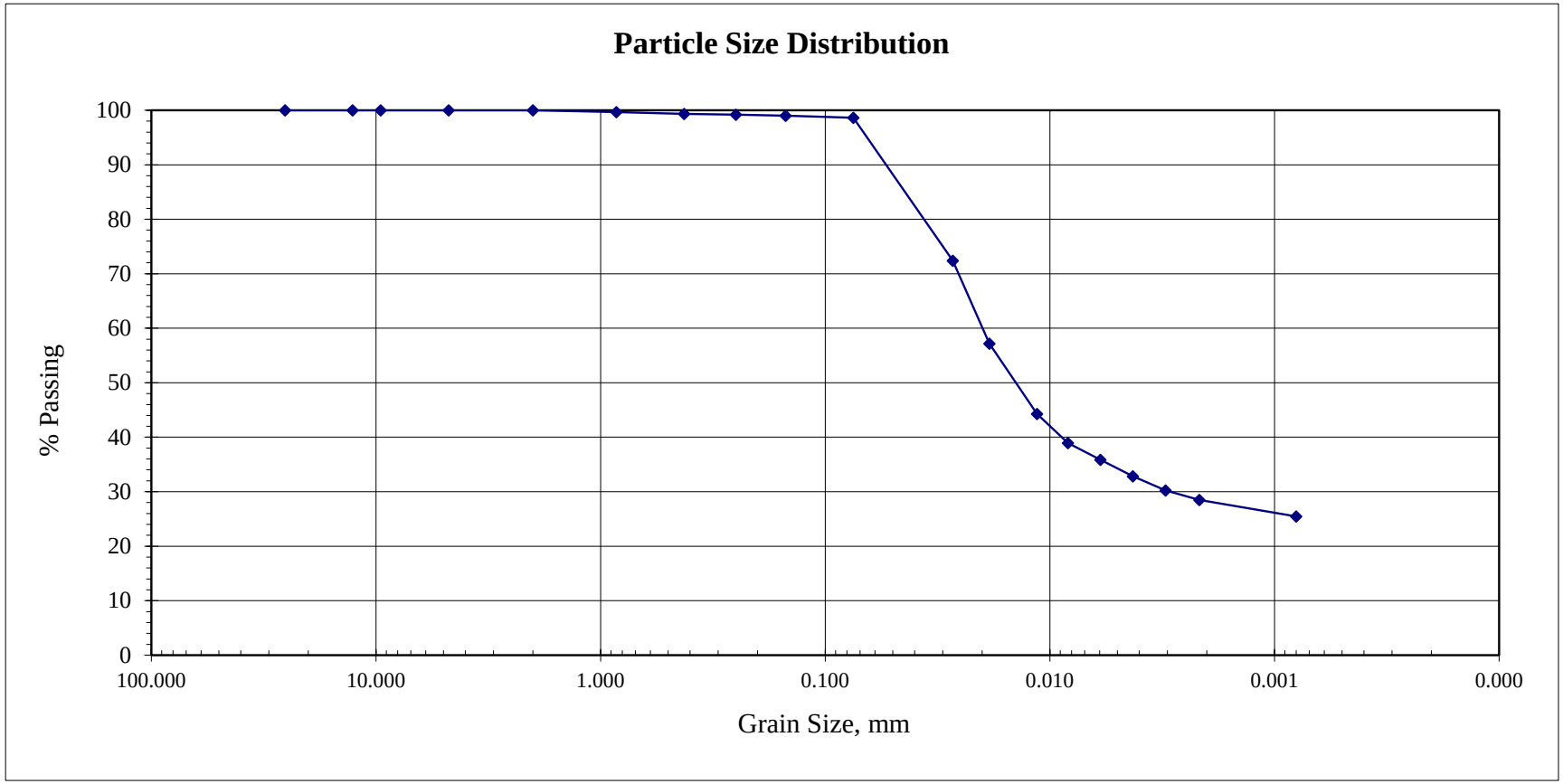
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	100
No.40	0.425	99
No.60	0.250	99
No.100	0.150	99
No.200	0.075	99
Hydrometer Analysis	0.0270	72
	0.0186	57
	0.0114	44
	0.0083	39
	0.0060	36
	0.0043	33
	0.0031	30
	0.0022	29
	0.0009	25

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	1
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	64
Clay	<0.005	34

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/24/22
Sample Number:	SS-7	**Calculated by:**	SLY 5/26/22
Sample Depth:	9.0 - 10.5	**Checked by:**	AD 5/26/22
Visual Description:	Brown, lean CLAY (CL), trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/24/22
Sample Number:	SS-8	**Calculated by:**	SLY 5/26/22
Sample Depth:	13.5 - 15.0	**Checked by:**	AD 5/26/22
Visual Description:	Brown, lean CLAY (CL), with sand, trace gravel		

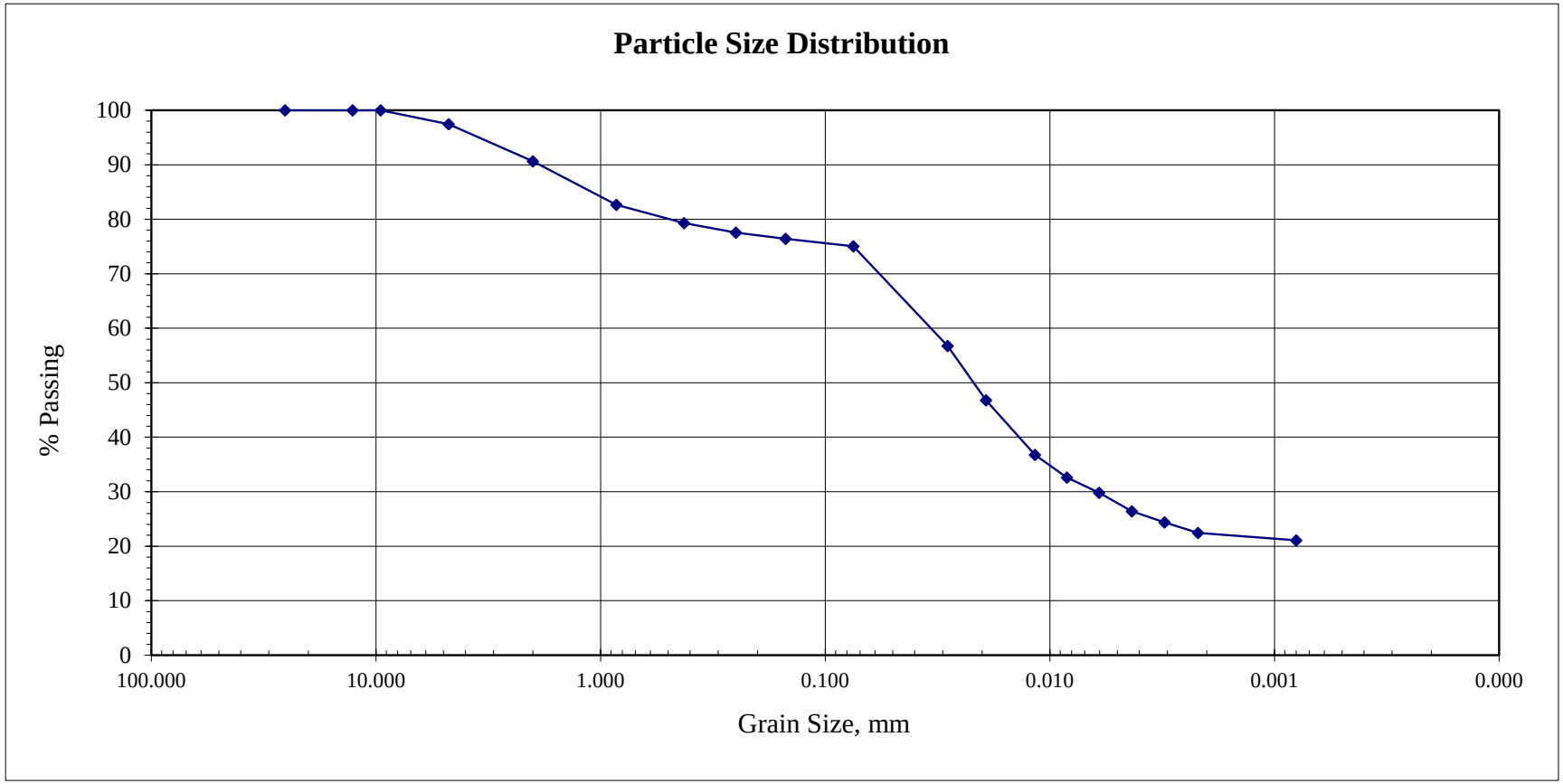
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	97
No.10	2.00	91
No.20	0.85	83
No.40	0.425	79
No.60	0.250	78
No.100	0.150	76
No.200	0.075	75
Hydrometer Analysis	0.0285	57
	0.0192	47
	0.0116	37
	0.0084	33
	0.0060	30
	0.0043	26
	0.0031	24
	0.0022	22
	0.0009	21

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	3
Coarse Sand	2.00 to 4.75	7
Medium Sand	0.43 to 2.00	11
Fine Sand	0.075 to 0.43	4
Silt	0.005 to 0.075	47
Clay	<0.005	28

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/24/22
Sample Number:	SS-8	**Calculated by:**	SLY 5/26/22
Sample Depth:	13.5 - 15.0	**Checked by:**	AD 5/26/22
Visual Description:	Brown, lean CLAY (CL), with sand, trace gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/24/22
Sample Number:	SS-9	**Calculated by:**	SLY 5/26/22
Sample Depth:	18.5 - 18.7	**Checked by:**	AD 5/26/22
Visual Description:	Gray, weathered SHALE		

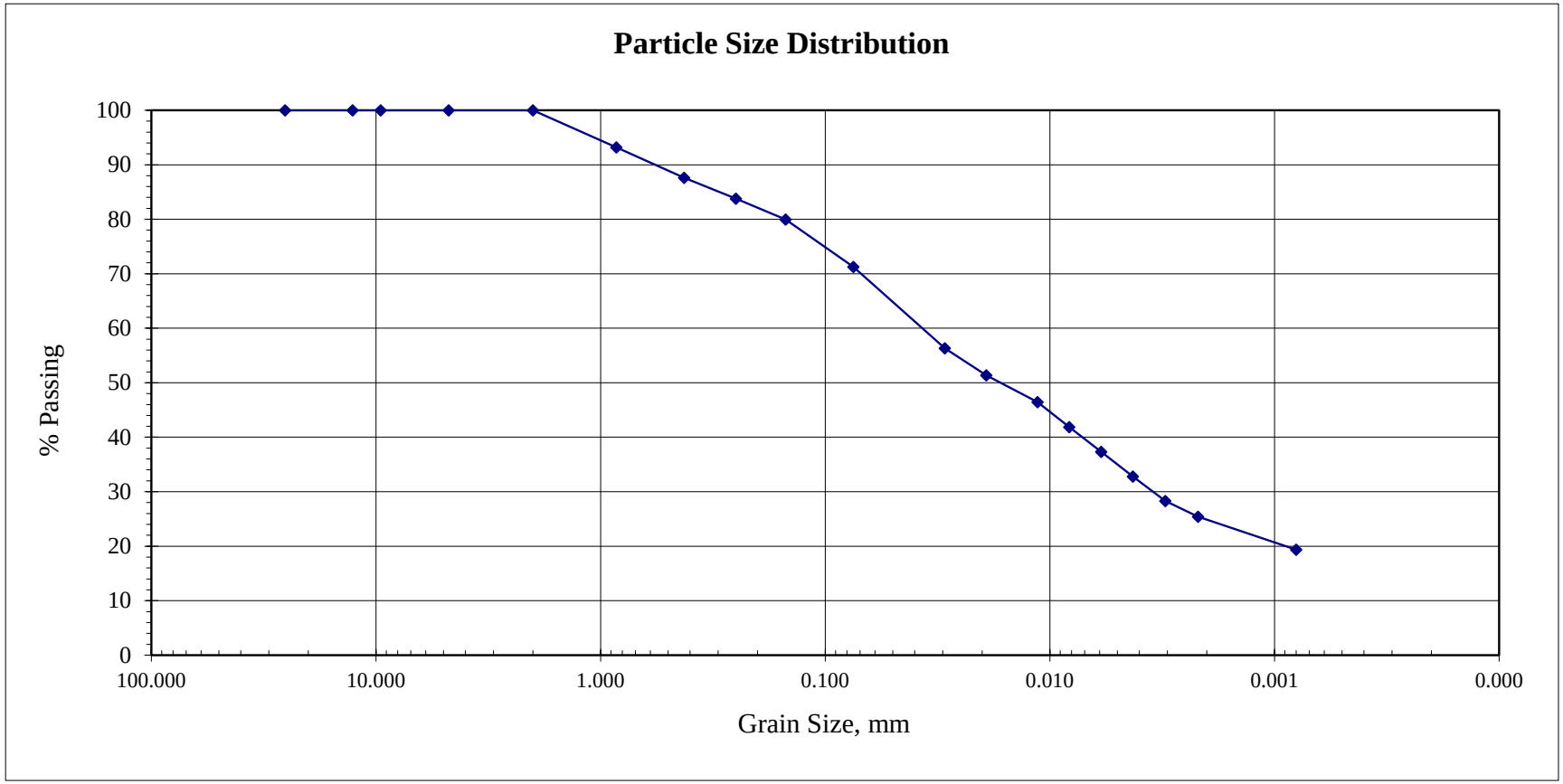
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	100
No.20	0.85	93
No.40	0.425	88
No.60	0.250	84
No.100	0.150	80
No.200	0.075	71
Hydrometer Analysis	0.0294	56
	0.0192	51
	0.0113	46
	0.0082	42
	0.0059	37
	0.0043	33
	0.0031	28
	0.0022	25
	0.0009	19

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	12
Fine Sand	0.075 to 0.43	16
Silt	0.005 to 0.075	36
Clay	<0.005	35

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	MW-6	**Tested by:**	SLY 5/24/22
Sample Number:	SS-9	**Calculated by:**	SLY 5/26/22
Sample Depth:	18.5 - 18.7	**Checked by:**	AD 5/26/22
Visual Description:	Gray, weathered SHALE		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	Pit-1	**Tested by:**	SLY 11/21/2021
Sample Number:	GB-1	**Calculated by:**	SLY 11/24/2021
Sample Depth:	1.0-1.5	**Checked by:**	AD 11/30/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		

Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	99
No.4	4.75	98
No.10	2.00	97
No.20	0.85	94
No.40	0.425	93
No.60	0.250	92
No.100	0.150	91
No.200	0.075	90
Hydrometer Analysis	0.0293	59
	0.0200	46
	0.0123	33
	0.0089	28
	0.0064	25
	0.0046	22
	0.0033	20
	0.0023	20
	0.0013	18

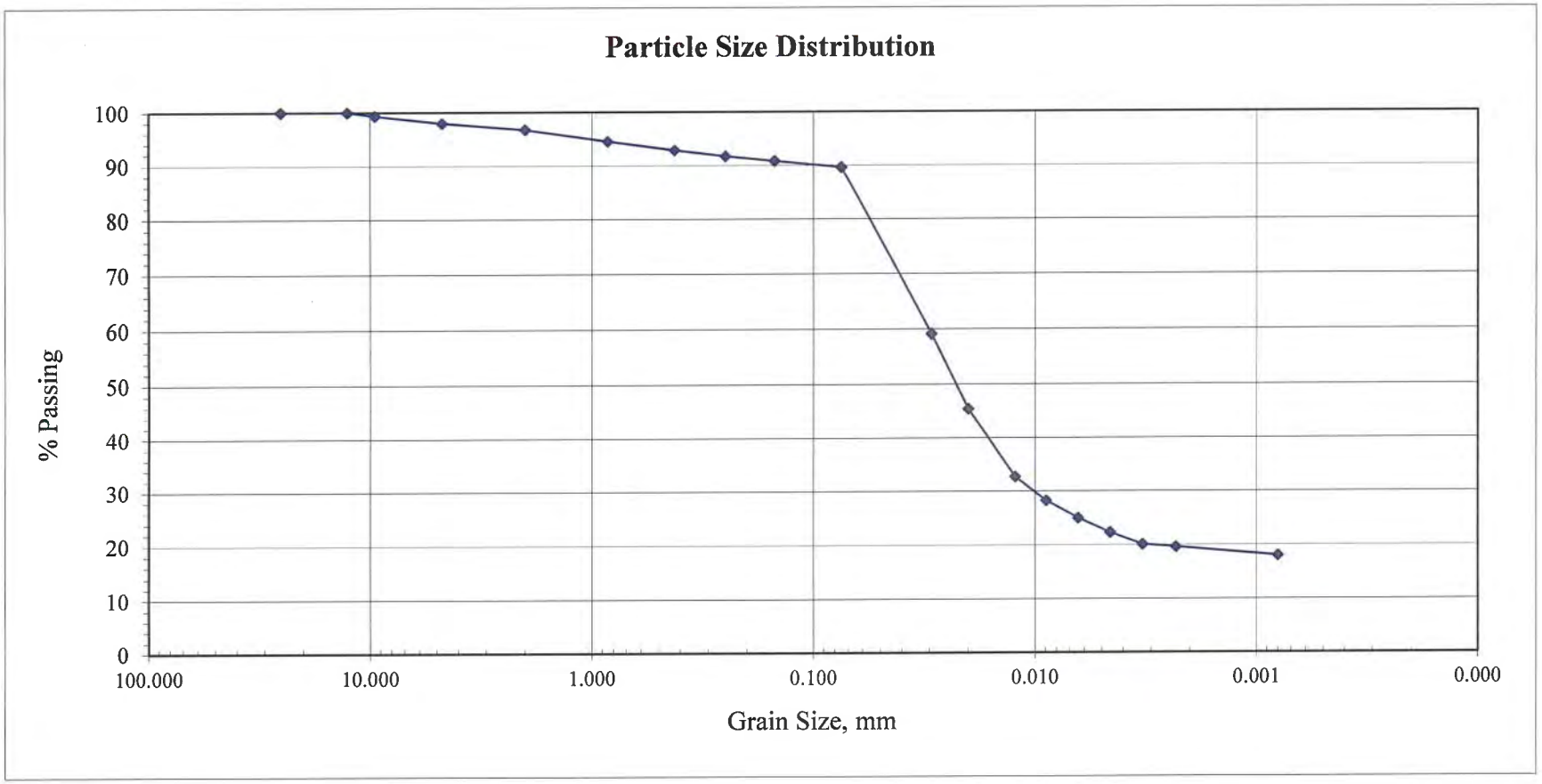
Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	2
Coarse Sand	2.00 to 4.75	1
Medium Sand	0.43 to 2.00	4
Fine Sand	0.075 to 0.43	3
Silt	0.005 to 0.075	67
Clay	<0.005	23

TSi Geotechnical, Inc.

HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	Pit-1	**Tested by:**	SLY 11/21/2021
Sample Number:	GB-1	**Calculated by:**	SLY 11/24/2021
Sample Depth:	1.0-1.5	**Checked by:**	AD 11/30/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	Pit-1	**Tested by:**	SLY 11/19/2021
Sample Number:	GB-2	**Calculated by:**	SLY 11/29/2021
Sample Depth:	3.0-3.5	**Checked by:**	AD 11/30/2021
Visual Description:	FILL: Brown, lean CLAY (CL); with sand, trace gravel		

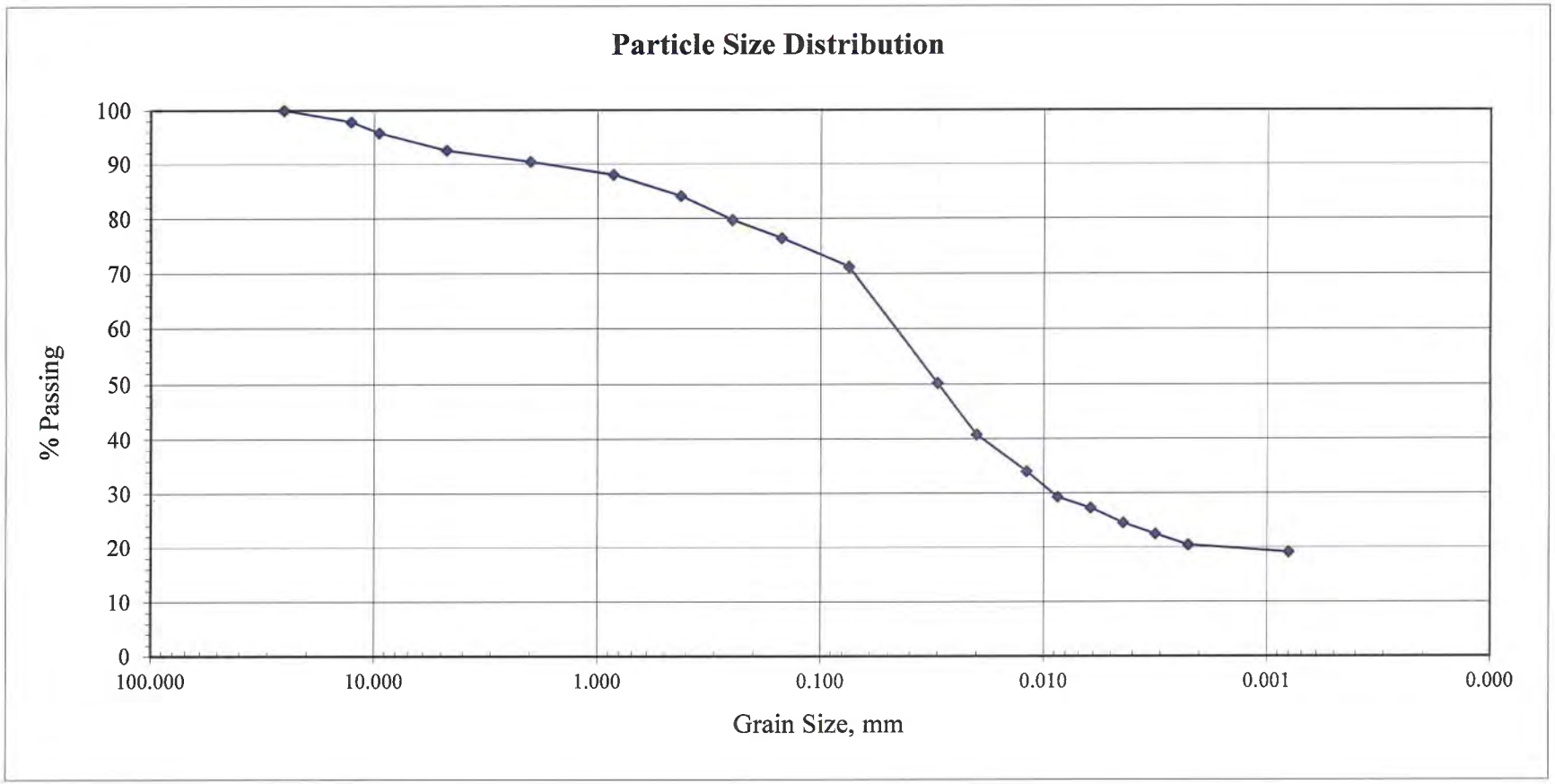
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	98
3/8"	9.53	96
No.4	4.75	93
No.10	2.00	90
No.20	0.85	88
No.40	0.425	84
No.60	0.250	80
No.100	0.150	76
No.200	0.075	71
Hydrometer Analysis	0.0300	50
	0.0200	41
	0.0120	34
	0.0087	29
	0.0062	27
	0.0044	24
	0.0032	22
	0.0023	20
	0.0013	19

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	7
Coarse Sand	2.00 to 4.75	2
Medium Sand	0.43 to 2.00	6
Fine Sand	0.075 to 0.43	13
Silt	0.005 to 0.075	46
Clay	<0.005	25

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	Pit-1	**Tested by:**	SLY 11/19/2021
Sample Number:	GB-2	**Calculated by:**	SLY 11/29/2021
Sample Depth:	3.0-3.5	**Checked by:**	AD 11/30/2021
Visual Description:	FILL: Brown, lean CLAY (CL); with sand, trace gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	Pit 2	**Tested by:**	SLY 11/17/2021
Sample Number:	GB-1	**Calculated by:**	SLY 11/19/2021
Sample Depth:	1.0-1.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		

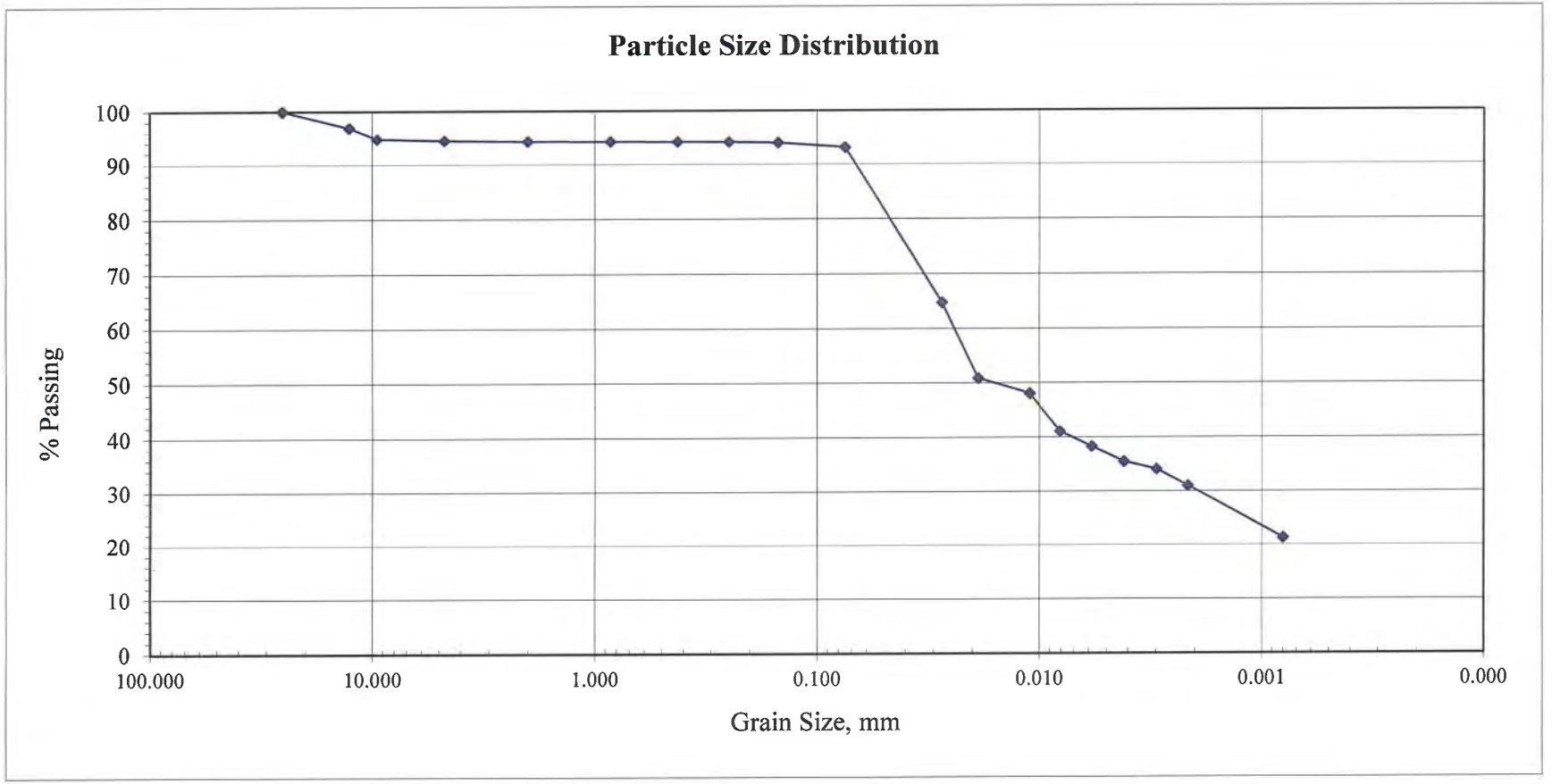
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	97
3/8"	9.53	95
No.4	4.75	94
No.10	2.00	94
No.20	0.85	94
No.40	0.425	94
No.60	0.250	94
No.100	0.150	94
No.200	0.075	93
Hydrometer Analysis	0.0274	65
	0.0189	51
	0.0110	48
	0.0081	41
	0.0058	38
	0.0042	36
	0.0030	34
	0.0021	31
	0.0013	21

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	6
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	56
Clay	<0.005	37

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	Pit 2	**Tested by:**	SLY 11/17/2021
Sample Number:	GB-1	**Calculated by:**	SLY 11/19/2021
Sample Depth:	1.0-1.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown, lean CLAY (CL); trace sand and gravel		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	Pit 2	**Tested by:**	SLY 11/17/2021
Sample Number:	GB-2	**Calculated by:**	SLY 11/19/2021
Sample Depth:	3.0-3.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown and gray, lean CLAY (CL), trace sand		

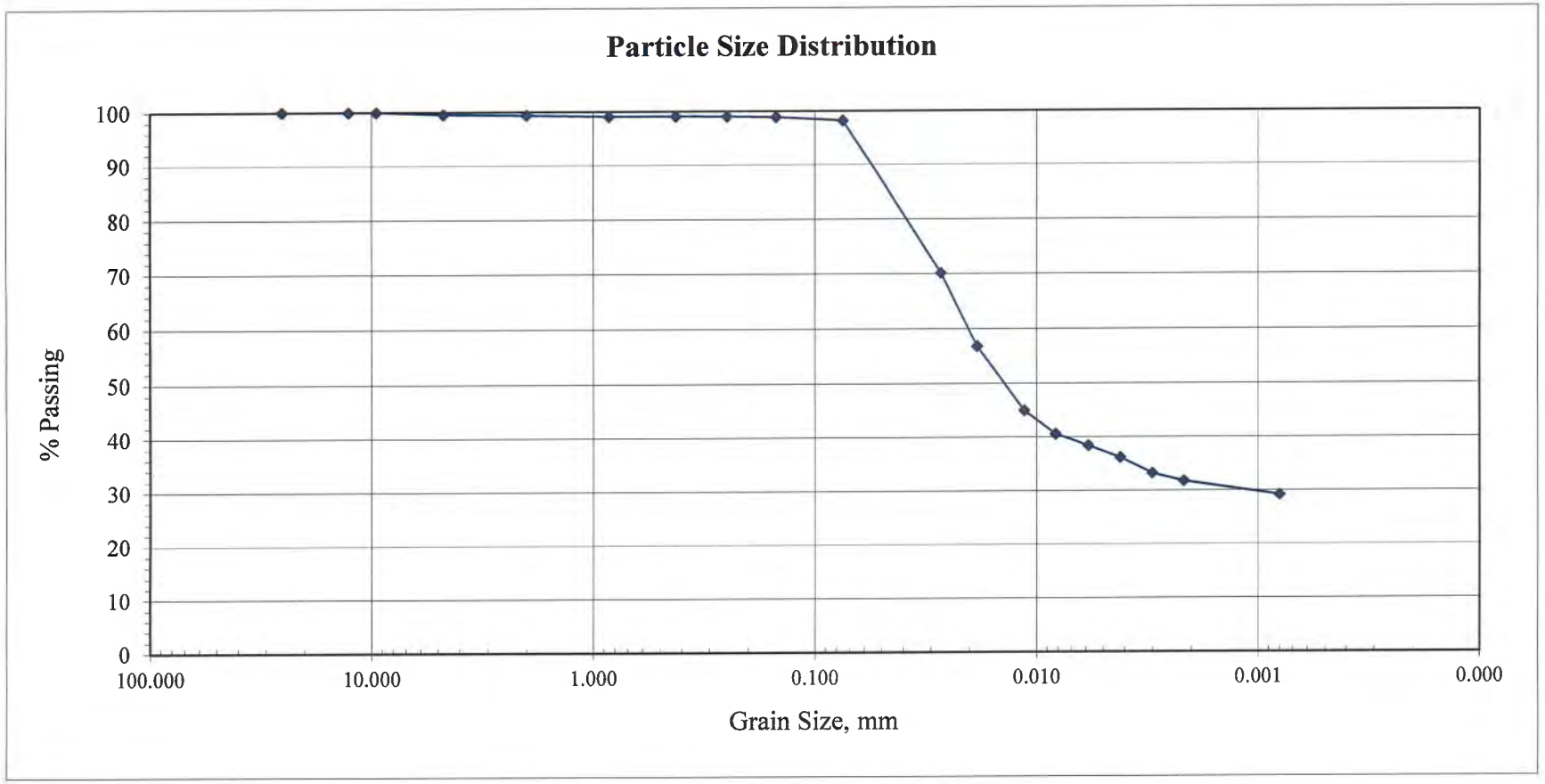
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	100
No.10	2.00	99
No.20	0.85	99
No.40	0.425	99
No.60	0.250	99
No.100	0.150	99
No.200	0.075	98
Hydrometer Analysis	0.0271	70
	0.0186	57
	0.0114	45
	0.0082	41
	0.0058	38
	0.0042	36
	0.0030	33
	0.0022	32
	0.0013	29

Particle Size Description
Unified Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	0
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	61
Clay	<0.005	37

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	Pit 2	**Tested by:**	SLY 11/17/2021
Sample Number:	GB-2	**Calculated by:**	SLY 11/19/2021
Sample Depth:	3.0-3.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown and gray, lean CLAY (CL), trace sand		



TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	Pit 2	**Tested by:**	SLY 11/17/2021
Sample Number:	GB-3	**Calculated by:**	SLY 11/19/2021
Sample Depth:	5.0-5.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown and gray, lean CLAY (CL); trace sand and gravel		

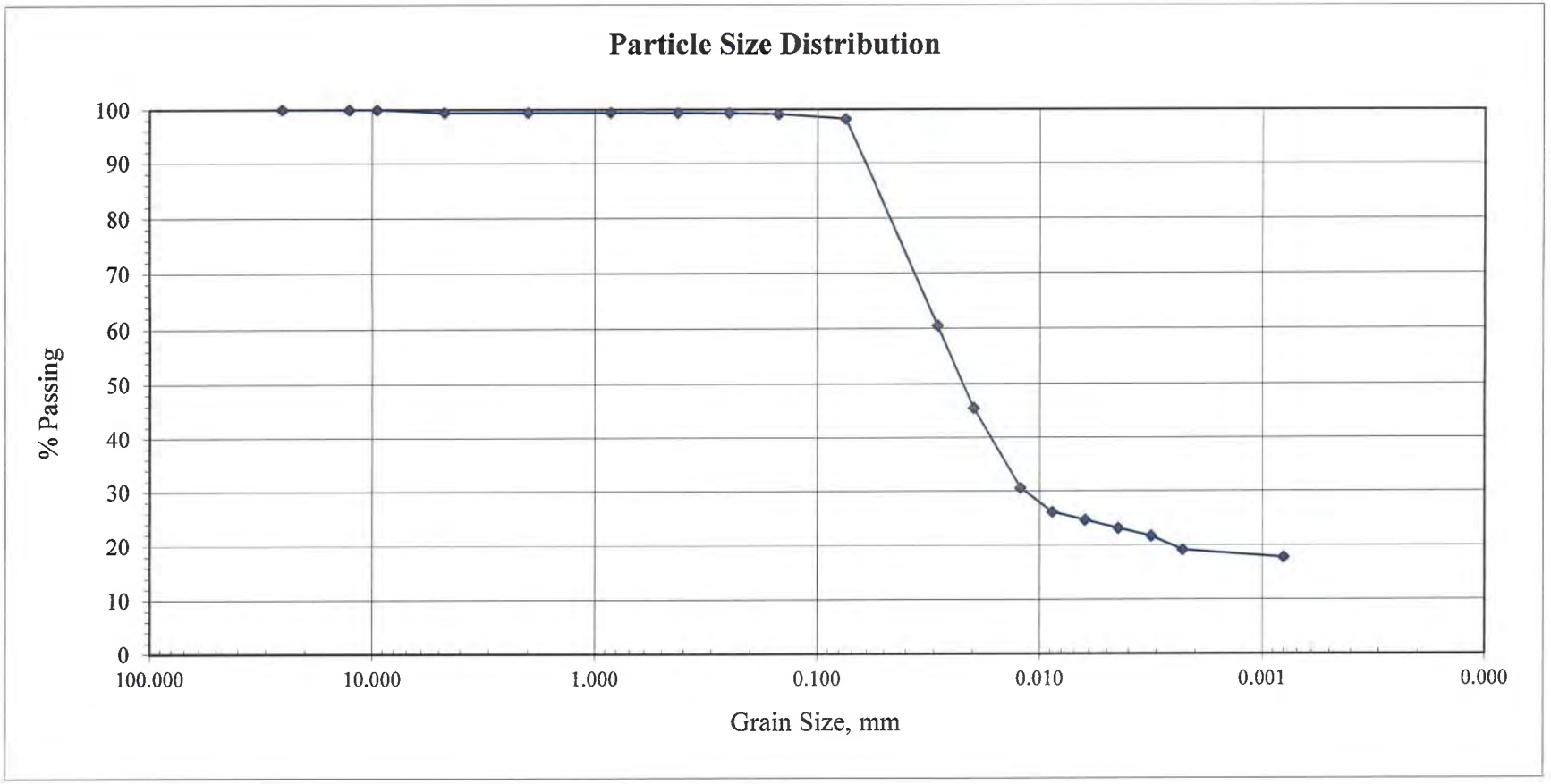
Sieve	Particle Size, mm	Percent Finer
1"	25.40	100
1/2"	12.70	100
3/8"	9.53	100
No.4	4.75	99
No.10	2.00	99
No.20	0.85	99
No.40	0.425	99
No.60	0.250	99
No.100	0.150	99
No.200	0.075	98
Hydrometer Analysis	0.0289	61
	0.0198	46
	0.0122	31
	0.0088	26
	0.0063	25
	0.0044	23
	0.0032	22
	0.0023	19
	0.0013	18

Particle Size Description
Soil Classification System

Particle	Size Range, mm	Percent of Specimen
Gravel	4.75 to 76.4	1
Coarse Sand	2.00 to 4.75	0
Medium Sand	0.43 to 2.00	0
Fine Sand	0.075 to 0.43	1
Silt	0.005 to 0.075	75
Clay	<0.005	24

TSi Geotechnical, Inc.
HYDROMETER ANALYSIS (ASTM D422)

Project Name:	Mill Creek Park	**Project Number:**	20212037.00
Boring Number:	Pit 2	**Tested by:**	SLY 11/17/2021
Sample Number:	GB-3	**Calculated by:**	SLY 11/19/2021
Sample Depth:	5.0-5.5	**Checked by:**	AD 11/22/2021
Visual Description:	FILL: Brown and gray, lean CLAY (CL); trace sand and gravel		



APPENDIX D

Project: Piezometer Water Readings
Mill Creek Park Green Infrastructure Groundwater Investigation
Kansas City, Missouri
20212037.00

MW-1				MW-2			
Date	Time	Water Level below ground (ft.)	Remarks	Date	Time	Water Level below ground (ft.)	Remarks
10/11/2021	12:30	0.15'	post-rainfall measurement	10/11/2021	12:35	8.96'	post-rainfall measurement
10/13/2021	10:53	0.04'	post-rainfall measurement	10/13/2021	10:40	7.93'	post-rainfall measurement
10/20/2021	8:19	1.81'	weekly measurement	10/20/2021	8:16	7.05'	weekly measurement
10/25/2021	8:20	1.85'	post-rainfall measurement	10/25/2021	8:29	7.18'	post-rainfall measurement
10/28/2021	9:04	1.2'	post-rainfall measurement	10/28/2021	10:52	7.0'	post-rainfall measurement
10/29/2021	8:44	0.25'	post-rainfall measurement	10/29/2021	9:04	6.94'	post-rainfall measurement
11/5/2021	12:23	1.51'	weekly measurement	11/5/2021	NA	NA	Well Destroyed
11/11/2021	18:38	0.62'	post-rainfall measurement	11/11/2021	NA	NA	Well Destroyed
11/17/2021	12:35	1.71'	weekly measurement	11/17/2021	NA	NA	Well Destroyed
11/26/2021	13:38	1.80'	weekly measurement	11/26/2021	NA	NA	Well Destroyed
12/3/2021	18:04	1.80'	weekly measurement	12/3/2021	NA	NA	Well Destroyed
12/8/2021	10:40	1.85	measured by HDR prior to slug test	12/8/2021	NA	NA	Well Destroyed
12/17/2021	15:18	1.76	weekly measurement	12/17/2021	NA	NA	Well Destroyed
12/22/2021	14:30	1.9	weekly measurement	12/22/2021	NA	NA	Well Destroyed
5/6/2022	20:10	0.5	post-rainfall measurement	5/6/2022	20:28	5.8	post-rainfall measurement
5/13/2022	13:17	1.5	post-rainfall measurement	5/13/2022	13:26	5.6	post-rainfall measurement
5/18/2022	12:02	1.23	post-rainfall measurement	5/18/2022	11:47	5.74	post-rainfall measurement
5/24/2022	12:57	1.87	post-rainfall measurement	5/24/2022	14:10	6.09	post-rainfall measurement
6/1/2022	16:25	0	post-rainfall measurement	6/1/2022	16:38	4.4	post-rainfall measurement
6/8/2022	16:42	0.9	post-rainfall measurement	6/8/2022	16:52	5.1	post-rainfall measurement
6/18/2022	9:56	2.1	weekly measurement	6/18/2022	10:04	6.4	weekly measurement
6/24/2022	17:11	2.2	post-rainfall measurement	6/24/2022	17:24	6.7	post-rainfall measurement
7/7/2022	12:02	2.6	weekly measurement	7/7/2022	12:47	7.1	weekly measurement
7/15/2022	7:54	2.8	weekly measurement	7/15/2022	8:12	7.4	weekly measurement
7/22/2022	10:38	3.2	weekly measurement	7/22/2022	10:48	7.7	weekly measurement
7/26/2022	16:06	3	post-rainfall measurement	7/26/2022	16:25	7.8	post-rainfall measurement

Project: Piezometer Water Readings
Mill Creek Park Green Infrastructure Groundwater Investigation
Kansas City, Missouri
20212037.00

MW-3				MW-4			
Date	Time	Water Level below ground (ft.)	Remarks	Date	Time	Water Level below ground (ft.)	Remarks
10/11/2021	12:40	7.71'	post-rainfall measurement	5/6/2022	19:38	5.85	post-rainfall measurement
10/13/2021	10:20	6.17'	post-rainfall measurement	5/13/2022	12:46	6.0	post-rainfall measurement
10/20/2021	8:11	7.94'	weekly measurement	5/18/2022	11:05	5.97	post-rainfall measurement
10/25/2021	8:34	8.26'	post-rainfall measurement	5/24/2022	12:23	6.16	post-rainfall measurement
10/28/2021	11:03	7.65'	post-rainfall measurement	6/1/2022	15:51	4.7	post-rainfall measurement
10/29/2021	9:14	6.05'	post-rainfall measurement	6/8/2022	16:18	5.6	post-rainfall measurement
11/5/2021	13:07	6.4'	weekly measurement	6/18/2022	9:38	6.4	weekly measurement
11/11/2021	NA	NA	Well Covered by Construction Activity	6/24/2022	16:44	6.5	post-rainfall measurement
11/17/2021	12:05	7.11'	weekly measurement	7/7/2022	12:02	7.1	weekly measurement
11/26/2021	13:26	7.31'	weekly measurement	7/15/2022	7:32	7.3	weekly measurement
12/3/2021	17:57	7.52'	weekly measurement	7/22/2022	10:18	7.8	weekly measurement
12/8/2021	11:17	7.13	weekly measurement	7/26/2022	15:45	7.7	post-rainfall measurement
12/17/2021	15:30	7.25	weekly measurement				
12/22/2021	14:40	7.35	weekly measurement				
5/6/2022	20:39	5.97	post-rainfall measurement				
5/13/2022	13:31	6.4	post-rainfall measurement				
5/18/2022	11:38	6.44	post-rainfall measurement				
5/24/2022	14:17	6.52	post-rainfall measurement				
6/1/2022	16:44	6.5	post-rainfall measurement				
6/8/2022	16:58	6.2	post-rainfall measurement				
6/18/2022	10:09	7.5	weekly measurement				
6/24/2022	17:31	7.4	post-rainfall measurement				
7/7/2022	11:54	7.5	weekly measurement				
7/15/2022	8:26	7.6	weekly measurement				
7/22/2022	10:53	7.9	weekly measurement				
7/26/2022	16:33	8	post-rainfall measurement				

Project: Piezometer Water Readings
Mill Creek Park Green Infrastructure Groundwater Investigation
Kansas City, Missouri
20212037.00

MW-5				MW-6			
Date	Time	Water Level below ground (ft.)	Remarks	Date	Time	Water Level below ground (ft.)	Remarks
5/6/2022	19:47	4.35	post-rainfall measurement	5/6/2022	19:38	5.85	post-rainfall measurement
5/13/2022	12:55	4.7	post-rainfall measurement	5/13/2022	12:46	6.0	post-rainfall measurement
5/18/2022	11:14	4.69	post-rainfall measurement	5/18/2022	11:05	5.97	post-rainfall measurement
5/24/2022	12:33	4.97	post-rainfall measurement	5/24/2022	12:23	6.16	post-rainfall measurement
6/1/2022	16:10	1.8	post-rainfall measurement	6/1/2022	15:51	4.7	post-rainfall measurement
6/8/2022	16:28	4.7	post-rainfall measurement	6/8/2022	16:18	5.6	post-rainfall measurement
6/18/2022	9:44	5.3	weekly measurement	6/18/2022	9:38	6.4	weekly measurement
6/24/2022	4:56	5.6	post-rainfall measurement	6/24/2022	16:44	6.5	post-rainfall measurement
7/7/2022	12:10	6.1	weekly measurement	7/7/2022	12:02	7.1	weekly measurement
7/15/2022	7:39	6.4	weekly measurement	7/15/2022	7:32	7.3	weekly measurement
7/22/2022	10:26	6.8	weekly measurement	7/22/2022	10:18	7.8	weekly measurement
7/26/2022	15:53	6.8	post-rainfall measurement	7/26/2022	15:45	7.7	post-rainfall measurement

Project: Piezometer Water Readings
Mill Creek Park Green Infrastructure Groundwater Investigation
Kansas City, Missouri
20212037.00

PIT-1				PIT-2			
Date	Time	Water Level below ground (ft.)	Remarks	Date	Time	Water Level below ground (ft.)	Remarks
-	-	-	-	-	-	-	-
10/13/2021	10:33	3.34'	post-rainfall measurement	10/13/2021	10:25	1.49'	post-rainfall measurement
10/19/2021	8:05	2.29'	Infiltration test	10/19/2021	8:10	0.517'	Infiltration test
10/25/2021	8:25	DRY	post-rainfall measurement	10/25/2021	8:37	2.44'	post-rainfall measurement
10/28/2021	10:40	DRY	post-rainfall measurement	10/28/2021	11:13	1.86'	post-rainfall measurement
10/29/2021	8:54	3.24'	post-rainfall measurement	10/29/2021	9:20	1.08'	post-rainfall measurement
11/5/2021	12:31	DRY	weekly measurement	11/5/2021	12:52	2.17'	weekly mesurement
11/11/2021	18:28	3.11'	post-rainfall measurement	11/11/2021	18:18	1.66'	post-rainfall measurement
11/17/2021	12:27	DRY	weekly measurement	11/17/2021	12:13	1.66'	weekly mesurement
11/26/2021	13:34	DRY	weekly measurement	11/26/2021	13:29	2.29'	weekly mesurement
12/3/2021	18:06	DRY	weekly measurement	12/3/2021	18:01	2.39'	weekly mesurement
12/8/2021	11:08	DRY	weekly measurement	12/8/2021	11:12	2.39	weekly measurement
12/17/2021	15:23	DRY	weekly measurement	12/17/2021	15:45	2.31	weekly measurement
12/22/2021	14:34	DRY	weekly measurement	12/22/2021	14:45	2.4	weekly measurement
5/6/2022	20:06	2.3	post-rainfall measurement	5/6/2022	20:25	1.58	post-rainfall measurement
5/13/2022	13:13	2.1	post-rainfall measurement	5/13/2022	13:40	2.4	post-rainfall measurement
5/18/2022	12:14	2.45	post-rainfall measurement	5/18/2022	12:27	2.39	post-rainfall measurement
5/24/2022	13:07	2.54	post-rainfall measurement	5/24/2022	14:21	2.48	post-rainfall measurement
6/1/2022	16:28	1.3	post-rainfall measurement	6/1/2022	16:50	0.7	post-rainfall measurement
6/8/2022	16:48	2.1	post-rainfall measurement	6/8/2022	15:04	2.2	post-rainfall measurement
6/18/2022	10:00	DRY	weekly measurement	6/18/2022	10:13	2.5	weekly measurement
6/24/2022	17:18	3.4	post-rainfall measurement	6/24/2022	17:35	2.5	post-rainfall measurement
7/7/2022	12:42	DRY	weekly measurement	7/7/2022	13:40	2.5	weekly measurement
7/15/2022	7:59	DRY	weekly measurement	8:21	8:21	2.7	weekly measurement
7/22/2022	10:43	DRY	weekly measurement	7/22/2022	11:03	3	weekly measurement
7/26/2022	16:10	DRY	post-rainfall measurement	7/26/2022	16:39	2.6	post-rainfall measurement